

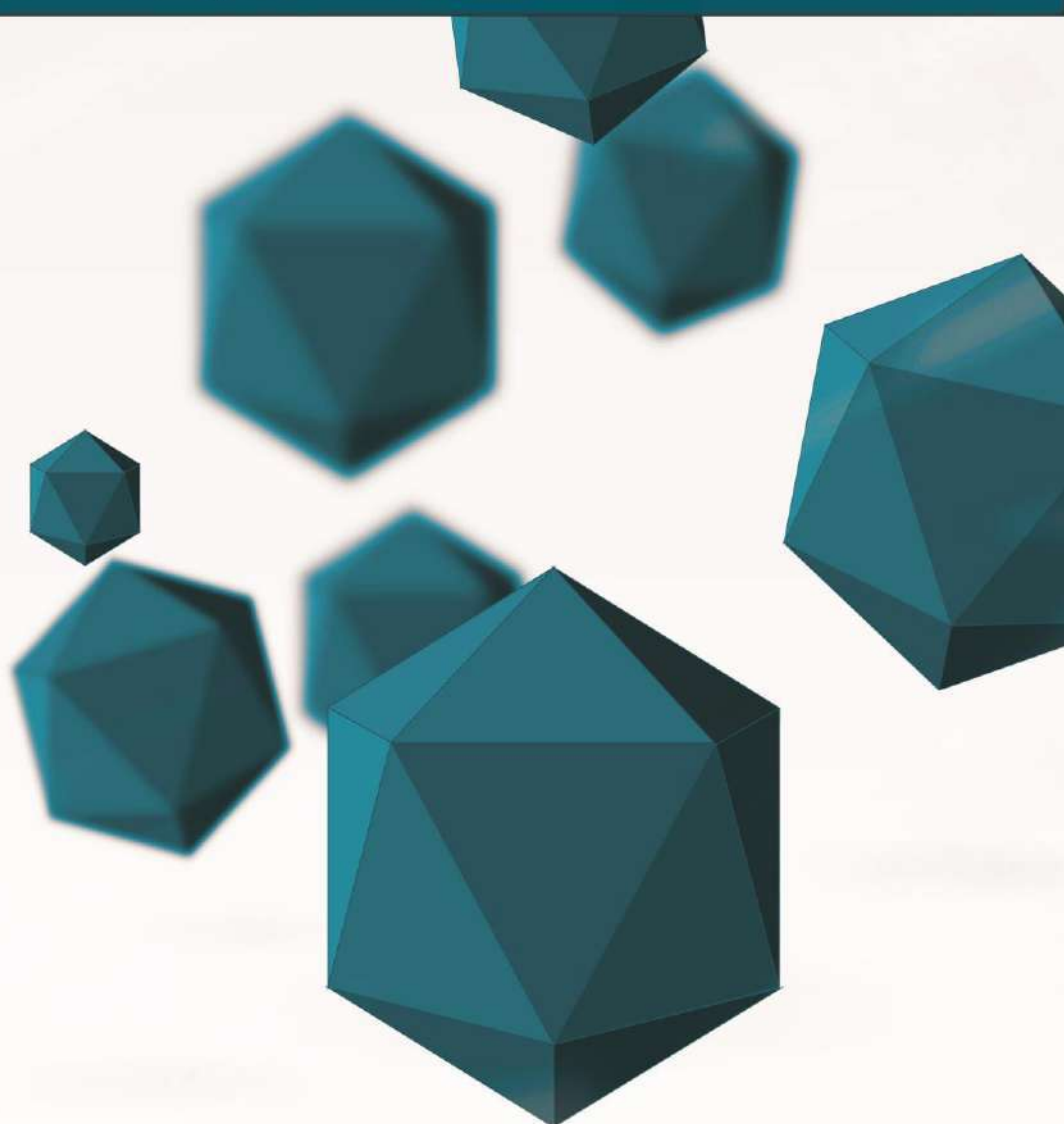
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FOREWORD

I am pleased to put into the hands of readers Volume-7; Issue-3: 2020 (Mar, 2020) of **“International Journal of Advanced Engineering Research and Science (IJAERS) (ISSN: 2349-6495(P) | 2456-1908(O)”** , an international journal which publishes peer-reviewed quality research papers on a wide variety of topics related to Science, Technology, Management and Humanities. Looking to the keen interest shown by the authors and readers, the editorial board has decided to release print issue also, but this decision the journal issue will be available in various library also in print and online version. This will motivate authors for quick publication of their research papers. Even with these changes our objective remains the same, that is, to encourage young researchers and academicians to think innovatively and share their research findings with others for the betterment of mankind. This journal has DOI (Digital Object Identifier) also, this will improve citation of research papers. Now journal has also been indexed in **Qualis (Interdisciplinary Area) (Brazilian system for the evaluation of periodicals, maintained by CAPES)**.

I thank all the authors of the research papers for contributing their scholarly articles. Despite many challenges, the entire editorial board has worked tirelessly and helped me to bring out this issue of the journal well in time. They all deserve my heartfelt thanks.

Finally, I hope the readers will make good use of this valuable research material and continue to contribute their research finding for publication in this journal. Constructive comments and suggestions from our readers are welcome for further improvement of the quality and usefulness of the journal.

With warm regards.

Dr. Swapnesh Taterh

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Challenges in medication administration by gavage in the intensive care unit: A literature review

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Abstract—Introduction: Enteral nutrition therapy and a key therapeutic option in the care for hospitalized patients. The route intended for enteral nutrition (NE) is also used for drug administration. It is suggested that the administration of drugs in this way needs to be monitored, aiming to improve the therapeutic results. Objective: To discuss the main challenges in medication administration by gavage in the Intensive Care Unit. Material and Methods: We performed a literature review searched the electronic databases Medline, Bireme, Lilacs, and Scielo, including national and international recent articles, the keywords used were: "enteral nutrition", "Intensive Care Units" and "Therapy Nutrition ". It was given preference for articles published between the years 2005 and 2014 looking always prioritize the most current jobs. Results: The results showed that errors in the administration of high surveillance medications are associated with the prescription, transcription, handling, route of administration, dosage form and the technique used. In case of errors can cause permanent damage leading to death. Adopt policies, guidelines, clinical protocols, training and training of the teams, are some alternatives that need to be used by healthcare organizations. Final thoughts: Therefore reduce and prevent mistakes and seek strategies to ensure quality and safety should be part of the daily work process responsible for health professionals, particularly pharmacists.

Keywords—Enteral nutrition, Intensive Care Units, Nutritional Therapy.

I. INTRODUCTION

In Health Care Services, the Intensive Care Unit (ICU) is established as a center for continuous monitoring of patients in serious condition, with decompensation of one or more organ systems, where there is a probability of restoring homeostasis, through highly technical support and intensive treatment by the specialized multidisciplinary team.¹ In the ICU it is common for patients unable to receive medications orally, having the option to receive the oral drug therapy prescribed through probes inserted inside the gastrointestinal tract.²⁻³⁻⁴

In daily practice with patients receiving enteral nutrition (NE) by probes, the technique for administering oral medicines basically consists of crushing tablets or opening capsules and dissolving the contents in water for later Administration. Controlled releasing solid medicines

with coating or gelatinous capsules may happen to be crushed, and it is possible that the pharmacological properties of the drug are not guaranteed.⁵⁻⁶

With this, appropriate drug presentations to patients with swallowing difficulties can become a challenge in clinical practice.⁷⁻⁸⁻⁹

Other complications can also happen, such as tube obstruction and the interaction between drugs and nutrients from enteral nutrition.³ It is estimated that the best way to avoid obstruction is the use of liquid forms of the drug, such as solution, suspension or master formulas. Obstructions can lead to the need to exchange the probe, increase nursing workload, decrease quality inpatient care, loss of medication administration, reduction of nutrients ingested, increase cost and increase patient's anxiety

status¹⁰⁻¹¹. Although responsibility for the administration of drugs by the probe is primarily of the nursing team⁸, all professionals involved in patient care need to be careful to avoid efficacy problems, promoting interventions that improvements aimed at patient

safety¹². In this sense, the performance of the clinical pharmacist also improves the safety of care provided to the patient¹³.

The pharmacist is the professional graduated to suggest the most effective management regimen, with the least probability of interference, be it chemical, therapeutic, physicochemical or physical. It is difficult to prevent the results of the simultaneous administration of enteral nutrition and drugs by the probe, which highlights the essential importance of pharmacists in monitoring the appropriate administration of these drugs and monitoring their effectiveness¹⁴. As for example, pharmaceutical interventions carried out in the ICU of HUOL (University Hospital Onofre Lopes - Natal RN) that seeks to standardize procedures, together with the multidisciplinary team, in order to reduce the effects of drug/food interactions on patients fed via enteral nutrition probe (PNE)¹⁵.

In order to avoid such problems, before the use of drugs, a pharmacological and pharmacological analysis is required. Therefore, this approach is prevented in clinical practice due to the insufficiency of information found in the literature on this theme, as well as in the specifications of drug manufacturers.³

Thus, this study aimed to discuss the main challenges in the administration of drugs by a probe in the Intensive Care Unit.

II. MATERIALS AND METHODS

To perform this research, a search was conducted in the scientific literature of the main problems related to the administration of drugs by a probe in patients in the Intensive Care Unit. For this, it was used by scientific journals, published preferably from 2005 to 2014 obtained through the Bireme databases (Regional Library of Medicine), Scielo (Scientific Electronic Library Online), Lilacs (Literature Latin American and the Caribbean in Health Sciences) and Google Scholar. The descriptors used were: "Enteral nutrition", "Intensive Care Units" and "Nutritional Therapy". This work was not submitted to the Research Ethics Committee because it is a literature review.

III. RESULTS AND DISCUSSION

Enteral nutritional therapy is administered through NES, nasogastric tube (SNG) or ostomy.¹⁶ However, these devices are not specific for the administration of enteral nutrition because they are commonly also used for drug administration¹⁵.

In the care context of intensive care, one factor that needs attention is the administration of probe drugs to patients in NE therapy. increased adverse effects or incompatibility of the drug with NE components.¹

In the study by Martins et al.,¹ in a teaching hospital it was verified that of the 909 medicines intended for oral administration, 806 (88.8%) were prescribed for administration via nutrition probe. Regarding the type of probe that patients used during hospitalization another study, it was found that 78.26% of the drugs were administered by SNG and 21.74% by NeS². However, Carvalho et al.,¹⁷ demonstrated that 55.4% of the patients had NES and 44.6 % with SNG.

In the lima and negrini³ research, the data obtained regarding the problems associated with the administration of drugs via enteral probe were divided into alteration of drug pharmacokinetics (38); damage to the TGI (9); obstruction of the probe (40); drug-nutrient interaction (7); biological risk (5) and without information (33). Thus totaling 132 possible problems with the administration of medicines in this way. The management and care related to the probe are extremely significant since they can influence the time of its use and, as a result, its durability. If the drugs administered by the probe are adequately crushed and, after each administration, the probe is washed, there are greater possibilities for it to be stored in an appropriate state for a longer period of time.¹⁸

In a survey with critically ill patients, it was observed that 57% of patients with nasogastric positioned probe and 24% of those with a gastrojejunal positioned probe had gastrointestinal complications¹⁸. For Carvalho et al.,¹⁷ in relation to the location of the probe, it is perceived that the more distal in the small intestine, the lower the frequency of episodes of gastroesophageal regurgitation, duodenogastric reflux and pulmonary microaspiration, and the diet is in the distal intestine capable of preventing this type of complication.

Hence the importance of investigating in which portion of the gastrointestinal tract (stomach or intestine) the drug

has its highest absorption rate, thus verifying whether the position of the probe contributes or impairs its absorption.⁸ In a few cases,

there was confirmation by methods proper to the positioning of the probe. This becomes critical when we know that there are changes in the absorption of the drug when it is released in different anatomical sites.³

Obstruction of the nasoenteral tube is also part of mechanical complications, managing to be associated with the retention of enteral formula residues in its lumen, due to the formation of insoluble formula-drug complexes; of high osmolarity; tablets mislabeled and injected by the probe and precipitation of the formula due to the acidity of gastric content¹¹.

Gorzoni, Torre and Pires,⁷ found in their research some solid medicines unfit for use in probes, such as lactulose, captopril, phenytoin, ranitidine, omeprazole, complex B, folic acid, tramadol, bromoprida and nifedipine. Alternative presentations were found for 15 (65.2%) of the 23 drugs unfit by this route.

In the research by Carvalho et al.,¹⁷ the solid pharmaceutical form was used in most drug prescriptions. Liquid forms had a low prevalence of use, only 16% of patients' prescriptions.

In the work of Martins et al.,¹ 572 prescriptions were analyzed, which contained 5,283 medications. Of these, 909 (17.2%) were oral medications, which could be classified into two distinct pharmaceutical forms: 551 (60.61%) solid and 358 (36.52%) Net. Hoefl and Vidal⁹ found 52 different drugs administered by probes in their research, 47 of which in solid form (92%) with a prevalence of simple tablets.

In Brazil, Heydrich¹⁴ showed the prevalence of enteral therapy in a hospital unit that was 12.4%, where 95% of patients received some solid oral drug to be administered by the probe.

According to Carvalho et al.,¹⁷ the frequency of prescription of drugs orally in patients admitted to ICUs was low in relation to the other routes of administration. Therefore, with regard to drugs for oral administration, there was a predominance of the solid pharmaceutical form, which frames with data found in the literature.

According to Lima and Negrini³, solid pharmaceutical forms had a high prevalence (above 80%) of use in this

study, similarly to that verified by other studies already mentioned, therefore, this fact is conflicting with the information in the literature that recommend so-called liquid pharmaceutical forms as preferred.

According to Heydrich¹⁴ and Phillips and Nay¹⁹, there are several solid drugs with liquid pharmaceutical choices. Despite this, the amount of prescriptions of solid shapes by the probe continues to grow. However, the lack of knowledge of the prescriber in relation to existing standardization or regarding the loss of effect of the use of solids via enteral can be analyzed.

When manipulating medicines for administration by probes, it is necessary to be aware that liquid pharmaceutical forms are the most appropriate, because they are easily absorbed and cause little obstruction. Although they are the most appropriate, liquid forms also present limitations, such as problems associated with viscosity, osmolarity and excipients contained in the formulations, especially sorbitol, which increases the risk of intolerance of the tract Gastrointestinal.⁶

However, the use of liquid formulas does not solve problems related to errors in nutrition. In the Lisbon, Silva and Matos research,⁶ errors were found related to dilution with medications in liquid form and all referred to the fact that the technician did not dilute the liquid medication. This mistake focused on emulsions and syrups. In the first group was mineral oil and in the second, lactulose and potassium chloride.

Nutritional therapy is not simple, in addition to obstructions, medications should be analyzed singularly as the need for fasting, medications with restrictions of use and possible interactions. As noted in the Lisbon, Silva and Matos research,⁶ among the administration of medicines that required relative fasting and enteral diet infusion, there was no pause in 116 doses of medicines (33.14%), with captopril, sodium warfarin, sodium levothyroxine, digoxin and sodium phenytoin.

According to Silva and Lisboa⁵, one of the frequent problems is the interaction of medicine /food, which can lead to changes in the expected therapeutic response. Carvalho et al.,¹⁷ found that of the drugs used, 33% were susceptible to interaction with nutrition. Lisbon, Silva and Matos⁶ also analyzed the possible interactions, where 48 varieties of medicines were found. For 17 medications (36%), there are data in the literature on their possible interactions with nutrients, while for three (6%), no available data was found and, in relation to 28

medications (58%), no information on interaction with nutrients was observed.

In the material selected by Silva and Lisboa⁵, some procedures are commented that can reduce interactions between drugs and NE, as well as: never administer medicines directly in the enteral nutrition formula; obstruct the administration of enteral nutrition at least 30 minutes before and after administration of medications; wash the probe with 15-30 ml of water before and after administration of any medicine and between drugs; do not associate two types or more of medicines in the dilution process; whenever possible, administer drugs in liquid form, a fact that avoids the need to modify the form of presentation of the drug as macerations of tablets.

Adaptations considered inadequate due to interaction with food according to Nunes et al.,¹⁵ included: nimodipine, captopril, propranolol, levothyroxine, warfarin, diltiazem, furosemide, phenytoin, rifampicin, calcium carbonate, paracetamol, pantoprazole and ivermectin.

Regarding drugs that have restrictions for nutrition probe administration, a better understanding of this information by the multidisciplinary team is imperative so that the choice for the use of these drugs by this route is appropriate and safe.¹

Another important aspect is that sometimes more than one drug is used at a time, and drug interactions may occur that intervene in therapy²⁰. A study revealed that in the administration of more than one drug at the same time, 68% of the interviewees administered them together, rather than separately, increasing the possibility of drug interactions. Approximately 15% crushed tablets with an enteric coating, altering the pharmacokinetics to which the drug proposes; 57% did not wash the probe before administration of the drug and may cause contamination and 19% did not consult the pharmacist about the availability of using liquid formulas²¹. Another study reports that 51% of the sample administers the drugs scheduled at the same time, and with the same syringe.⁸

Among solid medicines, the prevalent error was crushing, with the undue crushing of hard gelatin capsules (19.35%) and all release tablets controlled and coated. Insufficient milling errors (without turning thin powder) occurred with folic acid (73.33%), amiodarone hydrochloride (58.97%) and bromopride (50.00%). The mixture with other medicines occurred mainly with bromopride (66.66%), amlodipine besylate (53.33%), bamifiline (43.47%), folic acid (40.00%) and acetylsalicylic acid (33.33%). Among

liquids, the only category of error was the absence of dilution in 67.85% of the doses.⁶

Carvalho et al.,¹⁷ it was observed that 88.2% of prescriptions with up to five prescribed drugs had potential drug interactions, as well as 99.3% of those with six to ten prescription drugs and 100% of those containing more than ten drugs prescribed medicines. Evaluating the prescriptions of the 65 patients studied, 62 potential interactions (95.4%) were observed, that is, most prescriptions had drugs that had the potential to interact with nutrition. It was also observed that seven drugs, of the 48 prescribed, would be involved in 98.4% of potential drug interactions. With this, it is important the presence of the clinical pharmacist in this environment, since it is the competent professional to minimize these aspects.¹³

In observing the technique of preparation and administration of medications in the units, Farias et al.,²⁰ it was contacted that: nursing technicians were always responsible for the preparation technique, of these, 23.7 % wore gloves, but 21% did not use any PPE; 71% did not perform any type of asepsis; 56.6% used gral and pistil in the preparation technique; 47.4% made the technique near the sink; the drug is always transferred to the probe with the syringe and at 77.6% of the time 20 mL of water is administered after administration of the drug, however only 7.9% used water before administration of the drug. Lisbon, Silva and Matos²¹ claim that washing the probes before and after administering medications is based on an effective preventive attitude of obstruction.

The multidisciplinary nutritional therapy team should develop a protocol for the administration of medicines in patients using enteral nutritional therapy, as this is an important instrument to prevent drug-nutrition interactions enteral in the context of ICUs.¹³

The participation of the pharmacist as a component of the nutritional therapy team is fundamental to prevent problems associated with medications in individuals with enteral therapy. For this, measures to benefit the appropriate administration of drugs by probe should be carried out, such as: preparing a list of drugs that cannot be crushed; develop, together with the nursing team, a protocol for drug administration for patients using enteral nutrition; advise members of the nutritional therapy team on interactions, incompatibilities, availability or feasibility to prepare liquid pharmaceutical forms and others associated with drug administration.²²

According to Farias et al.,²⁰ pharmacists still do not contemplate in their routines the follow-up of patients using drugs by the probe. It would be of great clinical importance to effective pharmaceutical interference in this practice, achieving them to start with screening and evaluating prescriptions until visiting and daily face-to-face monitoring of manipulation and administration of these drugs. For this, it is essential that the managers of the institutions grow the staff of professionals and qualify them for clinical and care activities focused on patients. It has been proven that whenever necessary we should prefer the use of drugs in alternative routes to the probe. If it does not constitute it, guidance should always be sought to try available therapeutic or pharmaceutical options. The development of internal protocols and educational work in health institutions help in the prescriptive conduct of solid drugs for probed patients.

Regarding the orientation of patients discharged from the hospital, the pharmacist plays an important role, especially when it comes to patients on the contribution of NE, in which there is a need to instruct them adequately on the derivation of pharmaceutical forms and dilution of liquid pharmaceutical forms. The knowledge acquired by the patient and caregiver with guidance is one of the most important variables for obedience or not of the prescribed drug regimen.²³

IV. CONCLUSION

To prevent problems associated with the administration of drugs by probes in Intensive Care Units, it is necessary to encourage research and modernize the health team as nurses and the pharmacist on this theme. The creation and adoption of protocols can collaborate, assisting in the proper selection of the pharmaceutical form of the drug and the administration technique, in addition to analyzing incompatibilities and interactions.

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Strategies in Brazil's Higher Education and its Reflections

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Abstract— This article aims to identify the strategies used federal the institutions of higher education (IFES) located in the north-northeast of Brazil and its effect on the General index of courses (IGC) developed by the Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira (INEP). The methodology used consisted of a Survey among all the IFES 22 located in Northern and northeastern Brazil, evaluated by the IGC in the period between 2007 and 2011. The results show that the strategies that influenced the positioning of IFES evaluated in the IGC are scaling, monitoring of processes by means of indicators and information systems; the systematic assessment of faculty; systematic awareness of students with regard to the importance of National Examination performance of students (ENADE); the policy of support for the residence of students through scholarships; as well as the creation and excellent functioning of coordination of the MEETING (program support the restructuring plans and expansion of Federal Universities); as well as the Commission Own assessment - CPA; logo should be considered in the planning of IFES.

Keywords— Evaluation and regulation; University Management; College Ranking; Higher Education.

I. INTRODUCTION

The management level of enterprises and the economic well-being of a society are, in principle, dependent on the quality of university education. Although they are classified as learning organizations, universities, paradoxically are hard environments change (HAVLICEK and PELIKAN, 2013). On the one hand, these institutions expose significant advances in the formation of (future) managers, on the other, the University Management adopts for itself, in many cases, a model of choosing leaders based on erudition of these in certain disciplines or in educational curriculum to the detriment of their potential managerial and leadership skills.

Havlicek et.al. (2006) point out that the University should behave as a “learning organization” and implement

the corporate education that offers to third parties within their own environment. In this design, some countries tried to make alterations relevant occidental have, through the implementation of “managerial” elements in University environments (LEWIS, 2005; COLCLOUGH, 2010; YI, 2011), fact verified in Brazil, especially from the enactment of law No. 10,861 of April 14, 2004, which established the National Evaluation System of higher education - SINAES.

The latter has for objectives the central orientation of the expansion of the offer of education; the ID of the merit and value of the institutions, areas, courses and programs, on the dimensions of teaching, research, extension, management and training; as well as improving the quality of higher education in Brazil. According to data published by the Ministry of education (e-MEC), the Brazilian higher

education currently has 245 universities, being private, 143 public State and federal 63 39, however, only 17.1% of young people of 18 to 24 years attend or have already completed higher education in Brazil (IBGE, 2011).

To the achievement of the goals set, the scope of SINAES is based on the central pillars of the institutional evaluation of courses and students (BRAZIL, 2004). Its structure comprises several instruments, such as the Census of higher education, institutional assessment, the National Examination performance of Students – ENADE, the Preliminary Concept of Course -CPC, and the concept of the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES, which establish the General index of courses – IGC.

It is important to emphasize that the implementation of the IGC, in the year 2007, occurred simultaneously to the launch of the program in support of restructuring plans and expansion of Federal universities (REUNI), established by Decree No. 6,096, April 24, 2007, as an integral part of the educational development plan (EDP) in recognition of the strategic role of Federal universities to the economic and social development of the country.

In short, the REUNI consists of a program whose measures aim to ensure universities the necessary conditions for the expansion of access and permanence in higher education; ensure quality through academic innovations; promote articulation between the different levels of education, integrating the undergraduate, graduate, basic education and vocational and technology education; as well as improve the utilization of human resources and the infrastructure of federal institutions of higher education.

The dimensions of the program include the expansion of the offer of places in higher education; academic curricular restructuring; pedagogical renewal; intra-and inter-institutional mobility; social commitment of the institution; and graduate support the development and qualitative improvement of undergraduate courses, having as main goals: the gradual elevation of the completion rate of the average undergraduate Presential to 90%; gradual elevation of the student/teacher ratio to 18 students to 1 teacher; minimum 20% increase in undergraduate enrollment; and the period of five years from 2007 for the fulfillment of the goals, with intake forecast of additional financial resources necessary for the fulfillment of the targets set by the institution, including significant investments in expansion,

renovation and improvement of the physical area of the universities as well as the progressive binding budget increment to the stages provided for in the plan.

Put the representativeness of SINAES and REUNI for the development of higher education in Brazil, the present study develops from yearning to relate the strategies, plans and actions developed by the federal institutions of higher education - IFES with their respective results on the IGC, so that at the end of the study, best practices can be listed to support the management of higher education in Brazil.

The relevance and timeliness of the theme still ratify while in that the legal obligation imposed on IFES as the evaluation and adjustment of higher education, as well as the benefits and penalties arising from such reviews.

It put, the purpose of this article is to identify the strategies used by IFES and its effect on the scores obtained and subsequent IGC ranking continuously from the analysis of data collected in official databases. It is still a secondary goal of this study, to verify a possible relationship between the results obtained by the IFES in the IGC and the actions arising from the REUNI.

For both, this article is structured in the following order: in addition to this introductory character section, section 2, named “Theoretical” presents the theme of the assessment of higher education and the University rankings, as well as discusses in order minudential the National Evaluation System of higher education in Brazil and the pillars on which it is based. Section 3 is intended to present the procedures and steps for the development of this survey. In turn, section 4 exposes results obtained in the research, in the form of strategies adopted for each of the four groups of analysis: (a) institutional self-assessment processes; (b) the performance of students in ENADE; (c) the preliminary concept of course; and (d) the concept CAPES; Finally, section 5 deals with the final considerations of the study, success of the references cited in the article.

II. EVALUATION AND ADJUSTMENT OF HIGHER EDUCATION

The debate on the quality and performance of higher education systems has been greatly stimulated by the annual publication of the Shanghai Jiao Tong University Academic Word Ranking of Universities (ARWU), which compares the

performance of universities worldwide and which has as its main rival the UK's Times Higher Education Supplement (THES), which similarly has attracted the attention of the world to conduct research with the same purpose. Intentionally or not, the University rankings are a public tool that comprises political discourse about National University systems (SAISANA, D'HOMBRES E SALTELLI, 2010; LUKMAN, KRAJNC E GLAVIC, 2010).

Martínez-Torres and Díaz-Fernández (2013), add the "Performance Ranking of Scientific Papers for World University", directed by Higher Education Evaluation and Accreditation Council of Taiwan (HEEACT ranking), both cited previously as part of the three most popular rating systems currently. To the same authors, the three programs vary with regard to the methodology; however, all of them are strongly impacted by research conducted at universities, in particular, by the publication of scientific articles indexed in databases ISI (Institute for Scientific Information).

Given to the repercussions of such rankings, the debate about these happen spontaneously, especially in academia, in which, studies are examining the indicators they use. In this construct, Van Raan, 2007, affirms that the ARWU measures the excellence of the past and not the present, then, tends to favor large English-speaking institutions, by the fact of basing primarily on search performance, disregarding other important dimensions of University life as teaching.

Alike thoughts have Taylor and Braddock, 2007 and Marginson, 2007 s regards the THES. For them, to be made up of at least questionable aspects (experts ' opinions), indicators of reputation can be "mere symptoms of excellence", inclined to favor the old institutions.

For Sáfon (2013), such rankings are accused to distract the attention of the SBI from its most important factors (research, teaching, and extension), given the need to change their behavior as a function of a performance improvement in these.

On the other hand, David Hand, President of the Royal Statistical Society, stresses such rankings are not and never will be perfect, however, are certainly better than nothing (HAND, 2004).

Regardless of the different opinions on the subject have, however, certainty for all interested in the subject that such rankings brought the debate discussion minimally on

the performance of universities, including in this article, when discussing the assessment of higher education in Brazil.

As said, the Sistema Nacional de Avaliação da Educação Superior – SINAES was created by law No. 10,861 of April 14, 2004 aiming to identify merit and value areas, institutions, courses and programs, on the dimensions of teaching, research, extension, management and training, as well as improve the quality of higher education, guide the expansion of supply and finally promote the social responsibility of the Brazilian INSTITUTIONS of HIGHER EDUCATION.

To fulfill its mission, the SINAES uses various evaluation tools aimed at, therefore the evaluation of institutions of undergraduate and graduate courses and the performance of students, evaluating all aspects that revolve around these three axes through the following evaluative tripod: 1- Institutional assessment, which operates through the accreditation and reaccreditation of institutions of higher education; 2 – Evaluation of courses, which splits in courses in their permits and renewals of recognitions recognition; 3- National examination performance of Students – ENADE, which is part of the calculation of the Overall Index of courses (IGC), the most important indicator for the analysis proposed in this article and whose composition will be more detailed below.

Currently, for the assessment of IES, has ten parameters SINAES dimensions: 1) mission and the Institutional development plan (PDI); 2) policy for undergraduate and graduate education, research, extension and the respective forms of operationalizing, including procedures for stimulating academic production and research scholarships, tutoring and other modalities; 3) social responsibility of the institution, which is considered especially with regard to its contribution towards social inclusion, economic and social development, environmental protection, cultural memory, artistic production and cultural heritage; 4) communication with society; 5) personnel policies, Faculty careers and its improvement, professional development and their working conditions; 6) the organization and management of the institution, especially the operation and representativeness of the collegiate, their independence and autonomy in relation to the maintainer, and the participation of segments of the University community in decision-making; 7) physical infrastructure, especially that of teaching and research, library information

resources and communication; 8) planning and evaluation, especially in relation to processes, results and effectiveness of institutional self-assessment; 9) policies for service to students; and 10) financial sustainability, bearing in mind the social significance of continuity of the commitments in the provision of higher education.

With regard to courses, assessments of SINAES take into account the didactic-pedagogical organization, Faculty profile, and physical facilities of the institution evaluated, whereas the information collections are performed through the Census of higher education, the register of institutions and courses of their own Committees of assessment (CPA), created in higher education institutions (IES) with the assignment to drive the internal evaluation processes of the institution, of systematization and gathering information.

The system proposes an institutional evaluation composed of self-evaluation, external evaluation, and census cadastre. The first articulates a self-study according the General roadmap proposed in national level, plus specific indicators, educational, institutional design, cadastre and Census and whose must contain all the information and other evaluative elements contained in the common national basic roadmap, qualitative analysis and administrative actions, political, educational and scientific-technical higher education institution intends to undertake as a result of the self-assessment process, identification of the means and resources necessary to carry out improvements, as well as an assessment of the successes and mistakes of the assessment process itself, while the second follows the same script, being, however, performed by external members, belonging to the academic and scientific community, recognized for its capabilities in their areas and comprehensive understanding of university institutions.

In turn, the census is a collection of data about higher education with the aim of offering to the academic community and society in General detailed information on the situation and the major trends in the industry. Such collection has by reference the General guidelines laid down by the Decree of April 4, 2008 6,425 and gathers information about higher education institutions, their undergraduate Presential or distance, sequential courses, vacancies offered, subscriptions, registrations, freshmen and seniors, plus information about teachers, in different forms of academic organization and administrative category. These data are collected from the filling in of questionnaires, part by higher education institutions (IES) and another by importing data

from the system e-MEC, the following data consistency checking and reopening of the Census system for Conference and validation by IES. Once the census, the data are disseminated and published statistics.

Lastly, the IGC, also called institutional quality index is an indicator of quality of institutions of higher education, which considers, in its composition, the quality of undergraduate and graduate students (MSC and PhD). With regard to postgraduate courses uses the concept of the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) whereas with regard to the graduation of the Preliminary Concept is used of course (CPC) that besides the performance of students in ENADE considers information about faculty, infrastructure and didactic-pedagogical organization, weighted with data from Census Bureau of higher education and socioeconomic questionnaire replies of ENADE, so how has special relevance indicator in determining the level of quality of the Brazilian INSTITUTIONS OF HIGHER EDUCATION.

In its last edition (2011) were evaluated 18,346 of 2,136 courses, universities, colleges and universities, according to data from the Ministry of education.

In its composition, according to Banerjee et al. (2009), 40% of the final result is determined by the performance of students in ENADE, 30% by the indicator of Difference among the performances observed and Expected IDD, 11% by the educational resources, facilities and infrastructure, 12% for the percentage of professors with doctorate and finally 7% by the number of teachers with full dedication to IFES. Thus, according to the same authors, 81% of the composition of the institutions note the IGC under the student performance in ENADE and IDD (and provision of educational resources), while the other 19% is the percentage of doctors and teachers with full-time, whose information comes from evaluation based on information provided directly by IES.

III. METHODOLOGY OF RESEARCH

In terms of methodological framework this research, while research problem approach is classified as quantitative and qualitative; as to the nature of the objective, how exploratory and descriptive; and about the media Prism research constitutes a Survey.

It was determined as universe of interest of this research the twenty-two federal institutions of higher

education in the northern and northeastern regions evaluated by the IGC in the period between 2007 and 2011. Still determined by sampling goal the entire universe, it is appropriate to classify this research as census area.

Table 1 demonstrates the amount of Brazilian universities, properly classified (public and private) in their

Table 1: Brazilian universities by type and Region

Type	North	Northeast	South	South-East	Mid-West	Total
State Public	6	14	9	7	3	39
Federal Public	10	18	11	19	5	63
Private	37	7	24	55	20	143
Total	53	39	44	81	28	245

Source: From authors.

The research took place in three stages. Initially a documental search, which yielded useful information to guide the elaboration of the instrument of data collection and definition of variables (strategies) analyzed. Once observed at three institutions with the highest performance in the IGC in 2011, the Universidade Federal do Rio Grande do Norte – UFRN, the Universidade Federal de Pernambuco – UFPE, and the Universidade Federal do Ceará – UFC was executed a first round of semi-structured interviews objectified lifting variables (main strategies developed by the institution for each column of the IGC) to compose the data collection instrument.

At the end of the first round of interviews highlighted the following variables:

- i. continuous and systematic Awareness of importance of ENADE with teachers;
- ii. Continuous and systematic awareness of importance of ENADE along to students;
- iii. Continuous awareness and systematic from importance of ENADE along on the managers;
- iv. Continuous and systematic adjustment of the data of Sense;
- v. continuous and systematic Evaluation of teachers by students;

respective geographical regions. The IFES in Brazil totaling 63, of which 28 are located in the North-Northwest. It is important to point out that in this study were evaluated the institutions evaluated by the IGC in the period between 2007 and 2011, which totals 22 institutions.

- vi. Continuous and systematic training of the teaching staff;
- vii. Permanent improvement of infrastructure;
- viii. Permanent adjustment of Collection reports-CAPES;
- ix. Development of strategies to encourage scientific publication;
- x. structure and culture of management and monitoring of indicators;
- xi. Use of integrated informational System;
- xii. Commission assessment Itself - CPA with systematic action;
- xiii. Auto-continuous and systematic institutional assessment;
- xiv. Institutional strategy with focus on CPC, IGC, ENADE.

Identified the variables, we proceeded to the second stage of the research. In this, to evaluate the use of the strategies now cited a questionnaire was used with a three-point ordinal scale, with valuations of 0; 1; and 2 to assess each of the fourteen strategies listed. For all variables the corresponding option the valuation referred to 0 the absence of use of the strategy under review; the option 1 referred to the partial use of the strategy (in implementation); and the option to use 02 full tariff strategy.

The data were collected through face-to-face visits effect by the authors during the first half of 2013. It added that the questionnaires were applied with leaders and technicians in pre-set schedules.

The third stage of data collection took place by a documentary research carried out on the basis of the data published on the portal of the Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira – INEP.

To analyze the effects of the strategies used by the IFES in the IGC, was used to search multiple statistical regression technique. For Hair et al. (1995), multiple statistical regression technique should be used when the researcher wishes to examine the effects of independent variables or explanatory (strategies of IFES), on a dependent variable or reply (IGC).

According to Johnson and Wichern (1988), multiple statistical regression technique develops an equation which allows for explanation of the dependent variable from the set of independent variables, as the following equation:

$$y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \dots + \beta_nx_n + \varepsilon$$

Being y the dependable variable, which in the work is the IGC of each IFES; $x_1 \dots x_n$ are independent variables; $\beta_0 \dots \beta_n$ are the coefficients of regression associated to the independent variable; ε corresponds to the error term. The coefficients $\beta_0 \dots \beta_n$ can be interpreted as the contribution of each independent variable to explain the dependent variable.

According to Maddala (1992) the technique in question is suitable when the researcher seeks to explain a metric dependent variable, however, the dependent variables that compose the regression model can be binary or metrics. As these work strategies of the IFES were analyzed only as Yes, no, and On deployment, it was established that when the implementation of the strategy would be assigned the value 2, not achievement would be assigned the value 0 and when I was on deployment the value 1.

According to Maddala (1992) using the coefficient of determination (R-squared), which can be defined as the ratio of the variance of the dependent variable that is explained by the independent variables, can calculate the regression model accuracy. The value of this coefficient can vary between 0 and 1, and the closer to 1 the larger the explanatory power of the regression model.

Ownership of the data obtained by the IFES, a multiple regression was performed to analyze the impact of each strategy in the IGC of IFES. For the years 2009, 2010 and 2011, note that the correlation between independent variables and the dependent variable, represented by the R-multiple, is 79,52%, 74,40% and 67,52%. For the same periods, the explanation power of the regression model, represented by the R-square, is 63,24%, 55,35% and 45,59%.

In short, in order to meet the objectives mentioned above the following methodological steps were executed:

1. Literature review: extensive research in the literature about the University management, University ranking, evaluation systems of higher education and relevant Brazilian legislation;
2. Exploratory research: empirical research aspects and variables included in the theoretical foundation in order to identify together the IFES teachers and technicians directly linked to institutional assessment;
3. Descriptive research: sample Definition, of the instrument and the data collection procedures regarding the motivations and characteristics of institutional evaluation process;
4. Data collection about the IFES in various reports, interviews with technicians and managers through questionnaire, face-to-face form;
5. Analysis of data and preparation of the final report: the information collected was evaluated the correlation and impacts inherent in the strategies of the IFES with the outcome of the IGC following the making of the final report.

IV. RESULTS OF RESEARCH

This section aims to expose the results obtained with the search, so that from these discussions in the sphere of established goals once can be proposed. Based on firm the perception of the reader in the relations established, it seems appropriate to mention that this study aims to identify the strategies used by IFES and its effect on the scores obtained and subsequent IGC ranking continuously.

The results presented in this chapter were tabulated by the authors from data published on the portal of the Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira – INEP, as well as from the data collected by the

IFES object of this research 22, more specifically next to their respective Commissions Own assessment and/or Pro-Reitoras of planning or organ with the same function.

their respective concepts in the IGC-continuous in the period between 2007 and 2011, listed according to their result obtained in the last year of the evaluation.

With regard to the results obtained in the IGC, table 2, below, lists the exposed IFES surveyed and the evolution of

Table 2: Evolution of the IGC continuum between the IFES of the north-northeast.

	IFES	Region	2007	2008	2009	2010	2011
1 st	Universidade Federal do Rio Grande Do Norte	Northeast	3,38	3,40	3,41	3,49	3,66
2 nd	Universidade Federal de Pernambuco	Northeast	3,53	3,56	3,50	3,69	3,55
3 rd	Universidade Federal do Ceará	Northeast	3,27	3,29	3,30	3,40	3,52
4 th	Universidade Federal de Campina Grande	Northeast	3,11	2,94	2,97	3,09	3,48
5 th	Universidade Federal Rural do Semi-Árido	Northeast	2,61	2,78	2,90	3,50	3,43
6 th	Universidade Federal da Paraíba	Northeast	3,05	3,05	3,13	3,28	3,41
7 th	Universidade Federal da Bahia	Northeast	3,30	3,25	3,19	3,33	3,33
8 th	Universidade Federal do Recôncavo da Bahia	Northeast	1,76	1,97	2,06	3,22	3,09
9 th	Universidade Federal Rural de Pernambuco	Northeast	2,72	2,86	2,98	3,34	3,08
10 th	Universidade Federal de Sergipe	Northeast	2,90	2,56	2,56	2,74	2,99
11 th	Universidade Federal do Piauí	Northeast	2,88	2,82	2,81	2,83	2,98
12 th	Universidade Federal Rural da Amazônia	North	2,64	2,40	2,39	2,75	2,97
13 th	Universidade Federal do Maranhão	Northeast	2,65	2,66	2,59	2,80	2,96
14 th	Universidade Federal do Pará	North	2,52	2,47	2,63	2,76	2,96
15 th	Fundação Universidade Federal do Vale do São Francisco	Northeast	N/A	N/A	3,12	2,9	2,84
16 th	Fundação Universidade Federal de Tocantins	North	2,41	2,42	2,44	2,59	2,84
17 th	Universidade Federal de Alagoas	Northeast	2,46	2,58	2,62	2,72	2,81
18 th	Universidade Federal de Roraima	North	2,58	2,63	2,46	2,66	2,81
19 th	Fundação Universidade Federal de Rondônia	North	2,84	2,92	2,73	2,77	2,75
20 th	Universidade Federal do Amazonas	North	2,80	2,76	2,65	2,68	2,69
21 st	Universidade Federal do Amapá	North	2,12	2,03	2,05	2,06	2,56
22 nd	Universidade Federal do Acre	North	2,60	2,74	2,69	2,64	2,55

Source: From authors.

In view of the above, it is possible to verify that the Universidade Federal do Rio Grande do Norte – UFRN occupies the first position in the IGC between institutions located in the regions understood in the object scope of this work, followed by Universidade Federal de Pernambuco – UFPE He held such placement by the year 2010.

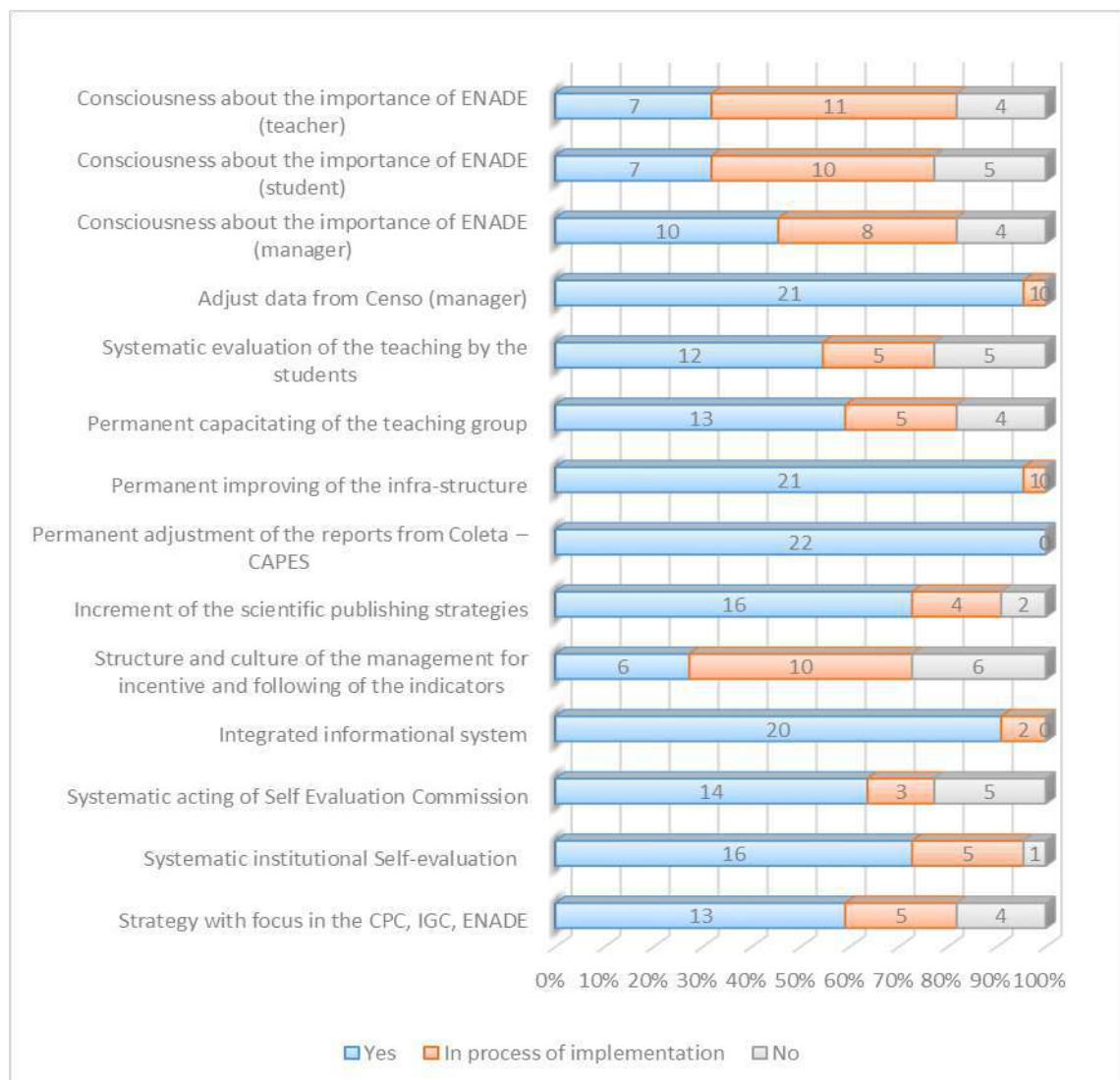
It is worth mentioning that the eleven best positioned, according to the IFES data presented are located in the northeastern region, being the Universidade Federal Rural da Amazônia - UFRA the institution best positioned in the IFES in the North of the country and the 12th when considered both regions.

Another highlight is the fact that the significant improvement of the score obtained by Universidade Federal de Campina Grande – UFCG that ranked in fourth place, according to the data collected.

Initial descriptive analyses expose that among the IFES surveyed, fourteen presented positive variation in their concepts; seven showed a negative variation in the concept obtained in the year 2010; and one remained unchanged concept.

The chart 01, in turn, summarizes the results related to the use of search strategies.

Chart 01 – Strategies adopted by IFES.



Source: From authors.

Under preliminary analysis are the results permanent adjustment-related surplus of collecting reports-apes, the permanent improvement of the infrastructure, the adjustment of census data, the systematic institutional self-evaluation and the use of informational systems integrated. Therefore, according to research data, constitute the most used strategies for IFES.

Such a finding is relatively expected analysis, since the provision of information in the Collection-Capes, the adjustment of census data and the achievement of institutional self-evaluation annually, are mandatory for the IFES. On the other hand, the results related to the improvement of the infrastructure is directly linked to the REUNI, which in turn had accession to all the participants of this study IFES, whereas the use of integrated systems of information constitutes an indispensable action facing the growth of structure of IFES.

With regard to institutional self-assessment, it is important to consider the importance of reading the data in conjunction with the actions of the CPA. With regard to the use and monitoring of indicators in management, have, according to the survey, only six institutions that in fact they do use in a consolidated manner indicators of University management; and ten others in the implementation phase. This fact reinforces the bureaucratic character of the self-evaluation in some IFES, considering that such a requirement is based in 10 dimensions or indicators that in theory, should be constantly monitored, so, direct the actions of the institutions.

Soon, in the face of this construct, it permitted the reading of the self-evaluation process can be used, most of the surveyed institutions only on the basis of the legal obligation, losing on purpose to constitute a not continuous process improvement development plan of the institution. In other words, the institutional assessment is a management tool capable of providing a holistic view of the institution and the interrelationship between the parts that compose it.

The items relating to the evaluation of teaching by students and permanent training of the faculty are very similar, once 12 universities have already implemented the first action and other 13 adopted the second strategy, and it is necessary to point out that only 8 institutions perform the two actions previously cited jointly, that is, there are situations in which they adopted the strategy of evaluation of teachers by students, without however occur docent training program and

vice versa, and clear the complementarity that exists between such actions.

As regards the increase of scientific publication have assumed that the most used by the IFES surveyed concerns the imposition of periodicals in the institution itself, diverging from the universities best positioned that in addition to this strategy have used the incentive for publication in journals and international conferences, including with financial assistance to authors, including students, to participate in events as well as the payment of publication fees.

In spite of the existing correlation, the use of strategies with a focus on CPC, IGC and ENADE will be examined against the items related to awareness of teachers, students and administrators on the importance of ENADE. The IFES surveyed 13 claimed to adopt indicators focused strategy mentioned above, however, of these, only 7 carry out awareness among teachers and students and 10 make it along on the managers.

The analysis of the data, allows to assert that universities cited das13, only 6 are awareness of teachers, students and administrators jointly.

Finally, it is worth mentioning that the IFES surveyed, Universidade Federal do Rio Grande do Norte – UFRN, is the one to adopt all the IFES strategies that patterned the present research, a fact that may therefore place it as the University best positioned among the surveyed.

The strategies adopted by Universidade Federal do Rio Grande do Norte

Created in June 25, 1958, UFRN has been dedicated to train professionals to meet the demands of society of North of Rio Grande do Sul in different areas of knowledge, showing, since the last decade, a visible improvement in their teaching activities (undergraduate and graduate), research and extension, according to the IGC.

With the implementation of the restructuring measures provided for in the program of support to restructuring plans and expansion of Federal universities (REUNITE), significant expansion and improvement in the quality of their academic activities, considering that the UFRN has 37,540 students enrolled in the various levels of education offered. 139 undergraduate courses are offered on-site, 52 academic Masters courses, 6 Professional Masters courses and 30

doctoral and research developed by 1422 doctors and masters through 382 194 research groups (source: Informational Systems of UFRN).

By joining the REUNI, UFRN undertook to carry out a planned changes and participatory, having as support studies, diagnoses and outcomes of institutional self-evaluation, which is one of the pillars for the improvement of indexes of institution, namely, the operation of the Commission evaluation Itself proactive - CPA, established formally in the year 2004 and UFRN composed of 14 members representatives of teachers, students, technical and administrative servers, as well as by civil society representative (member of the State Board of education) with the support of 4 Institutional Advisors with considerable experience in the area of education.

Still on the REUNI's stand out that proposal from the UFRN contemplated all the dimensions of the program, namely, expansion of the offer of Public higher education, Academic Restructuring-Pedagogical Renewal curriculum of higher education, Intra-and Inter-institutional Mobility; Social commitment of the institution and graduate support the development and qualitative improvement of undergraduate courses, with clearly defined targets and indicators and duly accompanied by Commission formally designated for this purpose composed of general coordination, a pedagogic-academic coordination and administrative coordination. This Commission itself became part of the technical team of the Dean of undergraduate studies Pro, being responsible for the management of restructuring, expansion and academic from the systematic evaluation of the results of the implementation of new courses, the expansion of existing courses and academic changes desired.

All this action framework required obviously large volume of investments in improving the infrastructure of the institution, purchase of new equipment and edifications that totaled R \$ 81,818,847, with a total of 37.73 works that included laboratories, University restaurant, auditorium for large events, buildings for new courses, libraries, clinics, expansion of the building of the deanery, blocks of classrooms, classrooms and teachers, enlargements of departments, halls of residence and central blocks of the production of didactic material, as well as resizing of its establishment plan, which included the hiring of 344 teachers and 120 technical and administrative servers and mid-tier 327, with magnification of 140Funções Functions – FG and

29 Direction Positions – CD, that student assistance grants to allies, master 's, doctoral, postdoctoral, visiting professor and other costing items totaled R\$182.757.188,96.

The CPA from UFRN in carrying out its activities, according to their Coordinator continued actions adopted 3 other points from UFRN in conjunction with the actions of the met with decisive impact for obtaining of results in the IGC, namely: definition, monitoring and action on the indicators of the institution, teaching evaluation systematically and systematic awareness of students regarding the importance of ENADE. The first includes the actions of student assessment, evaluation of faculty qualification, evaluation of institutional conditions, whereas the SINAES, CAPES assessment indices and other data of INEP, being relevant the fact of institutional self-evaluation process UFRN already constitutes a consolidated project in the institution, in which the CPA is responsible for all the processes that make up the internal evaluation.

In this process are used for data collection instruments composed of two questionnaires, one being filled by students-through which they analyze the performance of the teacher in the classroom and their own performance in the discipline, especially in terms of dedication-and another by professor, through which he has the opportunity to describe the physical infrastructure placed at your disposal by the Department/Centre and critique their own performance while for the course evaluation is considered a discipline within the framework of pedagogic project, as well as its articulation with the research and extension.

The data collection is carried out through the currently cited integrated system of academic management from UFRN-SIGAA, without which a student is not allowed to perform enrollment costs/, as well as non-realization on the part of the teacher constitutes a solution for consolidating Tuma.

After all the processing, the data are available on own system with filter options and consolidation Centre, Department and Course, consisting the average obtained by each professor, student assessment, along with the position and dispersion measures included in the result, while the departments/academic units carry out discussions of result of evaluating teaching in plenary session to propose the necessary measures for improving the quality of undergraduate education in relation to their respective teachers.

As regards institutional indicators, it is noteworthy that 88 related indicators are monitored the situation teaching and technical-administrative employees, students, teaching, research, extension, infrastructure and university hospitals, complex task, however greatly facilitated by informational systems of the institution, currently shared with several other federal universities and other organs of the federal public administration, being, such systems also responsible for results obtained from UFRN.

Finally, it is worth noting that to enhance teaching, learning processes through greater qualification of teachers, improving the physical structure and guarantee of the permanence of students through scholarships and other actions would be naturally expected significant improvement of the results of the students, however, awareness of these, on the importance of the examination and for the institution to maximize the result achieved.

V. DISCUSSION AND CONCLUSIONS

With regard to the proposed objectives for the work can be said to have been complied with, in so far as the strategic actions of the IFES surveyed were compared to the results obtained in the General index of courses. The method used has exposed to be effective in producing parameters for analyses and comparisons, providing subsidies for the understanding of the case studied.

The survey results showed that the scaling, monitoring through indicators and information systems, as well as the consequent achieving the goals agreed at the REUNI, are strategies whose use must keep consistent with the institutional self-assessment.

With regard to performance-related goals of students in ENADE and performance on the concept of the CPC and CAPES were patents existing relations between the results presented by the institutions and actions: systematic assessment of faculty; systematic awareness of students with regard to the importance of ENADE and; the policy of support for the permanence of students through scholarships and other programs are allies to improve the physical structure obtained with the REUNI.

It is important score, that the results obtained by the best institutions still must be positioned the creation and excellent functioning of coordination of the REUNI, as well as of the Commission evaluation - CPA Itself, given the importance of systematic control of the indicators and targets

related to the aforementioned strategic actions. While still de-emphasizing the contribution of informational systems of IFES for this control.

That said, it can be concluded that strategies evaluated in this study presented a direct repercussion on the results observed in the General Index-generated ranking of courses should therefore be considered in the planning of IFES.

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Sacred Medicinal Plants and Impacts on the Traditional Healing System of the Rodelas/BA's Tuxá Indigenous People

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Abstract— The changes in the biological formation of the São Francisco River after the construction of the Itaparica dam directly interfered in the socio-environmental, cultural and religious dynamics of the Tuxá people. This article aims to investigate the interaction of the Rodelas/BA's Tuxá Indigenous People, with medicinal plants in their healing rituals. For this, qualitative and quantitative techniques were used, such as ethnography, which aims to understand the particularities of the cultural aspects of a specific people. With the help of interviews, workshops and ethnomapping with young people, adults and the elderly. 30 indigenous people were interviewed. In the data analysis, the salience index technique was used, which makes it possible to quantify the cultural relevance and to analyze the different patterns of knowledge about the use of plants. Among the 39 plants mentioned for spiritual cures, caboclo rosemary (*Baccharis Sylvestris* L.) has a higher frequency of citation. This result suggests that caboclo rosemary has a greater scope in physical and spiritual healing, being the first to be remembered. As for the salience index, both caboclo rosemary and juazeiro (*Ziziphus* Mart.) Obtained the same value (0.5). Suggesting that the two plants have a greater cultural representativeness of use in relation to the 39 mentioned. The Tuxá indigenous people carry in their experience a great knowledge of their medicinal flora, and from it they take various remedies that they use in different ways to heal both the body and the spirit.

Keywords— Biodiversity; Traditional knowledge; Medicinal Plants.

I. INTRODUCTION

The perceptions and worldviews about the biotic and abiotic environment vary between human groups (JAIN, 2000; ALBUQUERQUE, 2002; SILVA, 2003) evidenced in the particularities of the use and perception of resources, in the forms of learning, stratification and knowledge transfer, which can result in the unique or particular nature of each one.

In traditional societies the symptoms of physical illness are explained in a way that does not separate nature from the supernatural, the social world from the natural world, and the individual from his social matrix. Therefore, there is an interdependence between nature and the supernatural, society and the individual (QUINTANA, 1999).

A Traditional indigenous medicine is based on a body of knowledge that undergoes space-time changes and that

has an essentially oral and gestural mode of transmission, and that does not communicate through a medical institution, but through the family and the neighborhood, because, according to Amorozo (1996), knowledge (the knowing) is always linked to the practical aspect (doing), that is, knowledge is interconnected to coexistence, to a real interference in the environment that the community occupies, and this action is often the factor of origin and emergence of new knowledge.

The Rodelas/BA's Tuxá Indigenous People Indigenous People lived historically involved in a favorable environment between the waters of the São Francisco River and the forests of the Caatingas of the semiarid and acquired the science of ecosystem flora and fauna, building a way of life transmitted by their ancestors.

However, the overexploitation of growing natural resources in areas inhabited by these peoples, by public and private development agents, is leading to an accelerated process of socio-environmental degradation with loss of their socio-cultural diversity, as was the case with the construction of São Francisco who caused countless territorial conflicts in all dimensions of human life for this group.

Rothman (2008), in his research, assures that the dams caused great changes not only in the aquatic biota but also in the terrestrial ecosystems due to the dimension of the flooded areas, causing profound socio-cultural transformations in the lives of the populations living in the flooded areas, directly altering the mechanisms of socio-cultural reproduction of local communities.

Given this scenario, it is essential to expand ethnobotanical research among indigenous peoples. Because, these are presented as an important tool of contribution in the rescue of the knowledge about the local flora, in other words, of the knowledge about the use and management of the plants, contributing to the conservation and development in the areas inhabited by these groups.

According to Toledo (1990), these societies have developed over the years, developing several sustainable use management practices, they are true guardians of the planet's biogenetic heritage. However, constant attacks on the natural environment in which they live have also led to the loss of their socio-cultural diversity.

Therefore, studying the relationship that the Tuxá Indians maintain with their sacred medicinal plants brings important contributions to the maintenance and conservation of ecosystems, these communities have their

own management systems, as a result of experiences accumulated over centuries of relationships with nature.

This article intends to analyze the interaction of the Tuxá Indians with sacred plants in the healing rituals, considering the impacts resulting from the construction of the Itaparica/BA dam.

This article is part of the results of the master's thesis in Human Ecology and Social and Environmental Management, which has the title, Ethnobotany of the Tuxá Rodelas Indians, in the line of Research on Ethnoecology and Traditional Peoples. The objective of which was to investigate the knowledge, use and management of the medicinal flora of the The Rodelas/BA's Tuxá Indigenous People, based on the ethnic-socio-environmental and religious conflicts resulting from the construction of the Itaparica's dam.

II. MATERIALS AND METHODS

2.1. Study area

2.1.1. The Tuxá People

The research was delimited within the scope of the Tuxá Rodelas' Indigenous People in which they define themselves as "Indians of the Tuxá Tribe, Proká Nation, Caboclo Arco, Flecha and Maracá", constituting one of the last of the diverse ethnic groups gathered since the 17th century, among which they suffered the intervention of several missions that were established along the course of the middle São Francisco (SAMPAIO-SILVA, 1997).

Children of the ancient Indians who lived in the São Francisco Valley region many years ago. The Tuxá village is located in the municipality of Rodelas/BA, in the region of Submédio São Francisco (MARQUES, 2008).

2.1.2. Characterization of the area

The Tuxá village is located in the municipality of Rodelas, in the northeast region, more precisely in the north of Bahia, on the banks of the São Francisco River. Its latitude is 08° 50 '44", its longitude is 38° 46 '00' '. It is limited to the municipalities of Paulo Afonso, Glória, Macururé, Chorrochó and Jeremoabo in Bahia, and to the municipalities of Floresta, Belém do São Francisco, Itacuruba and Petrolândia in Pernambuco. Rodelas has a semi-arid climate and is located in the Caatinga Biome. The municipality has grown considerably in recent years, due to local agriculture, especially with regard to the production of coconut, for which the municipality received

the title of "coconut city", for supplying coconut to the region of Bahia and to other states, such as Sergipe and São Paulo. Rodelas has a semi-arid climate and is located in the Caatinga Biome. The municipality has grown considerably in recent years, due to local agriculture, especially with regard to the production of coconut, for which the municipality received the title of "coconut city", for supplying coconut to the region of Bahia and to other states, such as Sergipe and São Paulo.

2.2. Research Type

The present research is bibliographic, ethnographic, field research with the use of open forms with a qualitative and quantitative approach, pointing through free lists the indexes of botanical projections pointed out by the referred indigenous community.

Lutz (1983) ethnographic research, aims at understanding the culture of a particular group in order to understand the reasons for certain forms of behavior, involving immersion, coexistence, observation and interview as a method and research tool. The free list was another procedure used, where the interviewees listed the plants most used by them in the last twenty years in order of their preference (Lawrence et al. 2005).

In conjunction with qualitative procedures in the collection of research data, a quantitative technique was used to process the information obtained about medicinal plants. The Saliency Index technique (SMITH, 1993; MARTIN, 1995; COTTON, 1996) was used, which takes into account two parameters: the frequency and order of citation, following the methodology recommended by Quinlan (2005), which it makes it possible to quantify the cultural salience and analyze the different patterns of knowledge about the use of plants; and thus, obtain more objective and closer to real information. The salience indexes were processed using the Visual Anthropac-Freelists 4.0 software (BORGATTI, 1996), and the index calculations were loaded into text files (*.txt), and later exported their results to Excel 2010.

For the identification of species, specialized literatures were used, such as Lorenzi and Matos (2008) and Marinho; Silva and Andrade (2011). The collected species were pressed into exsiccates, identified and stored in the herbarium of the State University of Feira de Santana - UEFS. The species were collected with the help of two bushmen from the Tuxá community, who know the plants and the territory.

III. RESULTS AND DISCUSSIONS

3.1 Interaction of the Tuxá People and their medicinal flora

According to Mark Plotkin (2008), nobody understands the secrets of plants better than the indigenous shamans, men and women shamans, who have developed an immense knowledge of the local flora, are true "living pharmacies" to cure ills, both physical and spiritual community.

However, the knowledge of these botanical magicians is rapidly disappearing due to deforestation and profound cultural transformation among the younger generations and the combined loss of this knowledge and these forests, promotes degradation that can compromise the world of cultural and biological diversity.

The Tuxá indigenous People has a great diversity of plants that they use for their healing system, as shown below, some represented in the figures.



Fig. 1: Jurema Preta (*Mimosa tenuiflora*)

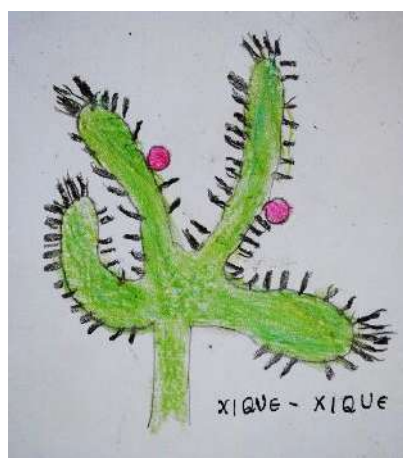


Fig. 2: Melão caetano (*Momordica charantia* L.)

Fig. 3: Cansção (*Jatropha urens* L.)Fig. 4: Candeia (*Lippia organoides*)

The Tuxá have a deep knowledge of their medicinal plants, and establish an interdependent relationship with nature. "Taking traditional medicine from the Tuxá people is like killing a large part of our culture, a large part of the existence of being from a different people" (Sandro Tuxá, 2012).

However, for the production and reproduction of their culture, the Tuxá maintain full mastery of the knowledge of their medicinal flora, expressed in ethno-drawings by the Tuxá Indians in a workshop.

Fig. 5: Xique-xique (*Pilosocereus gounellei*)Fig.6: Muçambê (*Cleome spinosa* L)Fig. 7: Mulungú (*Erythrina mulungu* Mart. Ex Benth.)Fig. 8: Mata cabra (*Ipomoea* sp.)

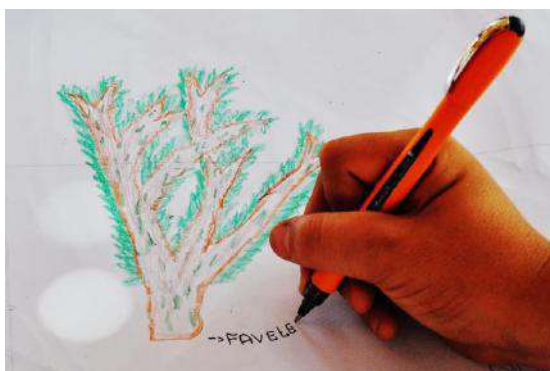


Fig. 9: Faveleira (*Cnidoscolus phyllacanthus*)

3.2 Medicinal plants for use in the sacred

These plants such as juazeiro (*Ziziphus joazeiro* Mart.), Faveleira (*Cnidoscolus phyllacanthus* (M. Arg.) Pax & Hoffm), genipap (*Genipa americana* Linnaeus.), among others, are part of the vast pharmacopeia of the Tuxá People.

The Tuxá Rodelas Indigenous People make use of plants considered sacred in their healing rituals; these are part of their rich healing system. They have an extraordinary knowledge of their plants, and make use of extremely elaborate recipes. However, these practices are threatened by the accelerated process of socio-environmental and cultural degradation that are exposed.

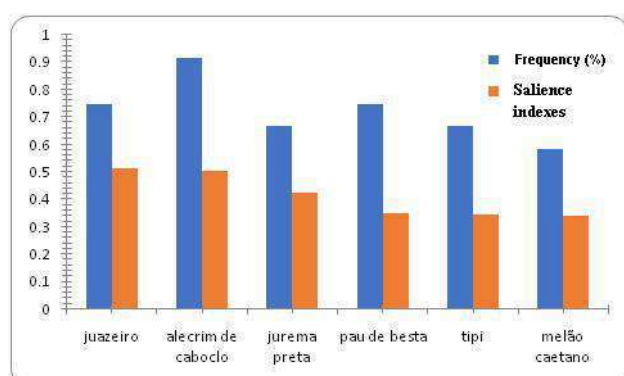
Table 1: Plants used in the healing and sacred rituals of the Tuxá People, according to the interviewees. (Field Research, 2012)

Scientific Names	Sacred Plants	Frequency (%)	Ranking	Salience indexes
01 <i>Baccharis sylvestris</i> L.	Alecrim de caboclo	91,7	7,09	0,505
02 <i>Ptilochaeta</i> SP.	Pau de besta	75	8,33	0,35
03 <i>Ziziphus</i> Mart.	Juazeiro	75	5,22	0,513
04 <i>Petiveria</i> L.	Tipi	66,7	8,13	0,344
05 <i>Mimosa tenuiflora</i> (wild.) Poir.	Jurema preta	66,7	5,75	0,424
06 <i>Vitex angus-castus</i> L.	Anjucá/liamba	58,3	9	0,251
07 <i>Momordica charantia</i> L.	Melão Caetano	58,3	7,29	0,341
08 <i>Senna Rizzini</i> H.S.Irwin & Barneby(det.L.P.deQueiroz,3.2013)	Pau de besouro	50	7,67	0,252
09 <i>Ocimum basilicum</i> L.	Manjerição	41,7	5	0,328
10 <i>Passiflora foetida</i> L.	Coentro d'água/junco	41,7	6,4	0,26
11 <i>Spondias tuberosa</i>	Umbuzeiro	41,7	7	0,224
12 <i>Bauhinia forficata</i>	Mororó	41,7	8,6	0,255
13 <i>Jatropha gossypifolia</i> L.	Pião roxo	41,7	9,6	0,176
14 <i>Scoparia dulcis</i> L.	Vassourinha	41,7	9	0,197
15 <i>Baccharis dracunculifolia</i>	Alecrim do mato	41,7	8,4	0,193
16 <i>Jatropha urens</i> L.	Cansanção	41,7	7,4	0,258
17 <i>Leonotis nepetifolia</i> Schimp. Ex Benth.	Cordão de são Francisco	33,3	6,75	0,218

18	<i>Byrsonima verbascifolia</i> Rich. Ex Juss.	Muricizeiro	33,3	6,75	0,186
19	<i>Nicotiana tabacum</i> L.	Fumo	33,3	13,25	0,088
20	<i>Parietaria Officinales</i>	Alfavaca	25	11,33	0,1
21	<i>Allium sativum</i> L.	Alho	25	8	0,138
22	<i>Boerhavia paniculata</i> Rich.	Pega pinto	25	6,33	0,177
23	<i>Cyperus esculentus</i> L.	Espada de ogum	25	11,67	0,093
24	<i>Croton blanchetianus</i> Baill	Marmeleiro	25	6	0,142
25	<i>Hyptis pectinata</i> (L.) Poir.	Samba caitá	16,7	6,5	0,089
26	<i>Ruta graveolens</i> L.	Arruda	16,7	18,5	0,022
27	Não identificada	Sete pecados	8,3	13	0,012
28	<i>Lippia gracilis</i> Schauer	Alecrim da serra	8,3	14	0,032
29	<i>Hyptis Salzm.</i>	Alecrim de vaqueiro	8,3	10	0,008
30	<i>Sansevieria trifasciata</i> Prain	Espada de São Jorge	8,3	14	0,026
31	<i>Ptilochatea</i> sp.	Pau besta	8,3	2	0,079
32	Não identificada	Melão São Francisco	8,3	13	0,017
33	<i>Caesalpinia pyramidalis</i> Tul	Catingueira branca	8,3	18	0,009

The constituent elements of the Tuxá identity are evidenced in the knowledge practices related to the forests, which are part of its mystical universe. This relationship provides them with a knowledge, use and management of their plants that encompasses a dimension that goes beyond a simple prescription, but that permeates the universe of the sacred experienced in their healing rituals.

Graph 1: Frequency of citation and salience of Plants used in spiritual healing (Field Research, 2012).



Among the 39 plants mentioned for spiritual cures, caboclo rosemary (*accharis sylvestris* L), presents a higher frequency of citation. This result suggests that caboclo rosemary because it is a plant that has a wider range of use in both physical and spiritual healing is the first to be remembered. As for the salience index, both caboclo and juazeiro (*Ziziphus Mart.*) Rosemary obtained the same value (0.5). Suggesting that the two plants have a greater cultural representativeness of use in relation to the 39 mentioned.

IV. CONCLUSION

The Tuxá Indians have a thorough knowledge of their sacred medicinal plants and their healing power, which has been demonstrated in rich recipes.

The interference caused in the Tuxá territory, with the formation of the Itaparica reservoir, drastically affected its socio-environmental and cultural relations.

The impacts on the diversity of medicinal flora Tuxá, due to the submergence of its traditional territory,

jeopardizes the continuation of its tradition, with regard to the important elements for the follow-up of its ritualistic healing practices. In this sense, the dimensions related to the sacred were also quite compromised in the face of the transformations undergone.

The symbolic universe of the Tuxá people is essentially constituted by the cult of the Enchanted / Masters, saints, caboclos and gentiles, and this symbolic dimension is manifested through their interaction with nature, mainly with the forces of the waters of São Francisco and Caatingas forests.

However, these rich knowledge acquired through a history of interaction with nature and ancestral knowledge, are rapidly disappearing, due to deforestation and the accelerated cultural transformation, experienced by its people in the last decades, originating from hydroelectric enterprises installed in its territory.

Today, within the resistance and the proposition, the Tuxá indigenous people are looking for actions that enable the proper and fair use of biodiversity and the guarantee of the right to their material and immaterial heritage. As is the case with the struggles for the resumption of their traditional territories.

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Impact of Career Management on the Motivation of Public Sector Employees in Benin: Cases of the Directorate of Research and Quality (DEQ)

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Abstract— A company is above all a social unit whose goal is to group people, coordinate activities and establish the necessary organizational relationships in order to steer all efforts in the same direction. Thus, in an organization, there are various resources that contribute to its optimal functioning. Of all the resources, the human factor is an important element in achieving the goals set by the organization. With this in mind, a HRM policy is being implemented that covers several aspects including payroll management, personnel administration, career management, recruitment, training, conflict management, social consultation [1]. The motivation of employees is a determining factor in increasing the productivity of staff, and when investing in an organization, the employee hopes to be able to make a career there. The career progression opportunities available to him can also be decisive. This article aims to show the impact of career management on worker motivation, based on the case of employees of the Directorate of Research and Quality (DEQ). The general assumption is that the motivation of workers is partly related to the way careers are managed in this organization. The methodological approach boils down to documentation and semi-directive individual interviews with DEQ employees, who are chosen accidentally. The results show that the needs faced by executives are to make the business productive, competitive, and to generate profits. Thus, career management appears to be an asset for the DEQ, as an essential factor in maximizing its profits. The career profile is more known and readable, the more motivated the worker is and invests in his work.

Keywords— Organization, Motivation, Career Management, HRM Policy.

I. INTRODUCTION

A nation's economic and socio-political development is based on the human resources at its disposal. They play a key role in a country's development, which is why developing countries must make motivating these resources a priority in their concerns. This requires a good policy of developing human resources. Today, companies, whether public or private, are increasingly involved in the efficient management of staff and thus in place management focused on the needs of workers. This practice of promoting human capital, still called Human Resources Management or HRM, differs from one company to another. In reality, employees' work performance is influenced by the style of promotion of human capital developed within the organization. This influence can be positive or negative. For example, in a context where the employee may feel a slowdown in the momentum of work in order to reduce production if the employer develops an autocratic management style. On the other hand, the democratic management style that focuses on staff aspirations is a source of better performance on the part

of the staff (Assouman, 2010). Various financial, material and human resources contribute to the optimal functioning of the company. But of all the resources, human resources present themselves as the real wealth for the company, an important element in achieving the goals set. Indeed, the organization is led by actors with individual needs, aspirations and leading a life outside the organization. Life outside the organization (also known as "out of work") influences the individual's performance in the workplace, hence the introduction of an HRM policy to better supervise the worker both inside and outside Organization (Assouman, 2013). This policy covers several aspects including payroll management, personnel administration, career management, recruitment, training, conflict management, social consultation to name a few. Human resources management is about constantly adjusting the business skills needs and the skills of workers. Moreover, the density of the worker's social solicitations may lead him to invest in parallel lucrative activities (Koffi, 2005). Thus, the fact that the organization takes steps to reduce the worker's burdens

removes certain concerns. In other words, health insurance for the medical care of the employee and his family members is a source of motivation. At the Directorate of Studies and Quality (DEQ), the company makes employee motivation a priority in the implementation of its human resources management policy. Thus, as we have seen in the field surveys, in order to have a motivated staff, this public company makes human resources management policy a pivot of its overall management, notably by: strengthening staff capacity through regular training sessions for employees, the establishment of a home loan system to enable the employee to have a house, the establishment of an annual school loan system, - the introduction of medical coverage for the employee and his entitled rights holders. In addition, the Department of Human Resources is led by actors who listen to their employees, regardless of their personal activities. As an illustration, the Initiative to talk daily with employees on a given topic by showing an open attitude and attentive listening. The purpose of this interview is to verify whether the employees' feelings correspond to the lived reality. The manager is therefore empathetic and understanding. Discussions generally focus on the difficulties of collaboration between one employee and another, the desire to transfer to another department or agency, conditions and the work environment, etc. But what exactly is the case with career management, which, let us remember, is an integral part of human resource management? In other words, what career management policy does DEQ adopt to create and maintain employee motivation? Is the motivation of DEQ employees necessarily linked to the management of their careers? In other words, what explains the motivation for DEQ officers to work? These are all questions to which this article strives to give an attempt to answer, with the aim of showing the influence of career management on the motivation of public sector employees in Benin, based on the case of employees of the Directorate of Studies quality. Our general assumption is that the motivation of DEQ workers is partly related to the way careers are managed in this company. The work is structured around methodology, results and analyses followed by discussion. The conclusion reviews the main results obtained and sheds light on the social and scientific scopes of the study.

II. METHODOLOGY

In this article, we focus on career management as a key motivator for human resources. In other words, we try to understand the motivation of employees as arising from the

human resources management style in general, but also and above all as a result of career management. This work, which is non-experimental research, is supported by a methodological approach that encompasses both documentary research, semi-directive interviews with DEQ agents and manual stripping of the information collected. Dialectic and content analysis serve as a reference method and technique respectively to explain worker's behavior in relation to career management. Documentary research was the first step in collecting data. The documentation used is derived from scientific articles and works, administrative documents, study reports. For this data collection phase, we went to the archives and documentation department of the Ministry of Public Service and Social Affairs of Benin, and to the Documentation Centre of the French Institute. We also used online documentation through persee.fr and revues.org sites. The documentation was supplemented by semi-directive one-on-one interviews with DEQ employees, who were chosen by accident (technical at all coming). The place of human resources in the organisational system of the DEQ; Motivating factors for employees at THE DEQ; human resource management and career management are the themes around which the interviews are focused. The study population includes all workers working within the DEQ. In other words, all individuals, regardless of gender and rank, who are employed as employees of that company are part of the study population. As a result of the procedures, only the Central Human Resources Service and a local agency based at Akpakpa were allowed to do so. These two structures total 32 and 18 officers respectively. We therefore found it irrelevant to be a sample, given that the population is small and the survey is essentially qualitative. Finally, the results of the study were generated by manual counting and interpreted from the content analysis and dialectic method. Finally, it should be noted that the choice of the DEQ is linked to two reasons: it is one of the oldest public companies (since 1966) and has better national coverage with 36 agencies or an average of 3 agencies in each department of Benin.

III. RESULTS

Before addressing this part, we propose to clarify the concepts of career and motivation for a better understanding.

Clarification of career and motivation concepts

In the professional world, career is defined as a suite of duties and activities related to a person's lifelong work that is associated with particular attitudes and reactions. The

concept of career has an individual component and an organizational component (Gutteridge, Leibowitz and Shore, 1993). For the first component, the term career can be defined from the perspective of an individual's work experiences. It is a question of observing the crucial steps that mark the career progression of a particular person (Gutteridge, Leibowitz and Shore, ditto). These steps are not necessarily precisely determined; they vary greatly depending on the occupational categories to which workers belong, the culture and organisational structure, the preferences of individuals and their aspirations, etc. Thus, obtaining a promotion is an example of a crucial step in a career. Career paths affect individuals and organizations. They affect people's performance at work, their satisfaction, health and well-being. In terms of the organizational component, career management is about planning for workforce movements to retain skilled employees and meet future organizational needs. It is therefore a system that reconciles the professional aspirations of employees with the needs of the organization [2]. The implementation of this system requires the company to analyze the information accumulated from formal or informal performance evaluations, so that it can then identify the best-performing employees and encourage them to access positions with greater responsibilities by providing conditions conducive to their development (Gutteridge, Leibowitz and Shore, 1993). In summary, the career encompasses the career path of the worker, from recruitment to retirement. That is to say, from his first service to his legal cessation of professional activities through transfers and promotions. This career path concerns both the worker and the employer who engage in a perpetual negotiation process with a view to achieving mutual satisfaction (Deshommes, 2008).

In general, motivation is what drives action, i.e. all the reasons that explain an act (Larousse, 2008). Psychology defines motivation as a set of dynamic factors that direct an individual's action toward a given goal and cause a given behaviour (Gacha, 2010). Motivation is the process that regulates the individual's commitment to a specific activity. It determines the trigger in a certain direction with the desired intensity and ensures its extension until the outcome or interruption. Motivation is equated with an "energy reserve": it refers to zeal, desire, aspiration to overcome one condition to reach another. According to Bory and al. (2005), motivation to work is a set of energy forces that come from both human beings and their environment to stimulate work-related behaviour, and to determine their form, direction,

identity and environment. Duration. The concept of motivation has often been used to explain behaviours such as absenteeism. Manon (2005) and Viviant (2005) examined the link between motivation and absenteeism. The first reveals that absenteeism and attendance are the result of pressure from the demands of the subjective work environment. The second states that job satisfaction is an indicator of motivation, but is by no means a cause, since the former is more of a feeling and the second is more of a process. Therefore, the less motivated the employee is, the more absent he or she is. Motivation at work is thus the strength that drives the individual to surpass himself, to make sacrifices to excel in his field and above all to enable his organization to achieve its goals. Ultimately, motivation can be understood as a mental and behavioural process that influences the individual's participation in any activity [3]. In our case, it is influenced by the career management policy practiced at the DEQ. The survey allowed us to identify some motivating factors on which the DEQ is stepping up its management and which are supposed to improve both the working environment and the standard of living of the employee. The first factor is remuneration: according to the information gathered, employees appreciate their basic salary and regularity, but are also aware that this salary can evolve at the same time as their career. Without giving any information on the base salary, employees feel that salary and also performance bonuses and benefits reflect the notoriety of the DEQ. Mr. E., a senior executive at the DEQ, confirms this thesis: "I cannot tell you my salary, but I can tell you that what I receive here is far greater than what friends of the same rank receive in the competing companies, whether they are public or private. Being an employee of the DEQ is like a privilege... ». The second factor is the legitimate desire for the employee to own a home: for this, a home loan system has been instituted to facilitate the acquisition of a house, in partnership with a local bank. The words of the material manager reinforce this idea: "With this home loan system, I have 4 years at most to live in my own house, the house I have always dreamed of having and it is thanks to the DEQ." The third factor is the employee's ability to make a successful start to school: a school loan system has also been set up to allow each employee to manage school fees and related accessories. The fourth factor is the employee's desire for training: Building the capacity of staff is one of the elements that enable the company to provide real skills. The fifth factor is the medical care that staff receive: getting treatment and caring for their families is a constant concern of the employee. Health insurance for the

medical care of the employee and family members is a source of motivation. The sixth factor is decorations and rewards. The DEQ has put in place a motivational mechanism that allows merit to be recognized among staff. These are factors that can motivate employees to excel. The seventh factor is the granting of a means of travel to all DEQ employees without distinction. These seven factors are the shield of the DEQ's human resources management policy. While all other aspects of HRM are taken into account in this undertaking, the factors mentioned above are the essential elements on which the company bases its staff strategy [4].

Motivating aspects of DEQ's human resources management policy

Compensation and rewards. Speaking of remuneration, the base salary is set by inter-ministerial decree and it is the same for all salaries in the Benin public sector. The DEQ has aligned itself with this base salary to set that of its staff, but it evolves according to the occupational category of the employee. Depending on whether you are a design officer, a master's officer or an enforcement officer, the salary differs from one category to another. It is worth noting that switching from a given category to a higher category results in a subsequent increase in the employee's salary. However, the misallocation of wage increases can be frustrating and affect the enthusiasm for "aggrieved" employees at work. This is deplored by some employees: "Everyone's efforts must be rewarded in the same way and should not be based on the affinities between decision-makers and employees. Injustice in the allocation of certain benefits and bonuses sometimes frustrates and creates a bad social atmosphere." But, in general, DEQ employees say they are satisfied with their salary condition. They also believe that the company can do more: "The wages we receive are acceptable. It is good pay; you can still take care of yourself and feed the family. But, the company can make us a salary increase because of the high cost of living." The DEQ also focuses on rewards to reward employees who have put more effort into production. The company, based on the profits and dedication of the employees to the task, offers them a sum of money or distinctions to encourage them in their momentum. The DEQ has included in its policy of motivation the system of school and real estate loans. At the beginning of the academic year, the school loan system allows employees to have a financial envelope to cover back-to-school expenses such as the purchase of supplies. The home loan system

allows the employee to own a home. The acquisition of the land and land is managed by the Legal Affairs sector, which conducts investigations to ensure that the land is not the subject of litigation and that the employee is not at risk in the acquisition of a home of interest. This is facilitated by partnering with a local bank to make the funds available. For their medical coverage, employees receive medical care ranging from 60% to 90% and which extends to spouses and children. Regarding career management, some respondents revealed that this policy is not very transparent. They feel that the employee's evolution is not well followed and some find themselves disadvantaged when it comes to moving from one category to another. The appointment of an employee to a higher rank is a function of the affinities that bind certain employees to decision-makers. As a result, the merit or intrinsic value of the recipient is not often the basis of the appointment or promotion. The various interviews with employees revealed that the career management policy is still in the embryonic stage within the DEQ. According to one respondent, "the evolution of employees within the structure is not well developed, which makes the growth within the company a little opaque." It is easy to see that career management at the DEQ is focused on the diploma system, so that an employee with fewer years of experience, but who has a high degree, has rapid progress and has a position of responsibility in the at the expense of an employee who has several years of experience, but who has returned to the DEQ with a relatively lower degree. For the latter, progress is more slow. As for the training policy, it includes several stages: the mandatory stadium, the stadium on demand, and the stage of necessity. The mandatory stage is the training that all DEQ employees receive; The purpose of this training is to familiarize newcomers with the realities of the organization and its areas of action. On-demand training is done by employees themselves who at some point feel that they need training in a specific area to be even more effective and identify new realities that are relevant in their field. Necessity training occurs when the training service feels that a service needs an update of its working methods and that this is essential to make it more efficient. A travel tool is granted to all employees without distinction. Also, the establishment of a mechanism to recognize merit among staff is also a real means of their motivation to work according to another respondent. As a result, the mere knowledge that he or she can receive a decoration or reward is a factor that may motivate the salaried to give the best of himself to work. Communication is accentuated on the relationship between supervisors and subordinates, collaboration between

employees, conflict prevention and management, cleanliness of premises, etc. Seminars are organized to educate workers about the professional relationships they must have with each other, how to give orders, how to remonstrate to avoid frustration. All of the aspects discussed above are the main thrusts of the DEQ's human resources management policy. For the managers of this organization, the company's performance is determined by the willingness of employees to make it more efficient [5]. The employees interviewed pointed out that this way of thinking about the human aspect in business motivates them because their interests are taken into account. They also confirmed that there is a marked improvement in the company's performance when new arrangements are made by the company's executives for employees.

Impact of career management on worker motivation

- Career management practice

According to Guerin and Wils (1992), the process of career management in organizations consists of three stages: planning, implementation, and evaluation. Planning involves first informing employees of the career opportunities that exist in the organization and then developing a career plan. The implementation of the career management process involves identifying specific or specific problems that are impeding the career and, on the other hand, implementing organizational practices that aim to help employees orient their careers (training programs, mentoring, job rotation, etc.). Evaluation is about establishing the relevance and effectiveness of the career management process. Determining performance criteria allows us to assess whether the system is able to both meet individual needs and provide the company with a competent, available, mobilized and ready-to-take over workforce.

Career planning at DEQ

Career planning consists of activities that allow the individual to set career goals that are commensurate with their abilities and interests. The DEQ provides assistance to the employee, although the process related to this step belongs to the employee. The organization helps them discover their career preferences by offering career-choice training workshops, documentation, software and videos so that they can make a thoughtful and realistic choice. Once this step is completed, a second step is taken: to formalize the career plan between the employee and the employer. The

career interview follows a performance evaluation and is used to formalize the career plan.

Implementation of the career plan at the DEQ

The implementation of the career plan is divided into two stages. First, the DEQ identifies career planning practices that will achieve career goals. Second, it offers ways and tools to solve the potential problems of career progression. The implementation of the career plan is to identify practices that will enable employees to achieve the career plan established in the first phase. Career development requires accessible and relevant training programs. Assisting in solving individual career-related problems is a crucial step in the implementation phase of career management, as it helps employees overcome their difficulties. This aspect is not too thorough at the DEQ, which can prove to be a handicap in career management. The employee's progress can also be facilitated by sponsorship, professional assistance, assignments to challenging tasks. A series of support activities such as role-playing, counselling and friendship are designed to help the beginner worker shape his or her own identity (Benabbou, 2007).

- The importance of career management

As the workforce becomes more and more trained, its expectations increase, particularly with regard to the opportunities a company can offer to progress both individually and professionally. Businesses are facing an increasingly difficult situation: on the one hand, they recognize the need to meet the needs of qualified employees by creating the conditions for them to achieve their professional goals and remain in the company; on the other hand, they are aware that opportunities for promotion are increasingly limited due to the new structures put in place and sometimes the limited opportunities for advancement that may arise within organization. Nevertheless, career management is at the heart of human resource management. As noted, many authors agree that career management is a process that balances the needs of individuals with those of the organization. However, despite its many advantages, career management must take into account several considerations: it should not be lost in the view that DEQ employees have aspirations that differ according to individual characteristics such as personality, educational attainment, age and gender, and not all of them necessarily approach their careers in the same way.

IV. CONCLUSION

To motivate an employee, several tools are available to the manager. It must be able to add value to the problem, explain its consequences and build a detailed plan of measures to be implemented to combat the problem. Thus to motivate, the manager must meet the different needs of employees, such as: the need to belong, versatility, need for accomplishment, and need for recognition.

The issue of HRM has been extensively studied and the results generally show that the motivation of the human factor is a prerequisite for increasing organizational performance. The levers of HRM are generally put to the credit of the positive results obtained by the organizations, without any distinction between these levers being made [6]. It is this inadequacy that our study attempted to address by emphasizing the impact that career management can specifically have on workers' motivation. Compensation based on acquired skills and not on the position held must accompany the efforts of those who have acquired new knowledge. By doing so, staff motivation will always be enhanced, productivity increased and organization performs well, in an increasingly competitive environment. The worker has needs that characterize his goals or determine his choices. In these circumstances, his involvement in the life of the organization and his motivation to the task are determined by the satisfaction of his personal needs. When his needs are not taken into account, the employee suggests a lack of motivation that has the effect of slowing down the work. Although it is a public organization, the aim of the DEQ is to keep staff always motivated to avoid bankruptcy as much as possible. In this context, we have also seen that the needs faced by executives are to make the business productive, competitive, and to generate profits. In the end, the management of careers, which should be remembered, is an included component of human resources management policy, appears to be an asset for the DEQ, as an essential factor in maximizing the company's profits. Finally, it must be said that this work is inspired by previous work on the organizational factors of worker motivation. It places particular emphasis on the impact that career management, as an organizational practice, can have on workers' performance, or at least on their motivation to produce more for the organization. However, some aspects could not be elucidated, such as the level of effective contribution of career management to motivation. Measurement and assessment scales would have filled this gap. Further studies could therefore examine the issue in order to determine the actual

level of the impact of organizational practices on the motivation of salaries, its influence on the corporate culture.

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The actions of an NGO in proposing contextualized education towards coexistence with the semi-arid region

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Abstract— *The purpose of this article is to discuss the actions of a non-governmental organization in proposing contextualized education towards coexistence with the semiarid region, taking into consideration its outcome when contributing to formal education and professional development in the community of Massaroca, in Juazeiro-BA. We start from the understanding that education in perspective will allow individuals to be re-signified in spaces in which they live and an expansion of flavors that they already dominate in their daily lives, while conditions are necessary for the construction of citizenship.*

Keywords— *Coexistence, Contextualization, Education, Semiarid.*

I. INTRODUCTION

The introduction of the paper should explain the nature of the problem, previous work, purpose, and the contribution of the paper. The contents of each section may be provided to understand easily about the paper.

Contextualized education has become essential when thinking about the relationship between education, culture and territories as a way to overcome certain dichotomies and the homogenizing effect of decontextualized educational practices, but also to counter the worldview and thought that instituted a discourse on the Brazilian Northeastern semiarid region as being something behind the times, underdeveloped, where people are seen as ignorant and inferior.

It should be noted that this dominant worldview was conceived in the light of rationalist, mechanistic and utilitarian thinking, having in modern science the necessary support for the culture-nature, superior-inferior dichotomies, among others, to be established in the perceptions and values of the subjects.

This logic has perpetuated itself in Brazil since its colonization, in view of the ethnocentric concept of man and culture present in the dominant discourse, which in turn, further accentuated these dichotomies, for which this colonization meant not only the domination of territorial spaces, but above all, the imposition of European culture

to the detriment of local culture. However, this domination also took place through historical resistance and struggles of the indigenous peoples living in Brazil, where education was a mechanism for the alienation and the devaluation of the knowledge of these traditional peoples.

Nowadays, this hegemonic discourse is still prevalent in Brazilian education, since the idea of development rooted in global models is a camouflaged way of reproducing and reflecting the superior-inferior dichotomy around regions, places and people by means of the decontextualization of local realities.

Therefore, it will be necessary to break with this worldview in order to implement educational actions that bring new perceptions to the subject about himself and about the world in which he lives, in the perspective of coexistence with the semiarid region, through the appreciation of local knowledge and existing ways of life.

Given the above, we will present and discuss the contributions of the non-governmental organization Associação de Desenvolvimento de Ações Comunitárias (ADAC) in proposing a contextualized education in the perspective of coexistence with the semiarid region, in partnership with various sectors of society such as the Universidade do Estado da Bahia (UNEB), as part of a network that articulates and mobilizes people in the

community, highlighting the socialization of knowledge and successful experiences.

II. METHODOLOGY

We started from a qualitative approach both in procedures and in analyses, with a view to deepening the discussions on the theme, understanding the institutional dynamics, as well as the value that the subjects give in this process of articulation of the contextualized education proposal and of the community.

We developed the study at the Associação de Desenvolvimento de Ações Comunitárias (ADAC), which is located at Rua dos Ingleses, Centro, Juazeiro-BA, utilizing interviews with two technicians responsible for the pedagogical coordination, as well as consulting the institution's documents and archives, such as photos, projects, plans, etc.

III. THEORETICAL FRAMEWORK

Based on the researches developed by Carvalho (2011), Queiroz (2015) and Lima (2010) on the coexistence with the semiarid region, it is understood that the discourses instituted around this coexistence have been consubstantiated as an alternative for sustainable development, focused on the promotion of citizenship and the improvement of people's quality of life, that is, a re-appreciation of the nature and the subjects' perception of the world in which they live.

We notice that, throughout history, there have been several meanings for the term 'coexistence'. One of them culminated in the idea of inaction towards climatic conditions of the semiarid region, or rather towards the "problem of drought". On the other hand, another reading elicited the return to the past, in which the society would be sustained only by the primary activities that satisfied their basic needs.

However, Carvalho (2011) argues that the participation of several organizations in social networks made it possible to reflect on this "coexistence with the semiarid region" idea-project, mainly in view of the role of social actors in implementing programs and actions related to water and education.

For Lima and Silva (2010), the perspective of coexistence consists in changing attitudes towards nature in order to establish development parameters that take advantage of the potentialities offered by the environment, because

The coexistence with semiarid conditions requires a change in the way one looks at the reality of the place, as well as new insights that help to remove the blame attributed to natural conditions and look at the regional space with its own characteristics considering the stereotypical images that over the years have spread among the people of the semiarid region. (LIMA & SILVA, 2010, p.05)

This idea of semiarid in coexistence has been strengthened by the programs and actions developed by NGOs, the State, civil society and other institutions, since they have created alternatives and possible solutions for the problems that the people in the countryside face, but it has also contributed for the subjects to recognize themselves in this semiarid territory and to build their learning about the world.

It is in this sense that contextualized education is largely linked to the idea of coexistence with the semiarid region, because it is necessary to contextualize knowledge so that there is meaningful learning that contributes to the awareness of the subjects and that makes it possible to open new paths for local development and also collaboration among these social actors in the construction of a new rationality.

IV. ANALYSES AND DISCUSSIONS

In this section, we will discuss the importance and role of the Associação de Desenvolvimento de Ações Comunitárias (ADAC) in proposing projects aimed at contextualized education, under the perspective of coexistence with the semiarid region, since the education offered at most schools is based on misconceptions and wrong values about the reality of the region and of the local culture.

The Associação de Desenvolvimento de Ações Comunitárias (ADAC) is a non-governmental organization (NGO), formed from the idea of some researchers associated with Embrapa Semiárido and others, whose goal was to develop projects related to solving problems experienced by urban and rural communities in the semiarid regions through participatory methodologies.

This NGO initially appeared in 1989, but only on December 29, 1994 was it legally constituted in the territory of Juazeiro-BA as a private nonprofit organization. Among the actions developed by the ADAC, the most noteworthy of these is its role in proposing a contextualized education through pedagogical assistance to

the Secretarias Municipais de Educação (SEC) and in the continuous training of teachers and educational managers. Although they have several lines of action, such as: education, gender, environment, municipal planning and promotion of the rights of children, adolescents and rural youth, their predominant focus is on contextualized education.

Throughout its history, the ADAC has developed approximately 16 projects related to sustainable development. Since they depend on funding from other bodies and/or institutions, this entity's action is subject to the approval of proposals obtained by submitting projects in public notices. In addition, they promote the certification of managers and deputy managers of schools in the municipality of Juazeiro-BA.

According to information provided by the ADAC, the greatest experience of this entity was in articulating the construction of the proposal for the Escola Rural de Massaroca (ERUM) and for the Centro de Formação Rural de Massaroca (CENFORM), located in the municipality of Juazeiro-BA, which had an international Brazil-France cooperation through the Associação Serra Serrana and other partnerships.

It is noteworthy that this experience culminated in the discussions held in the community where they sought to develop a local development project. And education was of paramount importance in this process, since being a socializing element and disseminator of knowledge, it would meet the community's aspirations. (REIS, 2011)

Thus, this project was elaborated in 1992 with the effective participation of the community and had the support of *Communauté Economique Européenne* (CEE) and *Comité Catholique Contre la Faim et pour le Développement* (CCFD). They sought to develop a new education, or rather, to contribute to formal education so that it could elevate its productive processes through the professional development of human resources in the community of Massaroca.

We observe the contributions of the ADAC to this project not only in the development of techniques and the dissemination of knowledge, but above all, in the strengthening of the community as civil society and its participation in the formulation and achievement of proposals suitable to the place. It can be said that these actions and practices dialogue with the concept of education that is based on environmental sustainability and the construction of new coexistence relationships between people and nature. For Carvalho (2011), this orientation

towards coexistence results in a new "institution" because it associates its educational, productive and organizational actions based on a dialogic, contextual and relativist rationality, with the semiarid nature, culture and territory. Therefore, it argues that:

The basis for this environmental rationality is the "contextualization of knowledge". More than a methodological foundation, present in the actions of "Coexistence", in its different ways of using them, is the recovery of the thinking subject, the appreciation of non-scientific knowledge and of perception as valid forms of knowledge, so denied and set aside by Modern Science. (CARVALHO, 2011, p.187)

In this perspective, it is understood that the defense for contextualized education, present in the ADAC proposals, is justified by the need to empower the subject so that he broadens his view on the reality in which he lives and can perceive the existing possibilities.

Hence, it is necessary to contextualize knowledge with the local culture in the teaching-learning process, so that the potentialities and limitations of the semiarid region are highlighted as a means of producing new knowledge and disseminating technologies suitable to the semiarid reality.

V. CONCLUSION

The experiences we have encountered when getting to know some practices and projects have enabled us to reflect on the importance of these actions as strategies for coexistence with the semiarid region, which in turn, reinforce the idea of re-appreciating the concept of semiarid nature, when exposing its potentialities.

The good use of natural resources and the appreciation of the countryside's cultural identity are aspects identified in this new rationality, in addition to the feeling of belonging that is attributed to this territory. The ADAC plays a role in that, in a way that mobilizes people and communities under the perspective of "learning to coexist" as well as in the articulation of networks for the exchange of knowledge and collective experiences.

A conclusion might elaborate on the importance of the work or suggest applications and extensions.

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Economic Engineering: Economic Viability of Industrialized Mortar Applied with Projector and Applied in the Conventional Form

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Abstract— The present article analyzed the return and risk bound to the execution of coating in mortar, from the two possibilities of execution, being mechanically designed or manually, plated by hand. The main difference between the two mortars is in the execution process, being the hand-plated mortar made by the mason with the aid of a spoon, allowing the application and the closing of the mortar, already for the execution of the projected mortar uses mechanical equipment to apply the mortar to the substrate. It is an applied research as to its nature, descriptive as to its purpose, case study on the strategy to approach the problem. For the development of this research was assumed a commercial / residential venture, which will be coated with industrialized mortar, with an estimated demand of 9,497 m² or 189,94 m³ and estimated 20 days of service execution per month. As for productivity, for the projected mortar coating, will run 60.00 m² per day and worked 5 hours / day. As for the productivity of the coating of hand-plated mortar, will run 20.00 m² per day and worked 8 hours / day. Regarding the composition of costs for services and labor, the unit costs of the SINAPI Reference Worksheet (National System of Prices and Indices for Civil Construction), of the period of preparation in August / 2018, were used. the information and data necessary for structuring the projected cash flow in the respective periods (24 months), using a TMA of 8% pa For the analyzes of risks and returns involved, the Multi-Index Methodology was used. The two executive methods have a high return. The confirmation of the values is based on the Monte Carlo simulation using the Crystal Ball software, which is considered as uncertain variables, or input variables for the simulation, the quantity 9,497 m² of coating for 24 months of execution.

Keywords— Economic viability. Mortar. Coating. Designed. Chapada.

I. INTRODUCTION

In view of the current Brazilian economic scenario that we have been facing, we have faced the need to reduce expenses, and in return, the quality of services and products offered must be preserved. Consequently, through these requirements, the search for differentiated construction methods, new materials and technological innovation has become fundamental, always guaranteeing the quality of the final product offered.

The mortar coating is considered to be one of the most performed services in civil construction, and according to Carneiro (1993), because it is a coating in external mortar, its main functions refer to the contribution in the water tightness of the facades, for the thermal and acoustic comfort of the built environment, for fire safety and good visual appearance, providing harmony to the building. By satisfactorily fulfilling these functions, the required

performance of the external mortars is obtained. However, more and more skilled labor has become scarce, requiring construction companies to invest in new construction techniques where the number of professionals is reduced and the quality of the final product is maintained or exceeded.

As for the mode of application, the coating mortars can be divided into hand-drawn mortar and projected mortar.

The plated mortar is known as the manual execution process performed by the mason with the aid of a spoon, allowing the application and closing of the mortar (PEREIRA JUNIOR, 2010). Already for the execution of the projected mortar mechanical projection equipment is used to apply the mortar on the substrate.

In Brazil, as well as in developing countries, the execution of mortar coatings with continuous mechanical projection has grown in recent years, and its use has great

potential in contributing to the improvement of the quality of mortar coatings.

Defined as a technological innovation, the execution of the projected mortar demands qualification of the workforce, and consequently, it offers a significant reduction of cost, acceleration of the rhythm of the work and the process of execution of the coating.

Based on the above considerations, the economic viability of a Civil Construction enterprise was analyzed, with the objective of verifying its economic capacity, given the profitability - or not - of the adoption of materials and equipment, compared to the external coating service of façades, executed with mortar designed (mechanically) and with mortar plated by hand (manual), taking into account the reduction in costs and deadlines. The analysis was based on the Multi-Index methodology, two sets of indicators, the first being VPL, VPLa, IBC and ROIA, to evaluate the perception of the return of the activity, while the second set includes the IRR, TIR Index / TMA, Risk Management and Business Risk, aiming to improve the perception of risk, with Monte Carlo simulator application, through the Crystal Ball software simulator.

II. THEORETICAL FOUNDATION

Civil Construction in the world is developed through different techniques.

In Europe, the United States and the United Arab Emirates the buildings are constructed from galvanized steel frame structures with glass closures. In Brazil, the constructions are composed of elements in reinforced concrete and masonry sealing walls of ceramic blocks or concrete blocks.

These differences between the construction systems are due to the availability of natural resources, raw material, water, among others. To provide a good finish, these materials require the application of coatings that give surfaces adhesion, dewatering ability, mechanical strength, wear and durability.

According to Brazilian Standard 13.281, mortar is the homogeneous mixture of aggregate (s), inorganic binder (s) and water, with or without additives or additions, with adhesion and hardening properties, and may be either on site or in an own facility (industrialized mortar).

Mortars can be produced in construction sites (manually or in concrete mixers), produced in central, bagged, or supplied in silos.

The mechanically designed mortar comes as a strong allied to the new requirements of the construction industry. Increased productivity and increased coating quality are characteristics provided by the use of mortar designing equipment, provided care is taken (ABCP, 2012). In order to reach the desired standard, the specifications recommended by the equipment manufacturer and the mortars must be followed, ensuring the full operation of the projectors (ABCP, 2012).

2.1 Economic engineering

Economic engineering is a discipline that represents the set of principles and techniques necessary for making decisions about investment alternatives, evaluating the long-term investment.

The Multi-Index Methodology is intended to support the decision-making process in the acceptance and rejection of investment projects through the use of various indicators. The use of the various indicators comprises more consolidated information than using indicators in isolation.

The Multi-Index consists of using two groups of indicators. The first group is formed by VP (Present Value); NPV (Net Present Value); VPLa (Annualized Net Present Value); IBC (Benefit / Cost Index) and ROIA (Additional Return Due to Investment). However, the second group is formed by the TMA / TIR (Minimum Attractiveness / Internal Rate of Return) indicators; Risk Management and Business Risk. The two groups aim to improve the perception of the project analyzed.

There are several methods to evaluate an enterprise, among them we highlight:

- a) Simple Payback
- b) Discounted Payback
- c) Net Present Value (NPV)
- d) Internal Rate of Return (IRR)
- e) Internal Rate of Return (TIRM)

Simple payback is defined as the number of periods (years, months, weeks) to recover the initial investment. In order to calculate the payback period of a project, it is sufficient to add up the values of the cash flows, until this sum equals the value of the initial investment. The payback period is found as the cash flows "pay" investment.

Discounted payback is similar to simple payback, but with the addition of using the minimum attractiveness rate (TMA) before summing the cash flows.

The net present value (NPV) method consists in bringing to zero date, using the company's or project's TMA as the discount rate, all the cash flows of the investment and adding them to the initial investment value.

The IRR is the rate of return of the enterprise, considering the amount of money in time. It is the discount rate that zeroes the net present value of the cash flows of a project, that is, it causes all inputs to equal all the cash outflows of the project.

Considering that the mechanization of the processes reduces personnel expenses and increases productivity, a civil construction company specializing in the application of road coverings will be evaluated. Through the calculations of simple payback, net present value (NPV) and internal rate of return (IRR), at an estimated minimum attractiveness rate of 8% per year, the acquisition of an industrialized mortar projector was evaluated in comparison to hand of conventional work.

The equipment under analysis is the Menegotti Mortar Projector, which according to the manufacturer's specifications, has a mixing capacity of 150 liters, a pressure of 30 Bar, requires a three-phase voltage of 220 volts, with working autonomy for 5 hours per day. While conventional manpower produces about 20.00 to 35.00 square meters of daily towed area, the industrial mortar projector produces about 250.00 square feet per day. The area covered by the projector is about 40 meters horizontally and 20 meters vertically. In addition to increasing the coverage area, it reduces the amount of splicing in the plaster and reduces the use of scaffolding and rocker arms.

To obtain the cost of preparation of the mortar for the coating, the tables of SINAPI (National System of Prices and Indices for Civil Construction) were used. The values obtained for the industrialized mortar were measured in cubic meters per month and the number of employees was estimated from the monthly production predicted as a function of the number of operators; helpers and equipment.

2.1.1 Simulation of Monte Carlo and Crystal Ball

In the simulation of risk analysis, "one type of simulation in a spreadsheet is the Monte Carlo simulation, which generates random values for uncertain variables, repeatedly, to simulate a model" (CHARNES, 2007, p.6).

According to Jeronimo (2017), the Monte Carlo simulation is a powerful tool to support the decision-making process as well as the definition of strategic goals in companies. Through their use, managers can respond to the probability of an outcome occurring before making a

decision, which was previously based on the result derived from a few specific scenarios. Its use is indicated for any stage of the planning process that involves decision making and risk, mainly in the support of the strategic planning budget, which is used to support the analysis of important medium and long term decisions.

Recent technological developments have made it possible for this type of study to be made accessible to companies in general. Currently there are several software that carry out this process, and they are inserted in electronic spreadsheets or in specialized budget planning systems. An example of a tool that makes Monte Carlo simulation possible is Crystal Ball.

Crystal Ball is an easy program to perform forecasting and risk analysis by eliminating uncertainty in decision making. Through the power of simulation, Crystal Ball becomes an effective tool in the hands of a decision maker (CHARNES, 2007, p.1).

Through the process carried out based on the application of the Crystal Ball method, one has more security, because in this procedure the projection, the probability of reaching the profitability of an enterprise, the variables that most affect a forecast are realized, helping to maintain competitive advantage, unlike other risk analysis and forecasting simulation programs.

III. METHODOLOGY

Consistent with the current reality of an increasingly competitive and demanding market, the industrialization of construction systems is essential for companies seeking to stay in the market and seek to offer products that meet acceptable technical and financial standards.

As already pointed out above, the consumer market for mortar coatings is expanding, being one of the most relevant services in Civil Construction, where contributions are fundamental to the work, and justified due to the scarce labor force, the implantation of technological innovations, in the case, through mortar designed mechanically.

This research is characterized as descriptive, aiming to demonstrate from an analysis the costs of the production of mortar coatings, the risk and return perspectives, identifying the most prosperous way of execution of mortar coatings, being mechanically designed or manually, hand-plated.

Characterized as an applied research in relation to its nature, since it intends to generate knowledge for practical applications directed to the solution of specific problems.

For the development of the present research was assumed a commercial / residential venture, which will be coated with industrialized mortar, with an estimated demand of 9,497 m² or 189,94m³ (thickness of 2,0cm) and estimated 20 days of services execution a month.

In this venture, we opted for the acquisition of a mortar projection machine, whose investment demands R \$ 65,732.37 reais. This technology aims to reduce costs, ensure quality and expedite the completion of services.

As for productivity, for the projected mortar coating, will run 60.00 m² per day and worked 5 hours / day. For a satisfactory yield a team of three specialized employees is required, being a servant in charge of preparing the mortar and operating the machine, a mason to design and after a mason to sew and finish.

As for the productivity of the coating of hand-plated mortar, will run 20.00 m² per day and worked 8 hours / day. For a satisfactory yield a team of three employees is required, being a servant responsible for moving the mortar to the place of execution, and two masons for plating, finishing and finishing.

Regarding the composition of the costs for services and labor, the unit costs of the SINAPI reference sheet (National System of Prices and Indices for Civil Construction), of the elaboration period in August / 2018 with exemption, were used.

IV. RESULTS

4.1. Investment initial

For Buarque (2004), the objective of the investment stage is to determine the financial resources needs to execute the project, put it into execution and guarantee its initial operation. The initial investment of the project is formed by the purchase and installation of the machines / equipment, and EPI's (Individual Protection Equipment). Table 1 below shows the values for the initial investment of the project, with acquisition of a mortar projector.

Table 1 - Initial Investment for Mortar Projector Acquisition

Description	Price (R\$)
Acquisition of Mortar Projector	65.732,00
Epi's	1.500,00
TOTA	67.232,00

Source: produced by the authors

It is verified that the volume of investments, necessary to start the activities of the company in analysis is of R \$ 67.232,00.

We consider that for the company that will use hand-plated mortar, it would only have initial investments related to the acquisition of PPE.

For the calculation of viability, the fixed costs, variable costs, investment values, taxes and number of employees required to carry out such operations were taken into account. The cost summary is shown in Tables 2 and 3, showing in detail the expenses for mechanically designed mortar and mortar applied by the traditional method, respectively. After the costs were raised, a minimum profit equivalent to 29.79% and 34.24%, respectively, was estimated for the projected and manual. For the composition of labor costs, the costs with FGTS, INSS and 13th salaries were calculated.

Table 2 - Monthly Costs for Projected Mortar

FACADE WITH PROJECTED MORTAR				
Description			PRICE (R\$)	TOTAL (R\$)
Industrial mortar for plaster	24	m ³	590,10	14.162,40
Labor	1	month	6.551,36	6.551,36
Third party services	1	month	730,00	730,00
Water	1	month	300,00	300,00
Rental of suspended scaffold, type fachadeiro, capacity of 250kg / m ²	1	month	600,00	600,00
Electricity	1	kW/month	400,00	400,00
SUBTOTAL				22.743,76
			Lucro	29,79%
				32.392,08

Source: produced by the authors

Table 3 - Monthly Costs for Hand-Held Mortar

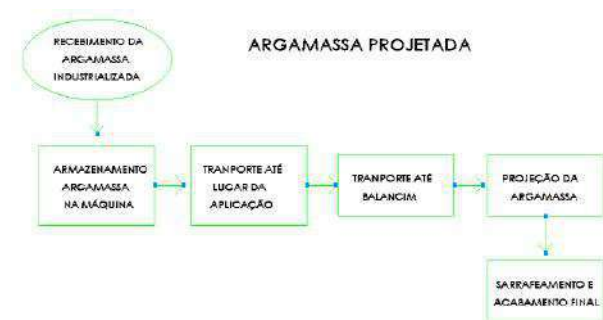
FACADE WITH ARGAMASSA HINGED				
Description			PRICE (R\$)	TOTAL (R\$)
Industrial mortar for plaster	24	m ³	590,10	4.720,80
Labor	1	month	8.090,33	8.090,33
Third party services	1	month	3.900,00	730,00
Water	1	month	300,00	300,00
Rental of suspended scaffold, type fachadeiro, capacity of 250kg / m ²	1	month	600,00	600,00
Electricity	1	kW/month	200,00	200,00
SUBTOTAL				22.743,76
			Lucro	34,74%
				32.392,08

Source: produced by the authors

It is evidenced that the expenses with material in the mechanized method are 3x higher than the conventional method, and this is due to the fact that the expected productivity is higher (24.00 m³ per month), although the input is the same - industrialized mortars. Compared to the item labor, one observes a greater expense referring to the traditional method, while the mechanized method does not need exaggerated human involvement, in controversy, the other one is based on the work mostly human.

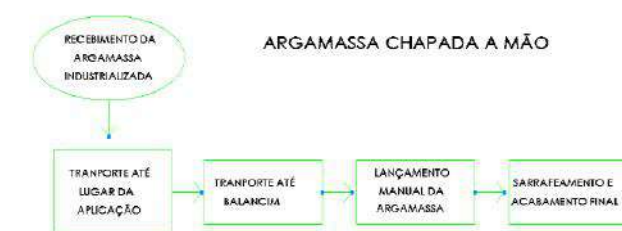
It was considered that the mortar supplied for the works would be of the industrialized type, dosed in central. The acquisition of mortar of the industrialized type, guarantees uniformity in the trace and confers superior

quality to the coating. A flow chart was established, as shown in flowchart 1 and 2 below, with the necessary operations for the application of mortar with the use of a projector and hand-plated.



Flowchart 1 - Executive Process Using Mortar Projector

Source: produced by authors



Flowchart 2 - Executive Process Hand-Held Mortar

Source: produced by the authors

In the economic viability analysis, the following Internal Rate of Return (IRR), NPV (Net Present Value), TIR (Internal Rate of Return) and Payback indicators were generated, comparing them with a TMA (Minimum Rate of Attractiveness) of 8, 00% per year.

The aforementioned indicators were analyzed using classic investment analysis methods according to two different scenarios, considering the acquisition of equipment for the projection of mortar and hand-plated mortar.

The cash flow summary, shown in Tables 4 and 5, shows in detail the inputs and outputs for mechanically designed mortar and mortar applied by the traditional method, respectively.

Table 4 - Monthly cash flow for Projected Mortar

PROJECTED MORTAR - 24M ³ /MONTH			
MONTH	DISBURSEMENT (R\$)	RECIPE (R\$)	CASH FLOW (R\$)
0º MONTH	-67.232,00		-67.232,00
1º MONTH	-22.743,76	32.392,08	9.648,32
2º MONTH	-22.743,76	32.392,08	9.648,32
3º MONTH	-22.743,76	32.392,08	9.648,32
4º MONTH	-22.743,76	32.392,08	9.648,32
5º MONTH	-22.743,76	32.392,08	9.648,32
6º MONTH	-22.743,76	32.392,08	9.648,32
7º MONTH	-22.743,76	32.392,08	9.648,32
8º MONTH	-22.743,76	32.392,08	9.648,32
9º MONTH	-22.743,76	32.392,08	9.648,32
10º MONTH	-22.743,76	32.392,08	9.648,32
11º MONTH	-22.743,76	32.392,08	9.648,32
12º MONTH	-22.743,76	32.392,08	9.648,32
13º MONTH	-22.743,76	32.392,08	9.648,32
14º MONTH	-22.743,76	32.392,08	9.648,32
15º MONTH	-22.743,76	32.392,08	9.648,32
16º MONTH	-22.743,76	32.392,08	9.648,32
17º MONTH	-22.743,76	32.392,08	9.648,32
18º MONTH	-22.743,76	32.392,08	9.648,32
19º MONTH	-22.743,76	32.392,08	9.648,32
20º MONTH	-22.743,76	32.392,08	9.648,32
21º MONTH	-22.743,76	32.392,08	9.648,32
22º MONTH	-22.743,76	32.392,08	9.648,32
23º MONTH	-22.743,76	32.392,08	9.648,32
24º MONTH	-22.743,76	32.392,08	9.648,32

Source: produced by the authors

Table 5 - Monthly Cash Flow for Manual Mortar

ARGAMASSA MANUAL - 8M ³ / MONTH			
MONTH	DISBURSEMENT (R\$)	RECIPE (R\$)	CASH FLOW (R\$)
0º MONTH	-67.232,00		-67.232,00
1º MONTH	-14.641,13	22.263,12	7.621,99
2º MONTH	-14.641,13	22.263,12	7.621,99
3º MONTH	-14.641,13	22.263,12	7.621,99
4º MONTH	-14.641,13	22.263,12	7.621,99
5º MONTH	-14.641,13	22.263,12	7.621,99
6º MONTH	-14.641,13	22.263,12	7.621,99
7º MONTH	-14.641,13	22.263,12	7.621,99
8º MONTH	-14.641,13	22.263,12	7.621,99
9º MONTH	-14.641,13	22.263,12	7.621,99
10º MONTH	-14.641,13	22.263,12	7.621,99
11º MONTH	-14.641,13	22.263,12	7.621,99
12º MONTH	-14.641,13	22.263,12	7.621,99
13º MONTH	-14.641,13	22.263,12	7.621,99
14º MONTH	-14.641,13	22.263,12	7.621,99
15º MONTH	-14.641,13	22.263,12	7.621,99
16º MONTH	-14.641,13	22.263,12	7.621,99
17º MONTH	-14.641,13	22.263,12	7.621,99
18º MONTH	-14.641,13	22.263,12	7.621,99
19º MONTH	-14.641,13	22.263,12	7.621,99
20º MONTH	-14.641,13	22.263,12	7.621,99
21º MONTH	-14.641,13	22.263,12	7.621,99
22º MONTH	-14.641,13	22.263,12	7.621,99
23º MONTH	-14.641,13	22.263,12	7.621,99
24º MONTH	-14.641,13	22.263,12	7.621,99

Source: produced by the authors

The NPV obtained shows us, in terms of today's currency, that the investment would yield us, respectively,

in projected mortar and hand-rolled mortar, a total of R \$ 164,149.72 and R \$ 115,714.77 above expectations. As the decision criterion is a zero or positive NPV, we can conclude that such an investment is attractive.

Figures 1 and 2, below, demonstrate the probability of project profitability from NPV. Considering the execution of 5,000.00 m² of hand-plated mortar the probability of return on investment is less than 5%. In the case of projected mortar, the probability of return is greater than 5%. The higher the NPV, the more profitable the project or new business (ROCHA and MELO, 2012).

Table 6 - Indicators

INDICATORS		
VP	231.378,98	182.946,77
VPL	164.146,98	115.714,77
VPLa	14.945,60	4.821,45
IBC	3,442	2,721
ROIA	5,28%	4,26%
TIR	13,69%	10,25%
ÍndiceTMA/TIR	0,55	0,73

Source: produced by the authors

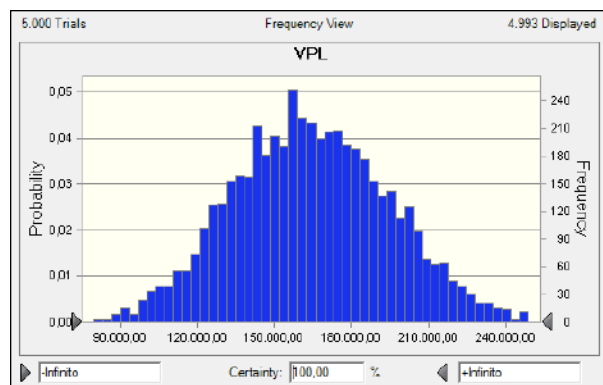


Fig.1 - NPV for Projected Mortar

Source: produced by the authors

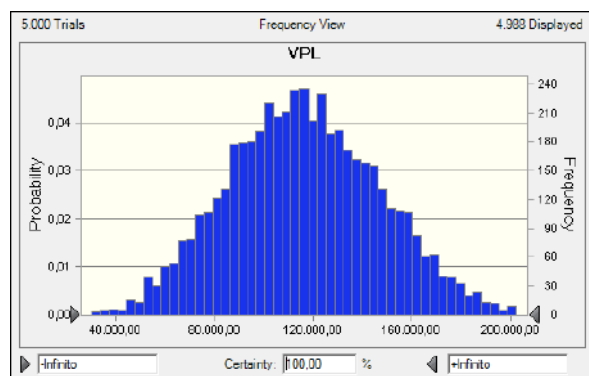


Fig.2 - NPV for Hand-Held Mortar

Source: produced by the authors

Table 7 - Statistics of Crystal Ball

STATISTICS OF THE CRYSTAL BALL ARGAMASSA PROJECTED			
Forecast: VPL		Forecast: ROIA	
Statistic	Forecast values	Statistic	Forecast values
Trials	5,000	Trials	5,000
Mean	164.251,99	Mean	5,25%
Median	163.345,76	Median	5,27%
Mode	'---	Mode	'---
Standard Deviat	30.199,58	Standard Devia	0,58%
Variance	912.014,341,12	Variance	0,00%
Skewness	0,09164	Skewness	-0,23456
Kurtosis	2,7	Kurtosis	2,81
Coeff. of Variabili	0,18386	Coeff. of Variab	0,11036
Minimum	73.883,31	Minimum	3,14%
Maximum	261.529,74	Maximum	6,84%
Mean Std. Error	427,09	Mean Std. Error	0,01%

Source: produced by the authors

Table 8 - Statistics of the Crystall Ball

STATISTICS OF CRYSTALL BALL ARGAMASSA MANUAL			
Forecast: VPL		Forecast: ROIA	
Statistic	Forecast values	Statistic	Forecast values
Trials	5,000,00	Trials	500000,00%
Mean	116.261,53	Mean	4,00%
Median	115.345,78	Median	0,04
Mode	'---	Mode	'---
Standard Deviat	30.782,36	Standard Devia	1,00%
Variance	947.553.606,86	Variance	0
Skewness	0,12143	Skewness	-0,30953
Kurtosis	2,73	Kurtosis	2,92
Coeff. of Variabili	0,26	Coeff. of Variab	17,67%
Minimum	24.262,68	Minimum	1,00%
Maximum	218.397,73	Maximum	6,00%

Source: produced by the authors

The IRR, which represents the true rate of return on investment, shows that such investment pays well above expectations (above 8% pa), which confirms the previous result (NPV), since the investment remains attractive, remunerating a rate of 13.69% per year and 10.24% a.a., respectively for the projected mortar and in the hand-plated mortar.

Finally, the discounted payback (PD), which consists of the time of recovery of the initial investment considering the amount of money in time, shows us a very satisfactory result, a recovery of the investment for the projected mortar within 7 months, and already for the hand-rolled mortar, due to the low investments, since the first month already recovers the initial investment.

Figures 5 and 6 show ROIA (Additional Return on Investment). For the projected mortar we have a market penetration average of 5.25% and for hand-plated mortar, the value reduces to 4.21%. These percentages show the tendency of the civil construction market, which seeks

more agile processes, increasing productivity and reducing the time the work fronts remain in the works.

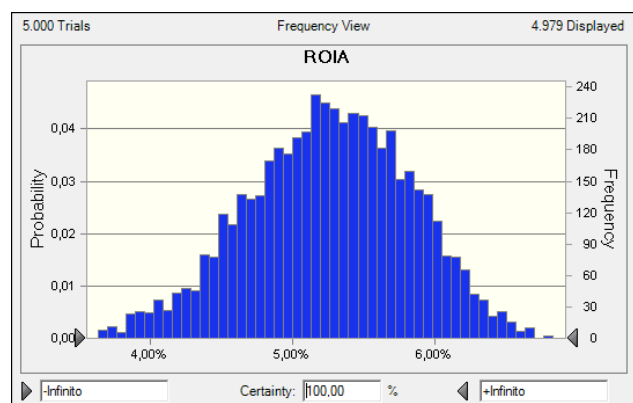


Fig.3 - ROIA for Engineered Mortar

Source: produced by the authors

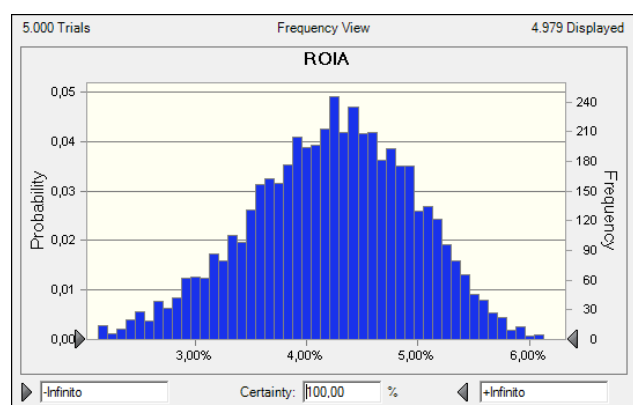


Fig.6 - ROIA for Hand-Held Mortar

Source: produced by the authors

V. CONCLUSION

The general objective of this work was to evaluate the technical and economic viability of the use of the projected mortar in relation to the conventional mortar, based on a bibliographical review about the subject.

Regarding the technical feasibility, according to the results obtained, the implementation of the mechanically designed mortar system becomes viable. The gain with execution speed is very high, thus allowing less expenses with the team, engineers, administrative staff, financial and warehouse. The search for the productivity of civil works has been motivated, among others, by the absence of skilled labor aiming at a growth of the civil construction sector. These are factors that encourage companies to invest in technologies to increase productivity and at the same time improve quality.

In view of the above, after analyzing the results obtained, it is observed that this is an economically feasible investment because it presents advantageous

results, quite attractive in all items analyzed and in the two executive methods presented.

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Hybrid Machine Learning Techniques for Heart Disease Prediction

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Abstract— Diseases can affect people both physically and mentally, as contracting and living with a disease can alter the affected person's perspective on life. A disease that affects the parts of an organism, which isn't because of any immediate external injury. Diseases are often known to be medical conditions that are related to specific symptoms and signs. The deadliest diseases in humans are arteria coronaria disease (blood flow obstruction), followed by cerebrovascular disease and lower respiratory infections. Heart disease are most unpredictable and unexpectable. We can able to predict the heart disease using machine learning technique. The datasets are taken from UCI repository which is a public dataset. These trained dataset are used for the prediction. Techniques like Decision tree, Support Vector Machine, K Nearest Neighbor and Random Forest algorithms are used in the prediction of heart disease and hybrid of these algorithms provides 94 % accuracy.

Keywords— Cardiovascular disease (CVD), Decision tree, Support Vector Machine, K Nearest Neighbor and Random Forest

I. INTRODUCTION

Harmful deviation from the normal structural or functional state of an organism in the human body is named as disease. Generally we can predict the disease based on the symptoms. Healthcare industry faces the major issues like prediction the diabetes disease among several others. People with high blood glucose and cholesterol with damage of blood vessels will tend to develop a heart disease and other nerve diseases. The European Society of Cardiology (ESC) survey that 26 million adults worldwide were affected by heart disease and 3.6 million were diagnosed every year[7]. Machine learning techniques provides us the ability for automatic learning and experience without being explicitly programmed. Machine learning provides an objective opinion to improve efficiency, reliability and accuracy. Machine learning methods used for decision support achieves high accuracy of decisions and they recommend a deep understanding of decisions and the decision makers will trust machine learning methods. Methods for learning implicit, non-symbolic knowledge will provide better predictive accuracy. Methods for learning explicit, symbolic knowledge produce lots of comprehensible models. Hybrid machine learning models collaborate strengthens knowledge representation model types. In healthcare industry and medical platform, Collecting and analyzing the data is considered to be important. Through

the machine learning concept, we can able to analyze and predict the data using several algorithms and techniques. Supervised machine learning algorithms have been the most leading method in the data mining field. This study aims to identify the key trends among several types of supervised machine learning algorithms and their performance, usage for disease risk prediction[6]. Managing diabetes involves a lots of issues and commitments like routine checking of blood pressure, blood sugar level and other health status. In this paper machine learning will predict the heart disease and non functional state of the heart using the necessary clinical data value. In classification method, the total dataset is divided into 70% of data for training and 30%of data for testing. The prediction of heart disease is based on machine learning algorithms like k-nearest neighbor algorithm (KNN), Decision tress algorithm, support vector algorithm(SVM), Random forest (RF) algorithm. [1].

II. LIRATURE SURVEY

Mohan et al. [1] Heart disease is one among the foremost significant causes of mortality within the world today. Prediction of disorder may be a critical challenge with the area of clinical data analysis. Machine learning (ML) has been shown to be effective in assisting, making decisions and predictions from the massive quantity of knowledge produced by the healthcare industry. Various studies gives

only a glimpse into predicting heart condition with ML techniques. In this paper, we apply machine learning technique to predict the heart disease with more accuracy. The prediction model is introduced with different combinations of features and a number of other known classification techniques. We produce an enhanced performance level with an accuracy level of 92% through the prediction model for heart disease with combination of hybrid random forest and linear model.

In today's era deaths due to heart disease has become a major issue approximately one person dies per minute due to heart disease. This is considering both male and feminine category and this ratio may vary consistent with the region also this ratio is taken into account for the people aged group 25-69. This doesn't indicate that the people with other age category won't be suffering from heart diseases. This problem may start in early ages also. Here in this paper, we have discussed various algorithms and tools used for prediction of heart diseases [2]. Data mining may be a technique performed on large databases for extracting hidden patterns by using hybrid methods from statistical analysis, machine learning and database technology. Further, the medical data processing is particularly a important research field to its performance within the development of varied applications in flourishing healthcare domain. In this work, three data processing classification algorithms like Random Forest, Decision Tree and Naïve Bayes are addressed and went to develop a prediction system so as to analyze and predict the possibility of heart disease.

David, H et.al [3], The main objective of this research is to use simplest classification algorithm to provide maximum accuracy when classification of normal and abnormal person is found. Thus prevention of the loss of lives at an earlier stage is feasible. The experiment is made up of the evaluation of the performance of algorithms with the assistance of heart condition benchmark datasets retrieved from UCI machine learning repository. It is found that Random Forest algorithm performs best with 81% precision in comparison to other algorithms for heart condition prediction.

Yekkala et.al [4]. Data is generated by the medical industry. Often this data is of very complex nature electronic digital records, handwritten scripts, etc. Since it is generated from multiple resources. Due to the

Complexity and large volume of this data necessitates techniques which will extract insight from this data in a quick and efficient way. These insights not only diagnose the diseases but also predict and may prevent disease. Heart disease or coronary artery disease (CAD) is one among the

main causes of death everywhere in the planet. Comprehensive research using single data processing techniques haven't resulted in a suitable accuracy. Further research is being carried out on the effectiveness of hybridizing quite one technique for increasing accuracy in the diagnosis of heart disease. In this journal, the authors worked on datasets collected from the UCI repository, and used the Random Forest algorithm and Selection is done by using rough sets to accurately predict the occurrence of heart disease.

According to Reddy Prasad et.al [5], We are in a period of "Information Age" where the normal industry can pressure the rapid shift to the industrial revolution for industrialization, based on economy of information technology. Terabytes of data are produced and stored in a day-to day life due to rapid growth in Information Technology. The data which is collected is converted by data analysis by using various combinations of algorithms. The large amount of the information regarding the patients is generated by the hospitals like x-ray results, lungs results, chest paining results, personal health records (PHRs), etc.,. Some certain tools are used to extract the knowledge from the database for the detection of heart diseases. The main theme of this paper is that the prediction of heart diseases using machine learning techniques by summarizing the few current researches. During this paper the logistic regression algorithms is employed, so that the health care data which classifies the patients whether they are having heart diseases or not according to the information in the record. Also it will be able to attempt to use this data model which predicts the patient whether they are having heart condition or not.

III. METHODOLOGY

1. DATA PREPROCESSING

Heart disease data is pre-processed by removing noise and missing values. The datasets contains a total of 310 patient records where 7 records are with some missing values those 7 records have been removed from the dataset and remaining 303 patient records are used in preprocessing.

2. FEATURE SELECTION

From the total 13 attributes of the dataset, two attributes pertaining to age and gender are used to identify the personal information of the patient. The remaining 11 attributes are considered important as they contain vital clinical records. Clinical data are vital to diagnosis and learning the severity of heart disease. As previously mentioned in this experiment, several (ML) techniques are used namely SVM, KNN, DT, RF Algorithm. The

experiment was repeated with all the ML techniques using all 13 attributes.

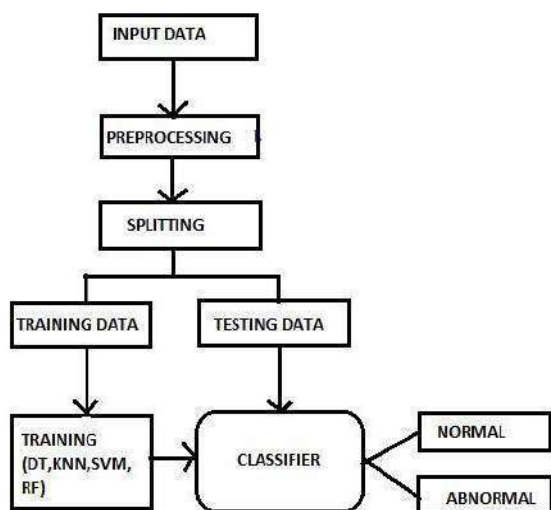


Fig 1. Experimental workflow with UCI dataset

3. CLASSIFICATION

The clustering of the dataset is done on the basis of the variables and criteria. Then the various classifiers are applied to each dataset in order to estimate its performance. The techniques are, Decision tree, Support Vector Machine, K Nearest Neighbor, Random forest algorithm.

3.1 DECISION TREE

For training samples of data the trees are constructed based on inputs. Regression and classification problems are solved using decision tree. This technique is performed on the basis of Top down divide and conquer approach. Tree pruning helps to remove irrelevant samples of data.

3.2 SUPPORT VECTOR MACHINE

SVM is said to be a supervised machine learning algorithm which may be used for classification or regression problems. It uses a way called the kernel trick to rework your data, then supported these transformations it finds an optimal boundary between the possible outputs.

3.3 RANDOM FOREST

A random forest algorithm is one among the foremost effective ensemble classification approach. This algorithm has been used in prediction and probability. The RF method consists of multiple decision trees. Each decision tree gives an information that indicates the decision about the class of the object. RF method blend bagging and random selection of

features. There are three different parameters in random forest are No. of the trees (n tree), Minimum node size and No. of features employed in splitting each node [9].

3.4 K NEAREST NEIGHBOR

K-Nearest neighbor (KNN) may be a simple, lazy and nonparametric classifier. KNN is preferred when all the features are linear. It is under supervised learning domain and finds intense application in pattern recognition, data mining and intrusion detection. KNN is additionally called as case-based reasoning and has been utilized in many applications like pattern recognition, statistical estimation. Classification is obtained by identifying the closest neighbor to work out the category of an unknown sample. KNN is preferred over other classification algorithms because of its high convergence speed and ease [10].

IV. RESULT EVALUATION

The prediction of disease is developed using 13 features and 4 classifiers to improves the accuracy of the models. The highest accuracy is achieved by K-nearest neighbor classification method when compared with existing methods.

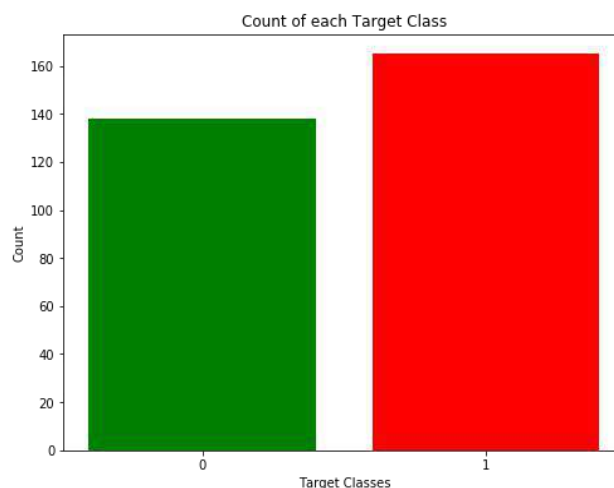


Fig 2. Target Class

```

# Evaluating using accuracy_score metric
from sklearn.metrics import accuracy_score
accuracy_logreg = accuracy_score(Y_test, Y_pred_logreg)
accuracy_knn = accuracy_score(Y_test, Y_pred_knn)
accuracy_svm = accuracy_score(Y_test, Y_pred_svm)
accuracy_nb = accuracy_score(Y_test, Y_pred_nb)
accuracy_dectree = accuracy_score(Y_test, Y_pred_dectree)
accuracy_ranfor = accuracy_score(Y_test, Y_pred_ranfor)

# Accuracy on test set
print("Logistic Regression: " + str(accuracy_logreg * 100))
print("K Nearest neighbors: " + str(accuracy_knn * 100))
print("Support Vector Classifier: " + str(accuracy_svm * 100))
print("Naive Bayes: " + str(accuracy_nb * 100))
print("Decision tree: " + str(accuracy_dectree * 100))
print("Random Forest: " + str(accuracy_ranfor * 100))

Logistic Regression: 77.04918032786985
K Nearest neighbors: 88.52459016393443
Support Vector Classifier: 75.40983606557377
Naive Bayes: 68.85245901639344
Decision tree: 68.85245901639344
Random Forest: 73.77049180327869
  
```

Fig 3. Performance of each classifier

Table 1. Feature information of the dataset.[8]

Sno	Attribute Name	Description	Range of Values
1	Age	Age of the person in years	29 to 79
2	Sex	Gender of the person [1: Male, 0: Female]	0, 1
3	Cp	Chest pain type [1- Typical Type 1 Angina 2- Atypical Type Angina 3-Non-angina pain 4-Asymptomatic]	1, 2, 3, 4
4	Trestbps	Resting Blood Pressure in mm Hg	94 to 200
5	Chol	Serum cholesterol in mg/dl	126 to 564
6	Fbs	Fasting Blood Sugar in mg/dl	0, 1
7	Restecg	Resting Electrocardiographic Results	0, 1, 2
8	Thalach	Maximum Heart Rate Achieved	71 to 202
9	Exang	Exercise Induced Angina	0, 1
10	OldPeak	ST depression induced by exercise relative to rest	1 to 3
11	Slope	Slope of the Peak Exercise ST segment	1, 2, 3
12	Ca	Number of major vessels colored by fluoroscopy	0 to 3
13	Thal	3 – Normal, 6 – Fixed Defect, 7 – Reversible Defect	3, 6, 7
14	Target	Class Attribute	0 or 1

V. CONCLUSION AND FUTURE WORK

Identifying the processing of raw healthcare data heart information will help in the long term saving of human lives and early prediction of the abnormalities in heart conditions. Machine learning methods were used in the process of raw data and provide the prediction of the disease and health status of the patient. Heart disease prediction is one of the challenging process in the medical field. Using this project the mortality rate can be drastically controlled if the disease is detected. The proposed hybrid approach is used to combine the characteristics of fuzzy logic and k-nearest neighbor algorithm which provides 94% accuracy. This method proved the accuracy of highest prediction rate. The further course of this research can be performed with the mixture of deep learning techniques to achieve better prediction in accuracy.

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Security Mechanisms of Information in Companies

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Abstract— Information security is a feature that aims to protect, but also a management area. With the evolution of information and its rapid spread technologies, also increased the crimes related to it, with it, this article proposes a survey of information security mechanisms, influence and use of them by companies. It was also used a directed form the target audience to gather information on how companies deal with threats to their assets, data and services, also seeks to know whether there is effective use of information security mechanisms.

Keywords— Companies, Threats, Information Security, Research.

I. INTRODUCTION

Information Security (IS) is an important area of the organization, the neglect of this can extensively affect the entire operation of the same, resulting in large losses, such as unavailability of services and customer dissatisfaction (Mendes et al., 2013).

It consists of skill, resources, best practices and mechanisms used to protect information systems and data against cyber-attacks and misuse, as well as loss of integrity or theft in general (POSITIVE, 2017).

Information security is a strategic level theme and can never be left out, mainly because of the great constant technological advancement, the lack thereof in an organization can undertake routine activities, but can also influence the results obtained and the reputation of same (positive, 2017). Note that it is impossible to get one hundred percent practical way to control all possible threats to information and / or services. You should always prioritize what is most relevant.

To better understand how the information security, you must understand the principles on which it is based, which are: Integrity, Confidentiality, Availability and Authenticity (HINTZBERGEN et al, 2018.).

Integrity - It is the guarantee that the information manipulated keep all the original features that have been set by the owner of the information, as well as ensure it is complete, inviolable and protected against use or tampering (HINTZBERGEN et al, 2018.).

confidentiality- The information can only be accessed and updated only by legitimate entities, or those authorized and properly accredited (HINTZBERGEN et al, 2018.). If the company does not have security mechanisms that are able to ensure confidentiality will become vulnerable to threats, such as cyber attacks and theft of confidential information or customer (POSITIVE, 2017).

Availability- Ensure that the information is always accessible and available on demand and performance specifications to authorized users (Mendes et al, 2013.). **Authenticity** - Procedure to identify and register the user who is modifying or sending information, ensuring the correctness thereof and non-repudiation, which is the inability of the denial of that information written or manipulation (Mendes et al, 2013.).

Due to the constant evolution and technological innovation, we know how hard it is to keep a track hundred percent of every kind of threat that will affect the services and information of companies and organizations. Therefore, this article aims to bring together information gathered through a questionnaire on how companies deal with possible threats and what information security mechanisms used more frequently.

Threat is a term used to describe a situation that can cause the loss of important information or devices. There's no way to talk about without understanding information security possible threats, in which are very comprehensive and varied (SANTO, 2012). Among them, we can highlight:

- Virus - often responsible for irreversible damage to systems and applications.

- Denial of Service (DoS) - Denial of service is an example of the threat that may affect the principle of availability by blocking access to a system and / or information.
- Fraud - Scam or Fraud can cover a lot of threats, the most common of these is the Phishing, where it is used for famous sites interfaces and / or sending emails to obtain confidential information.
- *malware*- They are responsible for theft of information through the invasions database and computers. As viruses are dangerous for the ability to spread rapidly.

Information Security mechanisms can be divided between Physical Security and Logical. They are used to ensure that the basic principles are not affected and inflicted by minimizing or blocking of possible threats to information. Mechanisms for Physical Security deal with methods to prevent access of unauthorized persons to areas where they are equipment and critical information. Some of them are restricted access, monitoring system and biometrics. Security The Logic aims to control access to passwords, files, data, applications and operating systems, as an example we have backups (backups), Firewalls, Information Security Policy, Redundancy Infrastructure and IT Risk Management .

Some of the mechanisms commonly used today in day are:

Detecção Vulnerabilities -Vulnerabilities are flaws or gaps in a system that allows unauthorized users to manipulate it, as well, can be failures in technological resources of hardware or software, such as installing and / or wrong configuration (BUZZATE, 2014).

Detection would be a way to identify potential vulnerabilities and take preventive or corrective action. The outdated technology makes it vulnerable all the security and infrastructure, because all equipment is subject to obsolescence, misuse, poor maintenance or break, which can compromise more than a principle of information security and generating consequences as operational inefficiency, dissatisfaction client and availability of services, so should adopt specific safety practices for each iT component (Servers, Computers, Networking and Software).

Backup (Backup) -Backups, more commonly known as Backups are used to ensure the principle of availability and integrity of information and services if the basis on which they are located are damaged or stolen (MICROSOFT, 2008). The backup storage can be done in physical or cloud devices, it is advisable always several backups stored in

different places. Note that companies that have good backup practices in case of loss of information can make the recovery of the same in a very short space of time.

Redundancy Infrastructure - A replicated infrastructure, whether physical or virtual, is another way to ensure the availability of information or services because if IT equipment (Server, UPS, Router) fails, there will always be a substitute to enter into immediate operation giving maintaining continuity and availability (pOSITIVE, 2017).

firewall - Mechanism that controls the data traffic of internal and external computer networks. It works by protocols (TCP / IP, UDP, HTTP) ensuring the correct functioning of the communication between one point and another, aiming to prevent intrusions (BUZZATE, 2014).

Restricted access - The use of restricted access to information, computers or sectors can be a way to ensure confidentiality and authenticity of the information. Some forms of application of this mechanism can be given for the use of biometrics (facial recognition, fingerprint), unique user identification and monitoring system with cameras (POSITIVE, 2017).

Security policy information - It is a document or manual that determines the most important actions to ensure [information security](#). Also reaching the issue of behavior in the company and access to resources (Martins, 2005). Promotes the standardization of actions so that everyone knows what to do and what to avoid.

Management of IT Risks - Aims to identify the company's IT risks, analyzing them and sorting them according to likelihood, vulnerability to be exploited and impact on routine and their goals activities (TCU, 2018). From this it is preparing a response plan for each risk, defining actions. We can avoid the risk through actions that extinguish, reduce the probability and / or impact of it, accept the risk monitoring it continuously or transfer with the hiring of a cloud infrastructure to the security commitment be due to the provider. Some of the main risks are the lack of guidance, errors in internal processes, negligence and malicious activity.

Cloud computing - Cloud computing allows outsourcing of information technology services, ensuring agility, cost reduction and constant updating. After his appearance was possible to provide services such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS) and Hardware as a Service (Haas) (Pereira et al., 2016).

- Infrastructure as a Service (IaaS) - Outsourcing Servers and Datacenters scalable according to the needs of the company. Amazon

Web Services (AWS), Microsoft Azure and Digital Ocean are examples.

- Platform as a Service (PaaS) - Outsourcing platforms for development and testing without the need to set up an infrastructure.
- Software as a Service (SaaS) - is the provision of software as a service over the Internet, is paid signature is used while the product. Google Drive and Office 365 are examples of SaaS.
- Hardware as a Service (HAAS) - Hiring and providing remotely hardware. AWS offers this type of service as well.

II. MATERIALS AND METHODS

This research aims to conduct a study on Security mechanisms of information and their use by companies. We conducted a survey of information in books, academic papers and dissertations available in the database and virtual libraries such as Google Scholar and various sites related to the topic of research.

It was also used a targeted questionnaire to the target audience, ie different segments companies (Automotive Center, Shop, Construction, IT) using a diverse range of IT services, making it thus necessary to use mechanisms for security its assets, data and information.

The proposals seek to take matters as much information about the segment, form the IT sector division, as well as, what mechanisms are used and review the efficacy and safety of their respective companies.

Participated in the data collection 20 companies, of which twelve (12) reported, including 2 of IT enterprises (17%) 0 Automotive centers (0%) 7 stores (58%) and 3 Builders (25%) .

III. RESULTS AND DISCUSSION

The questionnaire contained five questions, which were made with the purpose of collecting information about the subject matter of this article. Like all companies did not reply, graphics and information are based on responses from 12 companies that responded.

Em qual segmento se enquadra a empresa?

12 respostas



Fig. 1: Segments of the participating research companies

As shown in Figure 1, this question was drawn up in order to get information on the area of operation of the companies that answered the questionnaire. We see that the twelve companies 7 (58%) in the merchant operating area 3 (25%) act as builders and 2 (17%) are IT companies. None of the companies of the Automotive Center branch receiving the questionnaire responded.

Os serviços ligados a área de Tecnologia da Informação, estão à cargo de quem? (Pode marcar mais de uma opção)

12 respostas

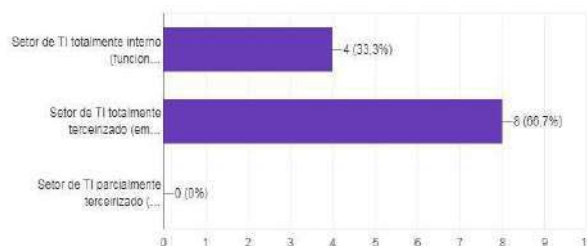


Fig. 2: Who performs the services of the Technology

4 of responding companies (33.3%) mentioned that they had fully domestic IT sector without outsourcing, 8 (66.7%) mentioned that they had fully outsourced IT Sector, 0% Sector IT outsourced partially as Figure 2. This happens because of the lack of knowledge of the companies in relation to information technology, or by the fact that today is more rewarding and less costly to have a third party looking after your assets and information without the need for new investments in an entire sector, such as the purchase of technological equipment and hiring a staff of trained employees to handle this type of service. There are several factors that can influence this decision,

In Figure 3 we have the response that sought to assess the information which is the information security mechanisms used by most companies nowadays, but also see what the least used so comparing the differences between the values obtained.



Fig. 3: What mechanisms of information security are adopted by companies

Among the information security mechanisms used in the first place was the Backup (Backup) with 11 (91.7%) responses from 12 companies, showing that today this mechanism is widely used for its ease and agility, followed Restricted access to 8 (66.7%) responses showing that companies are also concerned regarding access to its assets and general information.

The quantity of 6 companies (50%) responded that uses Monitoring System, 5 (41.7%) use Cloud Computing, a mechanism that is often used in conjunction with backups, seeking greater security against loss of it . 4 (33.3%) firewall uses to protect its information from viruses and potential cyber attacks.

Of the 12 companies that responded only five companies (25%) have an effective information security policy in the organization, showing that still lack information about how important an Information Security Policy can be for a company, it is through that it the company establishes guidelines and all possible actions to

threats on its assets and information.

Only 1 (8.3%) Response to Redundancy Infrastructure, Vulnerability Detection and IT Risk Management, showing once again that among those companies who responded, almost no understand the danger of doing vulnerability detection for through iT Risk management establish preventive and corrective actions for possible disasters to its assets and information, as well, it is through an infrastructure redundancy that you ensure greater availability of their services.

A empresa está preparada para ameaças à Segurança da Informação?

12 respostas

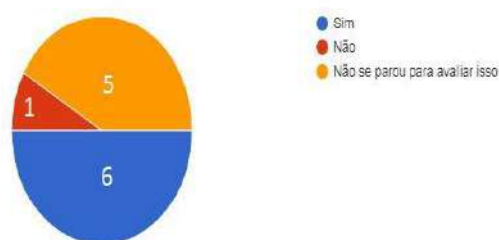


Fig. 4: preparation of business level

In Figure 4 we sought answers to the question elaborated in order to identify if companies feel prepared to face possible threats and risks to their information and assets may suffer, in which 6 (50%) said yes, they were prepared even taking into account that almost do not use effective prevention mechanisms such as Vulnerability Detection and iT Risk Management, as well raise the question if these companies are aware of your current situation or if you just do not feel interest in the subject.

Only one company (8%) replied that he was not prepared and 6 (42%) responded that they did not stop to assess it, even knowing that what was at stake was their valuable information assets and reputation.

A gestão da empresa acredita que os mecanismos de Segurança da Informação são mesmo eficazes?

12 respostas



Fig. 5: View of the companies on the importance of information security

Figure 5 shows the opinion of companies on the effectiveness of the security mechanisms of information, including, 6 believe that the use bring good results, 4 opined that relies heavily on the practices of the staff, one said he did not believe in the efficacy of use of the mechanisms and the other that there is no review, because everything changes very fast.

It was noticed that even though the importance of using safety mechanisms for the companies that responded do not engage in investment in IT the same as in the third question clearly shows the lack of use of the wide range of available mechanisms, apoiando- only the most simple, such as backups, restricted access and monitoring system, which is the basic for any company that wants to have a control over your assets and information, and a deficit in the use of more

elaborate and recommended mechanisms such as Policy Information Security and IT Risk Management.

IV. CONCLUSIONS

The conclusion section must be included and shouldn't indicate clearly the advantages, limitations, and possible applications of the paper. Although a conclusion may review the main points of the paper, do not replicate the abstract to the conclusion. The conclusion might elaborate on the importance of the work or suggest applications and extensions.

Throughout the work we have seen the importance of information security in organizations and companies, basic security concepts, potential threats and mechanisms for information security to combat such threats. Through research we have seen how companies deal with the threats taking into account all that has been presented previously.

It is necessary to combine the largest number of possible mechanisms, so that they can carry out a well-planned work, and thus combat the security threats of information and ensure the quality of work provided by third parties with the necessary efficiency.

The expectation is that the research described here is received as a warning for professionals Technology and even the managers of companies who care and are responsible for information security in organizations that best practice and mechanisms should be used as a manual.

for implementation of a Safety Management System Information (ISMS) based on standards ISO / IEC 27001 and 27002.

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Entrepreneurship digital in Students perception of a Management Course

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Abstract— The digital entrepreneurship emerges as highly relevant, creating new ways of doing business, ie when the entrepreneur opens your eyes to the opportunities present in the digital medium. Therefore, this study aims at assessing the perception of the Administration Course students, a Municipal Authority on the digital entrepreneurship. The participants were chosen randomly enrolled from first to eighth period. Therefore, an exploratory research was conducted with quantitative and qualitative approach, using as data collection instrument a questionnaire composed of four open questions and closed four. After analysis of the material, as a result it was observed that students have knowledge of the digital market, the advantages of this type of business,

Keywords— *Entrepreneurship, Digital Entrepreneurship, Administration.*

I. INTRODUCTION

digital entrepreneurship is an area that is growing increasingly in the digital world, for all new businesses created and directed to the internet world are called digital entrepreneurship, ie, a number of new activities that are turning into businesses. The digital entrepreneurship has grown a lot in Brazil and much of this growth is due to new digital ventures that open numerous possibilities for those who want to engage in this business.

From this perspective, new business see emerging applied to the digital world such as the creation of application area, creating games and the use of advertising. Also, there are a number of possibilities that people are looking to engage in the digital world. However, realize that some challenges are linked to the question of knowledge about the area, it is necessary to seek information to make the business already born more structured and has a greater chance of success.

Since, not just have a great idea and is not ready to develop it, it takes dedication and business planning to marketing and financial viability, considering that there are several similarities between the physical world and the digital, so you need to make decisions in procedural matters, as the partners, investments, marketing issues, among others, for the lack of planning leads many physical and virtual companies to close their activities.

Whereas the digital entrepreneurship is an opportunity to work without time barriers and geographical barriers,

since it is through online platforms with many dynamic tools to anyone who wants to start, it is necessary qualifications and learning with investments in media. Thus, possess knowledge in management and marketing will cause the entrepreneur is most prominent in relation to competitors. In this sense, Britto and Wever (2003) pointed out that in recent years, entrepreneurship has gained a wide scale and received much encouragement in research by public and private institutions.

Starting from the premise that higher education institutions have a very important role in the preparation of new entrepreneurs, especially in digital mode, the following question arose: What is the perception of the students of Management Course, a Municipal Authority, in relation to entrepreneurship Digital?

Whereas there is interest in knowing the future managers insight into this business model, the aim of this study was to evaluate the perception of Management Course students, a Municipal Authority on the digital entrepreneurship.

The choice of this theme is justified by self-interest to new models of driven business by technology, and also to know the level of knowledge of future managers, about digital entrepreneurship, as the online world has unique peculiarities, which makes it well different from the physical world, such knowledge being essential to professionals who crave success as entrepreneurs in the digital world.

II. ENTREPRENEURSHIP CONCEPT

Based on the established objective will be presented, the following is a brief review of the concept of entrepreneurship and digital entrepreneurship, as well as the conditions and obstacles that exist in this type of business.

Entrepreneurship can be conceptualized in different ways, according to Dornelas (2012, p. 28) entrepreneurship is "the involvement of people and processes that, together, lead to the transformation of ideas into opportunities." "It's the social phenomenon associated with entrepreneurial activity" (ENDEAVOR BRAZIL, 2017, p. 104). Thus entrepreneurship is a corporate social function in a social setting where connections are established involving moral support networks of family and friends, and professional networks of mentors, associates, affiliations, etc. (Hisrich; PETERS; Shepherd, 2014).

For Dolabella (2008), the issue is not considered a science, although increasingly publish and search on. So the main knowledge related area is not in the books, but around you, the people and the environment. From the point of view of Dornelas (2012), entrepreneurship has been around for hundreds of years and its application was being discovered and developed gradually. Still, on the concept of entrepreneurship, it can be found a relevant definition as a field of knowledge, described by Shane and Venkataraman (2000). The authors emphasize that the search entrepreneurship understand the emergence of opportunities to create something new; as these opportunities are discovered or created by specific individuals, which use various means to exploit these opportunities, producing thus a wide range of changes (SHANE;

With regard to research and teaching field, from the 80's entrepreneurship has become more exploited. Since then, they increased increasingly deepening the theme of respect to courses (MURPHY; LIAO; WELSCH, 2006; VANEVENHOVEN, 2013).

Currently discussions are aimed at increasing the complexity with which entrepreneurs and managers must deal with, that are far from survival in the existing markets, indicating further problems of creating new markets (Sarasvathy, 2008). However, for some authors, these challenges include both intrinsic and extrinsic factors affecting the creation of new businesses including: the working environment, family background, personality, historical, institutional support, markets and technology (Bessant; TIDD 2009; PEREIRA; VERRI, 2014).

Thus, as the fundamentals of entrepreneurship and the entrepreneurial process, these can also be analyzed from

the perspective of the integration of organizations in the virtual environment. Therefore, it is important to incorporate some concepts and definitions of digital entrepreneurship.

According to Caetano (2014) The digital entrepreneurship, in general, is when the entrepreneur sees opportunities present in digital media with the help of big media. Because of this it is that these entrepreneurs ensure their monthly income.

According to some authors, the cheapening of telecommunications infrastructure popularized the digital way of doing business. In this environment competition is fierce and the number of consumers increases more and more, with internationalization of business opportunities (ZIYAE; SAJADI; MOBARAKI, 2014). It is believed that the confidence in this business mode has grown increasingly likely this will occur due to the digital inclusion and greater knowledge that consumers are acquiring over time.

For Fagundes (2004, p. 24), "e-commerce over the internet is the branch of economic activity fastest growing in the world," and that now houses various types of activities. In this sense, Parker and Alstyn Choudary (2016) emphasize that the digital environment is radically transforming not only business, but also the economy and the behavior of society in general, and reinforce this thought, saying:

[...] any industry where information is an important ingredient is a candidate for the platform of the revolution. This includes companies whose "product" is information (such as education and the media), but also any business where access to information about customer needs, price fluctuations, supply and demand and market trends have value - which includes almost all businesses (PARKER; Alstyn; Choudary, 2016, p. 16).

From this perspective, you can see in general that most of digital entrepreneurs is responsible for creating infoproducts such as online courses or e-books, namely, the famous e-books. And, through the dissemination of these products, they begin to secure their profits through the Internet. And it's not just how to earn extra income, but consistent and expendable business, but that will depend largely on the quality of these products (Charaudeau, 2007).

However, Caetano (2014) points out that this is not the only way to work with digital ventures, as not everyone has enough knowledge to create their own products. In this case, only entrepreneurs promote third-party product sales through disclosure, receiving commissions through the affiliate program.

Therefore, considering that there are several services and products offered on the Internet, the Organization for Economic Co-operation and Development - OECD (2009) recommends that before you start a business of this type, it is necessary to analyze some questions: if the idea is good enough if there are potential customers if there is potential for the business to survive the competition and the profit to be obtained worth the effort, as well as consider other points: how, where, when, with whom and with what money will be made.

Furthermore, other virtual businesses are a reality, such as game stores, makeup and beauty products, thrift stores, agencies and media companies, web design, consulting on specific areas and group buying sites, which many of them use the free resource sites like Wordpress, Blogspot, Twitter, Facebook, Youtube and Instagram.

On the other hand, according to a survey of the IBGE (2010), the Brazilian Chamber of Electronic Commerce revealed that 33.3% of online shops and businesses close under two years of existence, for lack of administrative and commercial experience. It is clear, therefore, that training, whether online or not business is essential. However, in the case of a web service, the preparation should be very specific, through training and courses to deal with the complexity of the electronic universe.

At that point of view, rather than having a business through digital, digital entrepreneurship requires its components some different characteristics and capabilities of the business environment, as the online world has unique peculiarities, and not all entrepreneurs can have the same success in digital world (VALLE, 2016).

Therefore, Santos et al. (2016) report that it is important for those working in this business get planning, organization, focus and enthusiasm. One should also analyze legal issues for business deployment, get dedicated employees, dealing with all kinds of people, draw up an appropriate business plan, establish what are the products and the prices of each and know the target audience, competition, suppliers and define how it will be communicating with customers. Furthermore, according to the authors, one of the obstacles observed is that the Internet is also necessary to guard against fraud in payments by credit card and monitor data from the often business.

Finally, Santos et al. (2016) warn, those working in this business, not to fall into digital inertia: even if the business is successful in a year, the strategies used at that time may not work in another. This media is dynamic, new trends and forms of interaction arise quickly and is essential to

business to adapt to it and always be open to improvements and modifications.

III. MATERIALS AND METHODS

This is an exploratory research, with design through a quantitative and qualitative approach. As for the purpose, it is characterized as descriptive. Gil (2010), the search descriptive research to describe the characteristics of a given population or phenomenon, while the exploratory research is intended to develop, clarify and modify concepts and ideas, seeking greater familiarity with the problem.

The organization investigated was the Faculty of Social Sciences and Petrolina, Municipal Authority located in submedium backwoods of Pernambuco. The participants are students of the Administration course, attending the first to the eighth period, randomly selected.

As a data collection instrument used a questionnaire with eight questions, four open and closed four, which was printed and applied in person. The analysis of the material was initially carrying the collected data relating to closed answers for application forms of google resources and presentation of the results in graph form. As for the open answers after transcribed, proceeded to the descriptive analysis of the textual content of the selected material.

IV. RESULTS AND DISCUSSION

The sample was composed of 50 students from all administration groups course, with each period of 6 students (first to seventh) seven students in the eighth period. Regarding the gender of the respondents, the sample was made in a balanced way, with 46% women and 54% men. As for the results obtained, in relation to the perception of the students about the social networking as a business tool, the data in Figure 1, revealed that among the students of management FACAPE, 56% believe that social networks are great business tool, followed by 36% who considers good tool and only 8% think regular. It appears, therefore, that 92% have the perception that social networks influence the development of a digital business.

This understanding corroborates what was found by Santos et al. (2016) that most of the professionals who run to the virtual market are top level and prioritize management courses or business management and marketing.

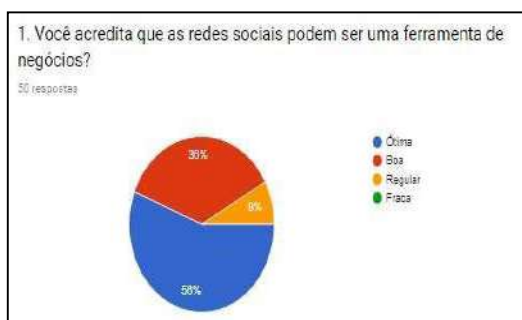


Fig. 1: Social networks as a business

However, when asked if they would open a business in digital platforms, only 66% of survey participants spoke positively to this kind of business. While 10% do not wish to open business in this modality, followed by 22% who responded never have thought of that. (Figure 2).

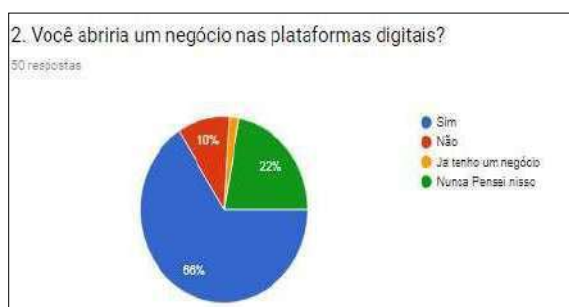


Fig. 2: Business on digital platforms

These data demonstrate that the act of taking in digital business is being viewed with some uncertainty on the part of students, suggesting that this matter be discussed further in the academic course of administration of FACAPE. On this question, the research Werle (2018), which deals with the identification of the entrepreneurial profile and the propensity for business creation by students of management courses in the city of Cerro Largo- RS, shows that 66.41% of students surveyed felt more encouraged to undertake after joining the course because the disciplines and the knowledge gained contributed to such.

Already when asked about what are the niches or areas of business that would undertake, among the participants there was a wide variation of responses, however, areas and niches most cited were: legal, educational, perfumery and cosmetics, creating applications in branch food, crafts, making custom clothes, fitness clothes, business and financial consulting, distribution area of health facilities, social networking, computing and applications technology, video games, aesthetics, tourism and drinks.

When asked if they start a business using digital platform is a motivational factor for entrepreneurial innovation, only 44% said yes, 34% depending on the business and 20% think not, as seen in Figure 3.



Fig. 3: digital and Innovation Platform

It is noticed little interest and motivation of the management students to use the digital platform as innovative entrepreneurship. In contrast, the Internet trade is among the ten most attractive business sectors for future entrepreneurs (DEGEN, 2009).

Thus, the entrepreneur must be willing to change and adapt to changes, including the use of technology as a tool to succeed in the new digital economy.

In view of this, on entrepreneurship and innovation, Oda (2017) notes that the use of the digital platform can be a great way to innovate in business and increase company sales.

Regarding the question, if seek digital entrepreneurship as an alternative form of income or main income, Figure 4 shows that the perception of the respondents was that 84% would seek an alternative income and 16% seek this one out as main income.



Fig. 4: Digital platform as an alternative income

These data demonstrate that in view of the students, research participants, there is no reliability in digital entrepreneurship as a major source of income from those who have chosen an alternative income, while they recognize as main income, they pointed to justify unemployment and the need for earn money to survive.

Thus, it has been the understanding that most fits the profile entrepreneur by chance, while at the minority fits the profile for the entrepreneur need.

Regarding the question about some uncertain factors that can bring a digital business, the assigned responses were most cited as: high competition, lack of quality in the transport and logistics services, threat of hackers on the network, collection of taxes by the government, information security, current precarious economic situation and lack of credibility on the part of customers. On these factors, mentioned by the respondents, it was noticeable that most concerns were with the competition, being mentioned as a factor that creates more risks due to the large amount of digital companies in several areas. Another unrest was observed with the economic and governance issues, such as logistics and high tax rates, which directly influence the competition.

With regard to the last question, we asked respondents to name a few advantages of having a digital business. According to the answers of the students the main advantages in almost all respects are the reduction of operating costs as physical space rental, hiring employees and charges and there is a good saving on taxes. Other responses were also more prominent were the practicality due to use only one computer, possibility of working only a few hours a day, the largest display of products, focusing on niche and well targeted audiences, timely dissemination of information, availability site 24 hours a day and unlimited client, ie, the initial investment to have an online business is significantly less prevalent,

Thus, it was observed that the students, although not prove motivated to join the digital business, have the perception of the advantages of having a website, especially as the cost savings and convenience. Another point noted was the fact that they realize that with the internet there are no barriers, while a physical business is limited to location, the company's website can be accessed by anyone in any corner of the world that has an internet connection.

V. CONCLUSION

This study aimed to evaluate the students' perception of FACAPE Administration Course on digital entrepreneurship. Regarding the results, it was found that the majority of respondents have the perception that social networks influence the development of a digital business, but only a portion would open a business in digital platforms, showing insecurity and lack of credibility to undertake in digital business.

It was also noted that in view of the students, the survey respondents, there is no reliability in digital entrepreneurship as a major source of income only as an alternative income, and they recognize as main income, made this option due to unemployment and the need to earn money to survive.

In view of this, it emerges that there is need to create a favorable environment in the Administration Course with regard to digital entrepreneurship. From this perspective, Endeavor and Sebrae (2016) point out that universities need to be more connected with their students, work and community market. Also, increasing the business knowledge and focus on planning to manage in the digital area will make a difference to address the risks and uncertainties, demonstrated by students who answered the survey.

On these results, it has been the understanding that this perception of students is opposed to the current market trend, as the digital way of doing business has become more popular, competition is increasingly fierce and the number of consumers increases every time more. It is believed that this situation is occurring because of the digital inclusion and greater knowledge of the digital market for consumers to see buying in recent times, so that increases confidence that business mode.

By the way, there is that the market in this digital area, in spite of being treated as a new business niche, still presents many challenges, which may justify the insecurity of students to greater adherence to digital entrepreneurship.

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Overview of Women's Participation in the Computer: One Search in Technology Courses Facape

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Abstract— This study aims to analyze and understand the lack of women in Technology Management courses in Information and Computer Science, the FACAPE. Identifying the barriers which women must face in order to follow his vocation. Facing from a historical and cultural context of pre-existing, to gender segregation and prejudice. For this, an interview with the focus on female students was prepared to thus be able to study the opinion of each and try to understand the lack of women in these courses which comes in large crescent.

Keywords— Historical, Cultural, prejudice.

I. INTRODUCTION

In an attempt to explain to the question "why the absence of women in technology courses?", There are various ideologies and theories departing from sexist and prejudiced beliefs on the part of society, to a historical factor, which says that woman was made to be home and the man to work.

The shortage of women in technology or exact goes through social and environmental evidence to contribute to the underrepresentation of women in science and engineering. (HILL, CORBERTT, ANDRESSE, 2010)

Given the gender inequality found in science courses in Computer and Management of Information Technology, FACAPE, this research was conducted in order to explain the low presence of women in these courses. For this, we interviewed the female minority who provides breaking the paradigm that the courses are for men, and analyzed their opinions regarding male predominance in their courses geared to technology.

II. HISTORICAL CONTEXT AND CULTURAL CONQUEST OF WOMEN IN THE AREA TECHNOLOGY

From the time of colonization and Brazilian social formation, the family model adopted was the patriarchal model, which the father figure becomes social and family reference. Thus, the role of man becomes, ensure the support and respect of the family, while the woman aims to

look after the house and children. This way of thinking has been perpetuated for much time and even nowadays you can still see it dominates.

Years ago the woman was taxed as a person and less for the sole purpose of managing the household chores. So, often deprived of desires, wishes and talents, just for the simple fact of being women.

From the seventeenth century, women began attending the universities and thrive in their areas breaking therefore the paradigm in which only women studying to be good domestic managers. However, in the nineteenth century, as science became professionalized, and just who was trained academically at universities could act in the scientific area, family care back to being a private matter and therefore reserved for women. Science before something hereditary, which all family members participate, something becomes public, ie facing men. Therefore, also excluding women academia. Hindering thus their professionalization and insertion in the labor market.

Historical factors refer and influence in this. And after survey of women in technology courses, the FACAPE, we identified that the sexist belief formed for centuries that women have no power to enter universities that refer to the exact area is still thrived and now propagated, even if camouflaged form.

Since intellectual formation of children, it is passed to it the stereotype that exists activities and functions that must

be performed by women and others by men. Which, from an early age, while men earn toys that encourage intellectual growth and motor, receiving for example, video games, games and computers, girls receive toys as houses, stoves and objects that refer to domestic and family care. So from the educational children based are taught to follow this stereotype and grow with gender segregation that generate environments with a predominance of only one gender, depriving the other to follow careers or enter environments, for being hostile places due to female minority .

Much is said in the absence of women in effective participation in the history of computing. However, little is known and prejudice prevails dominating where there is a lack of knowledge.

Although not known to all, the woman participates extremely important in the history of computing. Such as Grace Murray Hopper developed the first compiler of history and the creator of the term "bug" and "debug" and also had immense importance in creating a new common language for business-oriented, COBOL. We also, Augusta Ada Byron - Lady Lovelace, who is considered the first programmer in the world. Adele Goldberg who worked on the creation of the first "window", Madge Greswold helped in developing the ICON programming language; Lois Haibt developed an expression parser

III. MATEERIAL AND METHODS

In trying to understand the reason for the lack of women in technological courses / the FACAPE an interview in Science courses Computer and Management of Information Technology, with the target audience being, not just women these courses was drawn up, as well as the men. So that, it is possible to analyze not only the feminine vision, as well as the male view on the subject.

Therefore, we designed two types of interviews, one facing the public male and one for the female audience. Which each consists of four questions and diversifying between discursive essay.

IV. RESULTS AND DISCUSSION

In order to identify the male opinion about the absence of women in the GTI courses and Computer Sciences, FACAPE, we interviewed 67 men.

Thus, we saw that 67 men, 5 women reported that they may not have positions in promising technology. And the other five said they would not trust or depend on what the service to be worked, to rely on a service provided by a woman. Thus demonstrating that not so stealthy is prejudice

and to be something passed in the intellectual formation of being, this does not consider the gender segregation unusual but natural.

Although they are constantly growing courses because the technology area is an area in constant evolution, Technology Management courses in Information and Computer Science, the FACAPE, are dominated by the male audience. Which in rooms with 40 students, manages to realize two or at most three women. This gender inequality is by a number of factors, from the historical to cultural. Thus making the hostile university environment and difficult social interaction between genders due to the implanted prejudice in society coupled with lack of adequate disclosure of the course in the region.

A universe of 28 women, both courses, interviewed, 18 reported suffering or have suffered some kind of prejudice simply because they are female. As reported by two of the students to be asked to dissertarem the fact of discrimination: "At the time of internship, areas related to support almost not take girls." Or "They said that a woman's place is in the kitchen, I can not going to do a particular function." Thus demonstrating that ideologies formulated a long time ago perpetuate and influence the way of thinking today.

Analyzing the elaborate interview in technology courses, it was observed that of the 28 women interviewed, "What is the main reason for the low demand for women in the area of technology courses?" it was observed that 7 women answered that it was because of prejudice and discrimination that people females, who choose to go to the area of technology suffer and another 5 reported that it was due to lack of promotion and advertising of courses, thus causing these are less popularized and known by the female audience.

4.I perception of the female audience

1. Why did you choose to take a course in technology?

- "Because the technology market is an area that is growing and constantly changing and constantly learning will give me"
- "I chose ourso the ease of low competition"
- "Because I identify with technological area and for being a course in less time" (IT student)
- "For like tinkering on computers, curiosities to understand how the programs work"

2. Have you ever felt any kind of discrimination for being a woman in the technology industry?

- "Games of classmates. Feeling that the guys get more attention, opportunities and removal of doubts. "
- "I've been told that I could not solve a computational problem for not being a man."
- "I have tendered stage sometimes specifying that the candidate needed to be male."
- "I got a job opening because they said that would need a man for the activities."

It is explicit in the research revolt among women as the wave of stages jobs. Which of a universe of 16 women who said they had suffered some kind of prejudice or discrimination, 37.5% said they are struggling to find internship or work in the area because one of the prerequisites for joining the company is being male. Thus making clear the existing gender segregation today.

3. In your opinion what is the main reason for the low demand for women in the courses of technology area?

- "By tradition and lack of female interest"
- "Because most think the world of technology is for men"
- "I find it hard to be interested in an area that you do not feel welcome"
- "For the issue of prejudice and not if they feel able to work in this area"

4. What are the main reasons, in your opinion, the male predominance in the courses of technology area?

- "Because the company has already formulated technology that adapts to men"
- "Besides being an area that men are more encouraged, the female audience often gets carried away by discriminatory comments"
- "Greater acceptance and promotion of the area between men"
- "Encouraging family, I see the same incentive for women"

Through the analysis of the survey, we observed 67.9% of women who answered the questionnaire, chose their courses for identification or for longer exercise any function in the labor market in the same area. Even in a general context, complain of a lack of dissemination and disclosure of travel and constant division and sometimes with the same disrespect just because they are female.

4.2 The public perception masculine

1. What would be the main reason, in his opinion, the male predominance in technology courses?

- "Because the man has more technological domain and can absorb more technologies"
- "For lack of knowledge of women as they were the first to program."
- "I believe that there is no incentive enough to awaken the interest of women to technology, from childhood until the time to decide the course"
- "Maybe some kind of paradigm"

After analyzing the responses and male opinion, one can see that while over time and the breakdown of many sexist paradigms and prejudices, a male minority is still prejudiced and somehow oppress women simply because they are women . Which, a minority of 7:57% of men interviewed did not think the technology area prone to women, 03.03% would not trust an IT service to a woman and 06.06% of them would give preference to men in employment screening.

IV. CONCLUSIONS

In this paper we demonstrated the opinion of male and female students studying in the Science courses Computer and Management of Information Technology, FACAPE, regarding the lack of women in the institution's technology courses. Analyzing prejudices and difficulties faced by women who have chosen to attend one course aimed at the technological area.

Given this, it was observed that gender segregation is a long time and even with the passage of time, it still exists. Even if isolated or camouflaged manner. Thus we see that the evil disclosure of the area combined with the hostile environment generated by the existing discrimination and formed stereotype, because a certain lack of interest in women. Therefore making it avoid such areas and moving to more comfortable areas and greater social acceptance.

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Education for Transit: An Experience in Classroom

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Abstract— This paper discusses the importance of working with the theme Education for Transit in primary education. It is the result of research-training developed in the State School Manoel Messias Barbosa, rural town of Petrolina-PE, on the high rates of traffic accidents involving young people and children and other mobility-related issues. Elements of Collective Research were used in order to develop a participatory process, considering the school community members as research subjects. The objective of the activity was to develop a process of research-training, aimed at the participants' awareness of the risk of accidents in traffic. It also seeks to understand how students represent in their daily lives this theme. In the process, We could recognize that the experiences in school are significant when appropriate to the objective conditions and may contribute to its continuity in the integration of other learning in the event, dedicated to peaceful coexistence in the city. With regard to integrating, idea essential to mobility, it is necessary to enable individual and collective participation, also considering the historical moment of new struggles for rights guarantee. On investigation, it was possible to understand that the participation of youth is part of the process of their awareness as they can recognize the role played by them in activities that promote a better quality of life in the city. aimed at peaceful coexistence in the city. With regard to integrating, idea essential to mobility, it is necessary to enable individual and collective participation, also considering the historical moment of new struggles for rights guarantee. On investigation, it was possible to understand that the participation of youth is part of the process of their awareness as they can recognize the role played by them in activities that promote a better quality of life in the city. aimed at peaceful coexistence in the city. With regard to integrating, idea essential to mobility, it is necessary to enable individual and collective participation, also considering the historical moment of new struggles for rights guarantee. On investigation, it was possible to understand that the participation of youth is part of the process of their awareness as they can recognize the role played by them in activities that promote a better quality of life in the city.

Keywords— Traffic Education, Awareness, Experience, Collective Research.

I. INTRODUCTION

The paper discusses the importance of reflection in school about Traffic Education, as a right of all and alternative to the awareness of accident risks in traffic. The theme chosen enables interdisciplinary work at school, considering the complex constitutive relations of the city, such as those that are related to territoriality and participation of young people in the construction of public policies to improve the quality of life.

The current notion of mobility enables explain more clearly by the school community relations that were

established in city traffic because of the social division of labor and the advent of new technologies of communication and information elements that need to be thought of in the policies aimed at resolution problems in traffic, taking into account the large number of people who die or are left with any sequel due to accidents. By 2019, according to the World Health Organization (WHO, 2019), most of the victims in traffic were pedestrians, cyclists and motorcyclists, ie the most vulnerable. WHO also points out that the main cause of death for children and young people between 5 and 29 years are injuries caused by traffic accidents.

A significant factor for this discussion is the result of a survey published by IPEA (PEREIRA, 2020), which indicates that in twenty major cities in Brazil accessibility is higher for those who live in the central regions, where most of the activities and networks transport converge. The study also shows that poor black population has on average less educational opportunity, health and work, due to these conditions.

In 2015, international organizations adopted Agenda 2030 for Sustainable Development. Among the goals and objectives of this document are improvements in mobility in general and reduction of casualties in traffic. Considering the guidelines of the Agenda on the importance of participation of different entities in the debate on the prevention of traffic accidents, accidents numbers ever increasing and the fact that a significant portion of the people who are involved in accidents are young, compreendeu- the need to discuss the issue of traffic in the classroom, considering it as element relating to mobility issues.

The debate It was developed at the State School Messiah Manuel Barbosa, Petrolina-PE during the year 2018, in an interdisciplinary way, due to its cross-cutting nature, aimed at raising awareness of the participants and can contribute to the context of disciplinary content.

The project experience also enables tailor subject content to a perspective of complexity and critical. As Santos (2001, p.116), the formation of citizenship is necessary to pass a critical situation for criticism of reality, reaching "an awareness". The student can, for the understanding of reality, help transform their community and improve their lives. The debate over what is expected in terms of access to employment, health care, leisure and education facilities with safety and quality need to be updated as new needs arise.

The young man is a social and historical category. Youth is a stage of transition, like other phases of human life, which requires a look of specificity, considering the youths in their social constitution, including gender issues, territorial, ethnic, and others. To Corti and Souza (2012, p.20), "It is a mistake to anchor the young man that designed temporality, which makes sense only for adults who have had the opportunity to build their own life experiences and extract them their lessons." We must value the autonomy of action, the ability to integrate and the power of the critical set, characteristic features of youth. The activities at school must allow the exploration of the possibilities of thought and action of the young, creating opportunity to (self) knowledge and personal development.

Among the issues generating this research, we highlight the following Working Education theme for traffic school, considering the need to develop an awareness experience?

This discussion focuses initially on understanding how the city is experienced by the symbols and memory that are in everyday life. Seeks to identify the relationship between education, citizenship, mobility and prevention of risks in traffic. Subsequently, talks about the experience (Dewey) as awareness process (Freire). It describes and analyzes briefly the development of the Road Education Project: mobilize to integrate, experienced by the State School Messiah Manuel Barbosa, located in the countryside of the city of Petrolina-PE.

II. THE CITY AS SYMBOL AND MEMORY

The text excerpt Italian Italo Calvino (1990), used as the epigraph of this work, it helps to think of the city in its plurality of meaning. The city reveals itself through symbols, which are deciphered in a creative way by passers-by in their multiple experiences and memories. Calvin reveals the importance of looking at the movement of reality answers to understand the dynamics of constitution of the popular imagination of the city. It is also done by memory, creativity and change. The symbols that help city identification process are seized in particular the experience of each and multiplicity of meanings that are constructed in the social collective. According to Calvin (proposals for the next, p.85)

The historian Michel de Certeau (1994, p.38) also points to a multiple relationship between subject and city. For the historian, the everyday is invented creatively by the people, ie, the apparent order of daily life in the polis set up by elements of individual and innovative collective order, aimed at meeting the needs of individuals, beyond the mere reproduction the set.

For Certeau (1994, p.42), the action of individuals in urban areas is "One way to think. Invested in a manner of acting, an art to use. " So (in) discipline, people occupy the cities; and although a profile individualized this action, their practices always have a social bias and represent two dimensions, which are often in conflict: those who seek to preserve values and those who believe in renewal, due to the constant movement of ideas and of life itself in its multiple dimensions, so it is necessary to debate about what values must guide the collective life.

The city is made up of individual and collective representations and mobility policies need to consider this, recognizing the different interpretations of sustainability

and new integration modes in the city. People do not walk the same streets, or relate in the same way with the city, but their demands today clearly show related to dignity, freedom to get around the city to study, work and play. The alternative that presents the contemporary targeting the creative construction of alternatives that help to improve life is the collective debate in neighborhood associations, churches, schools and other spaces.

Considering the above, we believe it is necessary to institutionalize the school debate on mobility, to raise awareness early on children and young people about the importance of their participation in the improvement of the city, including the need to understand the risks that the irresponsible attitude in traffic can bring to the people.

There is a movement which is the contemporary urban space and increasing interest of people occupying these spaces. It is purpose of this article compare policy experiences on the topic, but to discuss how the work on mobility in school can allow the integration of people with ever more inclusive and social justice, considering the city in its political and symbolic dimensions.

The second citation of the title belongs to the French thinker Morin (2012), which points to the need to renew the thought from the perspective of complexity. In the complex thought, it is more important to consider the relationship between parties to the whole of reality. The fragmentation of knowledge fostered by the social division of labor can confirm for the sale of the result of human labor, hiding the relationships that constitute the production of goods and services.

Currently, it is understood that the instrumental rationality, argument used to justify the exploitation of nature, was not enough to ensure the basic survival of much of the world's population. Thus, the inherited model of life of modern thought has been criticized, for their resilience, requiring institutions, as is constitutively school, the formation of critical subjects of this fact, competent to participate in the political process of building that promote justice .

In contemporary terms, mobility is related not only to economic, but with more dimensions concern large with the organization of life in the city and improve the integration between the people and those with the environment in which they live. In its development, governments and civil society understand that the improvement in mobility can contribute to the realization of citizens' rights.

Mobility as the need for circulation, including a perspective that affects environmental issues, has its origins in the nineteenth century (BALBIM, 2004). In the following

century, the idea of a mobility point of view of urban science will be officially used to meet different operating needs.

Considering what has been discussed so far, it is understood that we must reflect on mobility from the perspective of youth participation, making it possible to create and improve communication channels between governments and civil society, which includes to highlight the theme of the debate at school or take to school to public spaces to help with awareness.

III. EXPERIENCE AS AWARENESS TOOL IN DEWEY

When it refers to the relationship between public and private; individual and collective; ethical and political; the school was established as suitable space for such a debate, while also serving as a place suitable to experience concrete experiences related to these social content, taking into account that there is "an organic connection between education and personal experience" and the influence of this experience on later (Dewey, p. 13, 1979). Continuity of experience and interaction are two Deweyian principles, which help to understand the need to work across the curriculum in school, with an emphasis on planning as appropriate method to achieve desired results.

For Dewey (2011, p.130), knowledge is an experience and is a "situation reconstruction tool." An experience follows the other, and may help in the emancipation of individuals, if the objective conditions create educational experiences valid. What it is very important to think about planning the teaching-learning process, since you can not expect people to learn of accidental way.

For Dewey (2011), the experience goes beyond the particular and conceptual, although that relates to these two dimensions. First, inspired by the studies of the biology of his time, understand that life depends on the continuous activity of the bodies in the event of an adaptation to active profile, you also modify the environment. Similarly happens to human, turning the environment where they live creatively. According to the philosopher (2011, p.91), the "intimate connection between act, suffer or undergo forms is what we call experience" (emphasis added).

Think an education that helps turn people to change reality is to enable creative experiences, going beyond the mere reproduction of the rules. According to Dewey, this is part of the breakthrough in the debate about the experience because this happens to be used to improve the experiment and make new breakthroughs. The planning procedures has an important place in this process, as it guides the action,

based on experience, and may be revised in a new experiment. In this case, the concern is not the immediacy of the result, but the process and the changes can still be made possible in the life of the subject, regardless of their age group.

In his pragmatism, Dewey understands that a priori schemes are not important because they frame the reality despising his moving character. Your instrumentalism is related to a rationality that is built on experience. Their concern is focused on understanding how the educational processes can contribute to the democratic development. For the philosopher, one can not separate the life out of school and experience in the classroom. It also includes that childhood is not a phase transition to adulthood. Dewey believes in educating how to be specific interactions consistent with their age and shape their experiences in school and beyond. It is also necessary valuing creativity and participation to develop a meaningful learning in school.

IV. A SUBJECT OF AWARENESS AND EDUCATIONAL EXPERIENCE IN FREIRE

Freire based their discussions on different readings, among them the philosopher Dewey (MURARO, 2013). The concept of experience in Dewey is present in discussion built by Freire awareness around the idea of education for democratic development. First, the appreciation of an active profile and the critical subject of the action; Second, with regard to how experience and awareness are part of the subject's development process; third, as the achievements resulting from the development of the individual need to be expanded with the help of previous experiences and relate to democratic processes.

Both Dewey and Freire pursue a democratic order for education in his writings and in his personal life, basing their discussions on concrete reality. In both perspectives, democratic participation is essential for the development of the subject. On the subject of participation in the awareness process for citizenship, Freire (2001, p.130) states that "the depth of the meaning of being a citizen goes through people's participation, the 'voice'. [...] is not open her mouth and speak, recite. The voice is a right to ask, criticize, suggest. [...] Having voice is be critical presence in history. A voice is to be present, not be present. "

Awareness is a very common theme in the writings of Freire. For the educator, the action on the reality can happen consciously, a process that goes from reflection to action and vice versa. There is a difference between the naive or critical relationship of the subject with reality. The critical activity is part of the awareness process, from an

epistemological positioning unveiling of concrete reality and recognition of the subjects historicity. In an existential process of reflection and action the subject can understand and become a reality.

As Freire (1980, p.27), the awareness "is based on the relation consciousness-world," a reality that is a movement. Awareness needs to be revised in accordance with the changes in society, in an ongoing effort at humanization. In this sense, subject and reality are never finished, but always to be done.

In this recognition process of participating in a historical circumstance helps in release of mysticism and oppression. The criticism that the subject is the human existential condition helps him to understand how the world. In this process, it is expected that the subject recognizes their spatiotemporal roots and realize that their freedom is preceded by a reflection on the concrete reality. In this perspective, the student is considered subject of the educational process and their own awareness. An activity that takes place through interaction with itself, with its environment and with others. Learning also takes place in dialectical syntheses in the encoding and decoding of the contents worked in education in a working form themselves of being in relation to its nearest context, but also the planetarium.

According to Freire (p.35), the human being "comes to be subjected to a reflection on his situation, about his concrete environment" (p.35). The idea strength of awareness in Freire is that the human being is a part, reflects, commits and is in the context, that is, a democratic experience. In the free process of the subject of creation of culture, it is expected that it recognizes critically an external reality you and another which are its companions. It's school paper form this transformer guy in the world, aware of self and other.

V. MATERIAL AND METHODS

In this paper, we reflected from a relational perspective (APPEL, 2013) on mobility and the awareness of students to the reduction of risks in traffic.

In the survey, they were used elements of Collective Research (ALVARADO PRADA, 2006), as the consideration that students and teachers are research subjects and not objects. Data were built collectively by two workshops, which were developed primarily with teachers and later with the students. It took into account the awareness of idea often cited by participants to choose the theoretical and methodological approach, which was being built collectively.

In the case of Public Research, the formation of a collective research is essential. Another important element of this type of research is the enhancement of the process at the expense of research results. Search is an individual and collective experience of the methodology to be used in construction of reality understanding process by gathering and systematization of data constructed by the participants. This requires understanding of reality by an experience in which the individual draws on previous experiences to constitute an updated knowledge. What is achieved in individual activity can be improved in participants debate with other subjects of the investigation.

The Dewey's and Freire's perspective of how the expertise and awareness allow democratic development requires that the methodological processes reflect individual and collective experiences. In this sense, dialogicity proposed by Freire enables creative synthesis that can help to understand and transform reality. The survey of generating words by members of the working group proposed in Freire's method is an important recognition instrument that affects the individual and his group also identifying values that guide the social collective.

As Freire, the methodology can be used in the process of the teacher instrument, but also the student. The generative words are significant, as make possible different social and cultural reactions in people. From this perspective, they were produced sketches of imaginary cities and construction of short texts, for the construction of data for the survey generating words and the development of a Knowledge Fair at school.

The reflection on the reality of objects that mediate the relationship between subjects, in a process of encoding and decoding proposed in dialogical pedagogy Freire is considered an experience of Dewey's point of view. Experience helps to recognize the relations that structure the concrete reality, allows another reading of reality, deeper, because it seeks the historicity of circumstance answers to your questions.

According to the Brazilian anthropologist Cardoso de Oliveira (2006), field research is necessary to consider the importance of three movements: the look, hear and write. These three actions are embedded in the process which Dewey calls observation. The observation is not an end in itself, but it is an activity of the investigator to identify signs that anticipate a fact. With the observed fact and planning developed, says something important about what's going on, not only on what is inferred that can happen. For the philosopher "Every act of thinking that is smart will mean the increase of freedom of action - the emancipation of

chance and fate" (Dewey, 2011, p.129). From this perspective, theories are instruments, are not the ultimate goal, are the basis of human action and need to be proven in practice.

During the research, it was found that the word awareness lined the speeches of the workshop participants. The actions developed in the project were based on the critical need for training in relation to mobility, the relationship between town and country and the participation of the subjects in the reduction of risks in traffic.

Some procedures of the research-training process developed in school are described below.

VI. EXPERIENCE REPORTING

This work is a sample of how you can develop the theme of mobility in school and allow students to debate as to what is proposed by the Federal Government in building a new national mobility plan (BRAZIL, 2018), which included not directly to schools.

Working with traffic education as cross-cutting issue is a recognition mode of conflicts and possibilities in urban areas and the difficulties in solving them, as the need to offer a quality public transportation, build bike paths, improving sidewalks and signage favoring the accessibility.

The Education Project Road: mobilize to integrate developed a high school in the city of Petrolina, Pernambuco, sought to develop in the community school a process of research and training, enabling the role of students and other members of the school community in solving situations -problema simulated in the classroom on mobility.

The activity was developed due to high rates of traffic accidents in the region and the need for awareness of everyone about the importance of preventing the risk of accidents. In addition, the actions aimed at the collection of data to be presented in the school community through a knowledge fair.

In 2018, students and teachers made the school a full discussion on mobility and the need to understand how is the integration between subjects and between them and the reality in the spaces of the city. The project is developed in school since the year 2016. Sensitized to the data provided by the Municipality of Petrolina Mobility Municipal (WIDE) on accidents in the region and the reports made by the students on the use of alcohol and direction in their communities, teachers and students accepted the challenge to delve deeper into these problem situations and many others that happen in everyday life of the communities on mobility.

The project was built by teachers and students in workshops under the guidance of teacher support. The activities were first experienced in training with teachers and then developed in the classroom with students. Due to the complexity of each situation raised by teachers and students with regard to the theme of the project, it sought to reflect on the choice of genres to be built and interpretation of data produced. All this in order that the process was transforming relations in the school routine and could contribute to the awareness of the need to reduce the risk of traffic accidents.

The project was expected to culminate on October 9, 2018 with a Knowledge Fair, but problems in school transport prevented that it be held on that date. After some adjustments, on 08 November, the students displayed their research and reflections to the community. Later, they were pleased to be able to participate as protagonists of this process with colleagues from other classes and visitors of a municipal school community.

Students and teachers responded to a written evaluation after the culmination of the project, which can help us to identify the directions given by them to the activity performed in school. Students evaluated positively both their participation as teachers. They expressed satisfaction in participating in the process, identifying the proposal, as they helped build it. It is understood that the positive experience instrumentalize students to deal creatively with future situations.

On the exposed information on there, they believe they can now recognize mobility in their daily lives and thereby strengthening the following learning: to ensure traffic safety; use appropriate accessories while driving; not to drink alcohol if they are using the vehicle; cell being not use the wheel; be more aware as a driver, cyclist or pedestrian; health care, considering the benefits of cycling and the forest roads.

In the assessment of the Knowledge Fair, it is understood that there was an association on the part of students and teachers mobility theme of the need to reduce risks in traffic and the importance of awareness of all to achieve this goal.

In the development of the tasks, the interaction helped solve real problems, finding more suitable alternatives. We understand that, to realize that participate in group activities, students can engage consciously in the process of learning, which allows them to recognize also as participants in building a more democratic society, a peaceful transit, reducing the risk of accidents.

For the next stage of the project are two suggestions to be discussed with the school collective. The

first is about the expansion of the subjects, such as physical and psychological treatment given to people who suffer accidents in traffic. The other issue required further examination is methodological. Terms of ensuring that the debate on the subject can be carried out continuously throughout the year, the production of genres of movement in the community where the school is located.

VII. CONCLUSIONS

Similarly to the city, the school is formed by the experiences, memories and knowledge built intersubjectively. In this sense, the public policies aimed at reducing risks in traffic need to be discussed and built from these experiences, values that predominate in the historical context, promoting the democratic process and to justice. Recognizing the knowledge produced by different social groups and their specific development needs. This includes widening the debate and research at school and in other spaces on youth and their participation in decisions about the city. The inclusion of young people in discussions and decisions about the education offered to them is based on confidence in its potential for change and for the development of public education with social quality.

The school is one of the places in the city that need to allow free debate, seeking the emancipation of individuals, respect for difference in thinking and appreciation of dialogic processes. It is the continuity of life that is experienced outside their walls. Thus, values that guide the city life and value human development are the same that need to be experienced collectively in the classroom or other activities with students through interdisciplinary practices.

The objectification of reality proposed in social research is the approach that the subject performs the daily movement through interaction that can help you understand the dynamics of formation of the groups, building data and interpretation of reality.

The collective activity from the perspective of an awareness experience goes beyond their psychological or biological dimension. It is historical and individual experience, because it depends on intuition, recurrence to previous individual experiences and interfere with the future actions of the subject. It is also social as it relates to the knowledge constructed and socially validated, the collective principles that guide planning and action. Taking into account also that the subject complements the other, requiring an ethical position.

Experience is particularly taking into account individual differences, for example, in the mode of

appropriation of culture and social values. It has an inter-profile because the knowledge of reality produced individually depends on social recognition, identification with other discourses produced in society.

O work at school with cross-cutting issues such as proposed in Traffic Education is part of the integral formation of the student. It helps to overcome the routine and the abstract if one takes into account the planning and participation of all members of the school community, the exchange of experiences and knowledge, and construction of contextualized knowledge.

The awareness to improve living conditions in the city, especially for reducing risks in traffic depends, among other actions, the participation of young people and a critical stance in front of the set, including with regard to habits and prejudices that need be overcome. The city was not made for cars, but for people. However, one must consider that today's society depends on an improvement in mobility, which includes an improvement in transportation and accessibility, for the care of basic needs that affect the dignity of the human person, regarding employment, education, health, leisure, etc.

It is necessary to advance in the proposed debate in this article and the school can contribute to this process, enabling the experience of valuable experience, ie through dialogue and awareness, aimed at consequent impairment of the subject in relation to its reality.

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The Sertão of Non-Violence

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Abstract— Violence is to subject that lacks reflections able to instigate the institutional actors and the critical sense in the population. In this sense, this article analyzes the functioning of interpersonal relationships with respect to physical violence, from its near absence in the semi-arid region, specifically in the town of Gust, part of the municipality of Petrolina / PE, located in the backlands of Pernambuco, where there were only two murders in seven decades. Is based on the discursive representations on the issue of violence and the ways in presenting the social ties that reinforce the Community Elán.

Keywords— Violence, Public Security, Semi-Arid, Public Policy.

I. INTRODUCTION

The introduction of the paper shouldnt explain the nature of the problem, previous work, purpose, and the contribution of the paper. The contents of each section may be provided to easily understand about the paper.

The theme of violence in its many facets, has been the subject of approaches in sociological studies, particularly for the demarcation of forms of socialization effects generation that are repeated more or less recurrently in societies. Discuss the issue of implies violence necessarily understand what the intrinsic elements in social relations that support violent behavior, as this would seem like instrument (ARENDT, 2001) for non-recognition, cancellation or division of another (Adorno, Horkheimer, 1985) denying thus their dignity.

The violence is the result of power relations that are produced by legitimate interpersonal relationships, or not, by institutional mechanisms that make the cultural arbitrary natural (Bourdieu, 2005) with significant implications for historic structures. From this perspective, it is important to reflect on the role of the social mechanisms of regulation of the relations of domination in regard to the question of the establishment of community ties.

In this context, the unsaid, the unrealized, fits as revealing what you intend to explain, because the shared discursive relationship in the collective sphere which does not run also constitutes a form of action. Thus, the methodological approach of the theme adopted in this study has the scope of the practices adopted by the inhabitants of Gust, village in the municipality of Petrolina / PE in

submedium the São Francisco Valley, a city that is a reference at the economic and political to state Pernambuco, one of the most violent states in the country, which has the peculiarity that, in the hinterland, not compute significant records of murders, only two in the last 70 years in its urban area.

To discuss the issue, the work is divided into three sections, besides this introduction: the first is a discussion about the influence of violence in the structuring of social ties; the second presents polyphonic aspects in the discourse of nonviolence in Gust and, lastly, the final considerations.

II. DISCUSSION THEORETICAL

An important question that arises is the face of this reality in Brazil, as pointed out by the Datasus, the Ministry of Health, when considering the average homicide rate in Rio de Janeiro and Pernambuco the same average: 41 cases for each group and 100 thousand inhabitants. It is relevant to note that Pernambuco appears among the five states most violent in the country 26 times, ranking third in 2006, second only to Alagoas and Holy Spirit. In the specific case of Pernambuco, there is a growing tradition to violent behavior as a form of social honor, which causes be known as' killer of earth.

Considering this context, it is necessary to understand the habitus (Bourdieu, 2004) established for the definition of social relations, in particular its influence on the formulation of agendas created in the sphere of public security, allows for understanding the nature of sociability

to the structuring of social ties, for "everything that exists in individuals and in specific fields of all historical reality as impulse, interest, purpose, tendency, psychological conditioning and movement" (Simmel, 2006) defines the nature of the associations.

In the social habitus of the conflict, building elements, which are scoped to the production of legal certainty and of the presumption of equality, based on the Enlightenment conception of the modern state and citizenship constituted by the political practice as a way to hold the ownership of the concept of justice Social. Thus to form a discursive trend for the production of social security (COSTA, 1998; Scott, 2002; TABAK, 2002).

In this respect we can see daily flows for enabling ontological security (Giddens, 2003), in order to create external security manipulation through the rooting of a moral economy (Elias, 1994) able to give vent to the need for answers to the dilemmas of logic current domination (CRENSHAW, 2002; Ferreira, 2004).

III. SOCIAL REPRESENTATIONS

Social representations had as a precursor Serge Moscovici (1978), which in the 1960s has resurrected his concept from the collective representations of Durkheim (SA, 2002). In this case, however, he emphasized the interaction between the individual and the social, rather than turn fully to the social side as Durkheim (1978) places.

Among the paradigms that have been formulated in recent decades, the Social Representation Theory emerged as a new way of interpreting the behavior of individuals and social groups. Moscovici says that they are formed by reciprocal influences and implicit negotiations in the course of conversations where people are oriented towards symbolic models, images and values. In this process, individuals acquire a common repertoire of interpretations and explanations, rules and procedures that can be applied to everyday life. Jodelet (2002) defines them as a form of knowledge socially elaborated and shared, with a practical goal that contributes to the construction of a common reality to a social group. This is evident when we observe what arises in Gust community as the consumer expectations regarding food standards (the DPB), regularity of purchase of clothing or personal belongings (usually in June, for the celebration of St. John, and in December, for Christmas). Another relevant factor is the regularity of living of the religious practices of the Catholic Church and, in particular, attendance at Mass and the wheels of São Gonçalo.

It can be considered a social representation as a form of practical knowledge that links a subject to an object

(SA, 2002), but it is not just a construction of the subject, it is also social, in that there are social and cultural participation this guy. This is because man is a social being, daily exchange ideas and opinions on certain subjects that arouse their interest and curiosity with their peers, and this interaction, each has its concepts arising from its own logic, formed by the collection of information and evaluative judgments of various sources and personal experiences and / or group.

Are the formative processes of social representations feeling and perceiving, says Moscovici (1978), the objectification and anchoring. He considers the anchor as cognitive integration of the object represented by people, ideas, events, relationships, etc. Anchoring is sort and styling. To Jovchelovitch (1995) the objectification and anchoring are specific ways in which social representations establish mediations of social representations in social life. Emerge with it, the opportunity to bring knowledge to the unknown into a reality known and institutionalized.

Already the objectification consists of a structural fancying operation and by which it gives a "form" (or figure) specific knowledge about the object, making concrete, almost tangible, abstract concept. Aim is to discover the iconic quality of an idea or be inaccurate, playing a concept in an image. With the objectification and anchoring are observed existing mediations between social life and individual life, such mediations are the representations, symbolic structures that originate both in the creative capacity of the human psyche, as the borders that social life imposes (Jovchelovitch, 1995).

For Moscovici (1978), in contemporary societies universe there are two classes of thought: the universes reified and consensual universes. Both act simultaneously to shape our reality. In the first, quite circumscribed, are produced and circulate the sciences and scholarly thought in general. The second, relate to the intellectual activities of daily social interaction, in which social representations are produced. The construction of symbolic significance is simultaneously an act of knowledge and an emotional act, whose base is the social reality (SA, 2002).

IV. MATERIALS AND METHODS

The central research question focuses on the elements contribute to nonviolence in Gust community, especially as the feeling that belongs to a well-defined group socially helps prevent violent physical attacks resulting in deaths in order to identify the main inducing elements of nonviolence. The study was performed in a qualitative perspective, requiring that the methodological approach is given by ethnographic work, justified on the basis of the

belief that this type of research points to the understanding of the studied phenomenon, allowing, from significant elements, it is possible to explain the social processes and imponderables (MALINOWSKI, 1976).

From this assumption, the identification of social representations was carried out with the help of search tools that favored the analysis of content, hidden by the focus of attraction, the latent, non-apparent, the unprecedented potential (of the unsaid) held by any message (Bardin, 1977). This aspect is the need for deepening the meanings of the world actions and human relations (BOUDON 1989) Capable of explaining myths, beliefs, aspirations, values and attitudes. Thus, there were 91 interviews with three focus groups divided by age into five classes (09 -11, 12 -17, 18 -30, 31-59; Above 60 years) to ensure the variety of perspectives for the design of the habitus Social.

the categories approach were established as follows: family, work, school, consumption and violence. Semi-structured interviews were conducted that allowed up the way of life predominantly adopted by the community.

To map research, we used the Content Analysis method, which allows inferences by the systematic and objective identification of specific characteristics of the message, organizing lists of themes, is characterized as a predominantly qualitative research. The ninety interviews were recorded, followed by the transcripts, floating reading to grasp the general aspects. Thus, if formed as an additional data source and stopped when it was realized that the data is "exhausted", supporting the concept of "theoretical saturation" (Nico et al, 2007). In this sense, the sample taken is theoretical, since the number of subjects or situations to be included in the study is determined when the information starts to be repeated and given new or additional are no longer found.

V. DISCUSSION AND ANALYSIS

On violence in the family group and the possibility of suffering physical violence on the street informants said the following:

"There's no fight. Why ugly brothers fight. If you learn to fight at home or at school agent does not want not "JWR 11 years.

"Ugly Fight not. Tiff simple and nothing to go to tapas "MA 18 years.

"Do not think of it, I do not consider. Here death does not happen "KR, 29 years.

"I have 53 years, never seen anyone kill the other then" AF, 53.

"No one here has the courage" PR 20 years.

Thus, the understanding of accepted uses as material allows for better visibility of the requirements validated by the social actors that are part of a substantial way the scope of the set of operating practices and values in social regulation. Consideration of the social scenario in the assessment of power relations requires the perception of the role of the various stakeholders, especially the conformation of motivation and direction of action bases. In this sense, to unveil the production of discursive practice of individuals within the community life is so crucial point of defining the degree of fact made equity (Giddens, 1991).

In a complex social environment, there are a multitude of reference structures with simultaneous validity (D'Incao, 1999), which atomizes the individual to put it in contrast to the different groups with which it has contact, whether of identity reaffirmation, either otherness . Strengthening individualization brings an imbalance in identity reference, a characteristic feature of the logic of postmodern society. Firm up the habitus as a "layer feature of membership of a particular social group to survive ... as there is no identity without identity-I-we" (Elias, 1994: 151).

It must consider the idea advocated by Bourdieu (2001) that there are structural homologies between symbolic fields, so that they are all interconnected by common elements, either in the system of primary socialities, or in the system of secondary socialities (Godbout, 1999). On this, Caillé (1998: 9) states that "social facts, we would say, to sum up the best of the specificity of Maussian vision, becometotal and should not be considered as things, but as symbols. " Belonging to a community presupposes a system of attributes and relationships in which individuals participate, directly or indirectly, of the common interests (BOUDON; Bourricaud, 2001).

Let's look at extracts from the reports of respondents about the family's role:

"Kinship, marriage with cousins all. Very important family of people "JMA, 35 years.

"And it all. The most important thing for people is the family "JS, 19 years.

The family is presented as a realization of security, a voltage ratio with the freedom of individual action, within the aspirations of sharing process.

The guiding question for the evaluation of social conformation is to verify the effectiveness of the behavior of individuals and the effects of their performance in the course of sociability that are built within the institutions, so as to need as symbolic exchanges are made in social

relations forward the relationship of physical violence, through the analysis of the discursive practice.

VI. CONCLUSIONS

This study examined how the sociability pattern established in Gust stands recurrence of emotional bond as kindred extended to ontological security element which appears as a valid expression of belonging in the community.

In the embedded speech to practice collective trust is experienced as a gift in the social process, which is demarcated by reinforcing ritualized practices to community ties, especially the experiences of social gatherings, religious or not, and the distance of which is unknown, the 'other', the stranger, the possibility of macular collective logic.

The recurring idea of violence is grounded in the possibility of insertion of external elements to the community, capable of causing tensions desestruturadoras habitus. In polyphonic elements of speech of non-violence, evident is the cultivation of family groups and, by extension, the kindred idea of extending the community as a determinant of an identity insulation to guarantee social peace.

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Relations between Aggressiveness and Empathy in the Context of early childhood Education: Theoretical Study

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Abstract— Improve the understanding of the cognitive and affective aspects of the human being has aroused the interest of the scientific community. Thus, this paper aims to pay attention to this fact, in order to analyze how aggression can be regulated by the influence of the development of empathic ability of the student in the school context. From the theoretical elements surveyed resulted in the development of a brief background of such construct (aggression and empathy), targeting exclusively for the school environment of children. Therefore, this work is justified by contributing to the understanding of the benefits of such a relationship, assisting in directions for regulation of aggressive behavior in the classroom, given that this is an issue that requires interventions mainly the first series. Therefore, it was found that even being a national and international issue is still very limited when it comes training and teaching practice and research in both empirical and theoretical showing the relationship of the constructs on the children's school context.

Keywords— Empathy, aggressiveness, childhood education, teacher training.

I. INTRODUCTION

A major focus of contemporary science has been to understand how to give the actions and human behavior (EVANGELISTA 2011 cited MOURA, 2014). Hence arises, in fact, interest in studies of values, ethics, morality, empathy, aggression and other constructs in order to improve the understanding of man in his cognitive and affective aspects, to contribute to the improvement of their social interactions, ie to live better in society.

On this reality, to pay attention to issues such as aggression and violence is noted that in recent years, both in Brazilian society and in various parts of the world, a significant if have experienced an increase in aggressive behavior, as well as increased scientific interest about this phenomenon (Pavarino, Prette DEL, DEL Prette, 2005a). Therefore, to obtain a better understanding of these behaviors is essential to observe the development contexts, in particular the family and the school in order to adopt more prospects 'social' problem (BARBOSA et al, 2011).

Therefore, the aggression has been a recurring theme of research in various fields of knowledge, and a cause of

growing concern among parents, teachers and other educators (IBDEM, 2011). For, although it is not a new phenomenon, its media coverage, together with the complexity and the different forms it takes, contributed to this scientific recurrence, becoming a research topic that has achieved strong advance today (DIAS, 2014).

Chopped and Rose (2009), when dealing with the subject in the school environment, emphasize that there is growing concern in this space as the manifestations of aggression and violence presented by students of different educational levels. Therefore, teachers mainly complain about the increase in aggressive behavior, challenging attitudes, disobedience, devolution in the tasks, and the lack of emotional self-regulation by the students. Teachers, according to the authors, have trouble regulated way to deal on these types of behavior and attitudes of the students.

Being aggressiveness a complex construct that is influenced and influences many aspects of human development, sought to, in addition to defining the context of research, relate to another human construct that can assist in the regulation of aggressive process. Therefore, the Empathy has been a construct that has been widely studied

for their influence with skills and social-emotional behaviors such as aggression.

From the contributions of researchers, cognitive-developmental, as Davis (1983), Eisenberg and Strayer (1987) and Martin Hoffman (2000), who conceive Empathy as a multidimensional construct, consisting of affective and cognitive components that develop over of human maturation (Sampaio, Guimarães, CAMINO, ANT, Menezes, 2011) it has been studied as a capacity to mobilize the moral and pro-social behavior, and to inhibit antisocial behavior or aggressive (Roazzi, MONTE, SAMPAIO, 2013).

Based on these, the present study deals with a review of the scientific literature and aimed to analyze how the aggressiveness can be regulated by the influence of the development of empathic ability of the student in the school context. This objective is justified given that aggression is one of the main complaints from teachers and administrators.

II. BACKGROUND OF AGGRESSIVE

Aggressiveness is subjectively and objectively in our lives in order that, according to Moura (2014), this construct is closely related to cognitive and affective aspects of human being. Set it in line with Days (2014), it is a complex undertaking, due to its conceptual boundaries are not clearly defined. Thus, some studies (RIBEIRO, 2007; ROSA 2008; VELEZ, 2010) have highlighted the fact that concepts such as aggression, violence and aggression being employed with a similar semantic connotation should not be taken as synonyms (DIAS, 2014).

As Pavarino, Del Prette, Del Prette (2005a) even used of interchangeable way in psychology, aggression and violence are constructs that generate dissent among researchers of this subject. Given this aspect, Bredemeier (1983, cited BIDUTTE, AZZI, RAPOSO, ALMEIDA, 2005) states that aggression is the beginning of the violent behavior. Already the violence is any physical, verbal or non-verbal offense with the intention to harm the other.

Barbosa et al (2011) also address the issue of violence, but is reporting its difference with aggression. For these authors what differentiates violence and aggression is the extent of the damage. Since violence aims extreme damage (p. Ex.: death) while in attack the injury is not as intense. Thus, violence is aggression, but not all aggressive behavior is violent.

In addition, there are also differences between the definition of aggression and aggression. The first is to "[...] behaviors that aim to harm physically or psychologically

another and / or yourself to interrupt the issuance of certain stock" (SAMULSKI 2002 cited Moura, 2014, p. 33). While aggression "[...] is the availability or willingness to aggression and combativeness [...]" (Scharfetter 1997 cited GALHORDAS, LIMA, Incarnation, 2007, p. 603).

The aggression can manifest itself in several ways, according to Kerneberg (1995, cited GALHORDAS, LIMA, Incarnation, 2007) there are four ways that can vary the intensity of aggressive mobilization, listed as follows: "[...] the irritation related to an accounting [sic] aggressive mild; irritability, defined as a form of chronic irritation; Anger, in which the affection [sic] aggressive is intense; and the reaction [sic] aggressive where aggression has an overwhelming nature "(KERNEBERG 1995 cited GALHORDAS, LIMA, Incarnation, 2007, p. 604).

Thus, it has not been, in fact, easy to define aggression, because in addition to assume different forms of expression, is also subject to the influence of biological, psychological and social (ABIJAUDI, 2016).

Beyond this conceptual question what really can be seen, according to Moura and Barrier (2017) is that most studies of aggressive behavior meant as a behavior that has negative impacts for both the aggressor, as for anyone who was assaulted. To dialogue with Jesus and Lempke (2015), they add that, in addition, these behaviors may also influence the personality of the individual case is not exceeded.

Recent research, considering both the international and national context (ABENAVOLI, GREENBERG, BIERMAN 2017; ALCANTARA et al, 2016;. ALMEIDA, Fofonka, WEISS, 2017; DESCHAMPS, VERHULP, CASTRO, MATTHYS, 2018; Henneberger, Coffman, GEST, 2017 ; SOUZA 2017), indicate that the current school is a space that is home to many types of aggression and its incidence among children has increased significantly, being singled out by both teachers and other school workers, as one of the difficulties they face in their professional practice in the school context (TAVARES, MENIN, 2015).

When dealing specifically aggressiveness developed by students of early childhood education, in line with Silva, Lucatto, Cruz, Martins (2015), it is understood that this issue is still a complex issue, difficult for professionals working in the school. Moreover, the dialogue with Royer (2002), he states that this issue is a problem that has been showing a steady increase, but there has been also a parallel increase in the capacity of teachers to help these young people.

III. BACKGROUND EMPATHY

Empathy has undergone major changes, from the investigations on this construct. Thus, it has been understood for a multidimensional perspective (Sampaio et al, 2009). Currently consists of three components, namely: cognitive, affective and behavioral (FALCONE, 1999). Cognitive is to accurately infer the feelings and thoughts of someone. Affective refers to the ability to understand the emotional states of others and be affected. But the behavior refers to the empathic expression through verbal or nonverbal communication (and RODRIGUES SILVA, 2012).

However, given the diversity and dissent that exists around the definition of empathy, one of the considered most important definitions regarding this construct was to Davis (1983 cited Roazzi, RIDE, SAMPAIO, 2013, p. 195), where "[...] empathy is considered an ability or personality trait comprising four components / dimensions, two and two cognitive affective ". Which according to Pires and Roazzi (2016), the first two consist of the emotional reaction of the subject, which can be directed both to share the emotional experience of the other (consideration empathic) and to understand the own states of anxiety and concern over relational situations (personal distress).

In Brazil, according to Ant et al (2011), the theoretical conceptions of empathy existed for more than two decades and are in various areas of science, such as: Psychology, Human Resources, Nursing and Medicine. Regarding the area of child development, as Pavarino, Del Prette, Del Prette (2005a), empathy has appeared as a cross-cutting theme, often associated with research on morality, emotion and social behavior.

In short, empathy has been a subject that has aroused the interest of professionals from different fields of knowledge, as it has shown a significant role in the development of cognitive, emotional and social skills (Azevedo, 2014).

Among the most used tools in the world to measure this construct the Interpersonal Reactivity Index (IRI), Davis (1983), differs by considering empathy as a multidimensional construct, developing assessments through affective subscales (personal distress and empathic concern) and cognitive (role-taking and fantasy) (Sampaio et al, 2011).

IV. EMPATHY AS EXPRESSIONS OF CONTROL STRATEGY AGGRESSIVE IN CLASSROOM

Since the beginning of the nineteenth century Empathy has been discussed in some fields of psychology and social sciences (Sampaio, CAMINO, Roazzi, 2009). After

insertion in psychology, several studies have been developed in order to seek a better understanding of the development of this psychological aspect and its relationship with other factors of social life (PIRES, Roazzi, 2016). Whereas aggressiveness, many studies have also been developed, in particular with children and adolescents, on the empathy, in view of the negative correlation between these two variables (Motta et al, 2017).

Therefore, one of the important school periods to develop interventions regarding aggression is in early childhood education (Moura and BARRIER (2017). For many children arrive unprepared for the demands of the educational process and, in many cases, end up showing also early signs aggressive behavior development (Luizzi, 2006). thus, the school can be constituted as a vulnerable spot, because this environment can occur different types of violence and aggression, both physical and more subtly, through psychological violence (MATOS, MARTINS, Jesus, Viseu, 2015).

However, it is also the school that children develop much of their social repertoires and learn moral and ethical standards (Silva LUCATTO, CRUZ, MARTINS, 2015). According to Poletto and Koller (2008) it is possible that children and young people can have within the school a place for the promotion of resilience through stimulating projects and activities of both individual and collective potential. Therefore, the interactions that occur in this formative and informative space can generate risk and protective factors (SANTANA, 2014).

In the case of established personal relationships in the school context, the teacher-student relationship is essential and empathy should be mediated construct such a relationship. So before that, both as affective cognitive processes should receive simultaneous attention, as both processes can generate positive or negative impacts, depending on how they are grown. Thus, the school can not be restricted to just be a systematic knowledge transmission space geared only to the cognitive aspect, it is also necessary to promote the emotional adjustment of their students (SILVA, 2012).

To pay attention to the performance of some empirical studies, even if still limited in the national context, some researchers (Pavarino, DEL Prette, DEL Prette, 2005a; RODRIGUES and SILVA, 2012) have presented results that show the condition of reducing aggression by developing empathic skills through specific training in school spaces. Thus contributing to instigate pro-social actions, minimize the manifestations of aggression and reduce school violence.

In the study by Pavarino, Del Prette, Del Prette (2005b), with 28 (twenty eight) children aged four (4) and six (6) years, the results corroborate the hypothesis of an inverse correlation between behaviors aggressive and empathetic present in other studies (Covell, scarola, 2002; Geer ESTUPINAN, MANGUNO-MIRE, 2000).

V. CONCLUSIONS

From what has been treated in this study, one realizes that empathy and aggression inversions provide results that affect the cognitive and affective components of the human being. That is, while the first construct contributes to a better social life, the other tends to hurt the victim and had an aggressive attitude.

Therefore, it is necessary to enhance the social relevance of this theme in initial training and continuing teachers as well as more research both theoretical and empirical to more advances of the contributions that empathy can offer in the school educational process, in view that the development of empathy not only favors the children, but at least the whole school community.

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Orality, its Linkages and Interfaces: An Approach from the African Cosmology

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Abstract—This research seeks to understand the study of orality from the African cosmology, as a way of construction of knowledge and paradigms break the post-colonial process of understanding the multiple languages in human communication. Highlights the need to know the representation elements and symbolic understanding of the trailer within the oral interrelationships. Points to the symbolism of the Bantu people and other peoples in their weaving, which uses signals as a spiritual representation and as a means of social communication, with this oral structure expression of differences in the community. Speaks of the extermination of the many languages of indigenous peoples in Brazil, showing that they were exterminated with the advance of the cities into the woods and, the maintenance of linguistic diversity is maintaining biocultural memory of mankind. As a result of the observations, the research seeks to answer questions related to orality and its structural organization within the religious rituals and the formation of knowledge, linking to what is considered by the Bantu community as sacred.

Keywords— Orality, African Cosmology, Bantu peoples, Sacred, Oral History.

I. INTRODUCTION

Understanding orality beyond the systems that pose as opposed to writing: This is a challenge that goes down and opens new avenues for understanding the multiple languages, the symbolic world and human communication that is beyond words. Hambatê Ba (2010) addressing the oral tradition in Africa, leads us to the importance that is attributed to this and the sacredness of the word, since the narratives of griots do not admit corrections as they represent the course of life in society and its precepts and teachings.

Decipher the pictorial signs has always been a human need, and we can not say that all these many and varied ways to register have been less important than the alphabet. People known as pre-Columbian, Central America and the Mayans, Incas and Aztecs also developed his pictorial registration forms, which have not yet been fully deciphered.

For cosmology of African peoples (Badiru; 2017) between the physical world and the sacred world are subtle connections that objectivity can not explain. Not always the word is what it seems or explains what he writes. Ojo-Ade (2010) states the sacred accompanying the physical utterance of the word, giving it the power and axé (force or

energy that moves everything that lives and the universe). Beyond that importance which it contains the word spoken, it is necessary to know other elements that add to him, the word dressed gestures and representations that may favor their expression or even replace it. This understanding moves to try to scale the symbolic world linked to orality, expanding its limits and making almost disappear fine line between what is oral what is written.

Grasp the meaning or sense of orality requires a sharp eye on their interrelationships with various forms of representation, which we call written, body, or performing. What we understand how oral language links with subtle languages, pictorial, symbolic, iconic, body movements and recording symbols.

This work seeks to demonstrate the oral from the African cosmology and is, in times of post-colonial debate where the criticism of African literature are inserted into the subaltern experience which we seek to establish a line of thought between knowledge written and unwritten, so that the oral, form of transmission of knowledge between generations, gaining ground within the academic and critical approach to decolonization because it assumes recognizes the need to understand the "ecologies of knowledge", in the words of Boaventura de Sousa Santos.

This points in its South Epistemologies work (2010, p.7) that "there is no neutral epistemologies and who claim to be so are the least neutral." That is, the deconstruction of certain epistemological hegemonies, as holders of the monopoly of knowledge, overshadows other forms of understanding of the realities, leaving out those that do not fit into that way of knowing and deconstructs the knowledge dialogues. It is this political-ideological position and breaking paradigms as the knowledge imparted orally, which are guided our research.

II. POSITIONS POLITICAL AND IDEOLOGICAL AND THINKING ABOUT THE COMPANIES WITH NO WRITTEN LETTER

The misconception that oral languages would be less complex and therefore less important than those using alphabetic writing, leads to the construction of prejudices and distorted views of reality, as stated Ki-Zerbo (2010). The study of these language issues is a way to get to a less simplistic understanding.

Overall, we got used to judge other peoples and societies from the parameters used to ours, and over time it is formatted the idea that people who do not use writing (alphabetical) would be "backward" or "no civilized. "

As highlights Calvet (2011), the absence of written tradition (alphabetical) in certain people does not mean no graphic tradition: "In many societies of oral tradition, there is a lively pictorialidade, the decorations pots and gourds, tissue, in tattoos and scarification in (...)" (Calvet, 2011, p. 11). As he points out, even without having to register function speech, these records take part in the maintenance of social memory; the various types of artwork found in oral societies have a wide range of representations, including on the cosmology of the people.

The author emphasizes the use of "messenger" drum in Africa, describing the touches of cyóndo, a wooden drum used by Luba (the western Zaire people) to post. This instrument, made with a wooden stem has a cavity with edges on uneven thickness, which emits high and low sounds: the duration (short vowels / long), and the tone of sounds that can be high, low or complex. This description of Calvert (ditto), message understanding is done by the drummer beats the female edge to edge lower and male tones to the high tones, and duration being perceived by prolonged vibration of sound.

To express a thus narrative, percussionist using the amplification technique, which is basically developing a text or a basic idea and can also use the feature of holófrases (stereotypical messages that can be constituted of a single

verse or several) . This implementation requires a mental exercise and material in order to make the instrument - cyóndo- communicate information that is complex, in a simplified manner. The example of cyóndo is another of the "talking drums", also well known in Yoruba culture, where the drums can transmit three tones of the vowels to compose entirely understandable messages by touch.

This fact indicates that the peoples of the African continent developed elaborate ways to increase communication, without it being necessary to alphabetic writing and using the performative elements.

The possibility of turning the word into other forms of language refers to a very wide world of knowledge, perhaps close to the understanding of philosophers and poets. Paulo Freire (2001) have introduced the term "palavramundo" and Manoel de Barros says poetically: ". I use the word to compose my silences" For Muniz Sodre (1983, p. 122) "The words are in the same plane of gestures", so they can say as much as a gesture, dance, body expression.

Zumthor (2007) speaks of voice abstraction in the contemporary world and the way it somehow apart from being reproduced by the technology can even be created by advanced technological devices. Advocates that the voice is not the word, is beyond, with its polysemy. I believe that the voice expands the word or the voices amplify the word and all your senses, making her stay in narrative forms that use the body and various other instruments, writing even.

The orality requires physical instrumental to materialize, and has different expressions. The expression embodies and translates into gestures, actions and performances, as noted by Zumthor (2007) to relate the concept of performance in the language to "the sensory and body engagement" (ZUMTHOR 2007, p.9).

Not only among the peoples of Africa, but in other parts of the world, the pictorial, performance and body language is widely used. The examples and considerations presented by Calvet (2010) are many, and these show that it is very little to establish a relationship of supposed inferiority of oral tradition comparing it to the written record: there are two different worlds, which now approach, intersect or move away in certain circumstances, as in multilingual situations.

We can not make the mistake of considering, as is common in other reviews, people who use the oral or the bias of denial, pointing out what supposedly they lack (Calvet, 2011). I understand that the role of orality is broad and decisive even for learning any language. In societies where the alphabetic writing, the other codes are as important as. There are ancient writings already missing

people on the African continent which until now could not decipher them.

There is, therefore, to give attention to limits and twists than is oral language and its pictorial forms / symbolic, the graphics that tell stories of the world and human experience, making it possible to understand that oral / written are not necessarily dichotomies, and or demarcate more or less legitimate grounds or "civilized".

Neves Santos (2019) found, in detail, an exemplification of the language of artwork with complex and not deciphered meanings by Western scholars: the art made weaving by Bantu people (also present in other people), where the signal "V" - also understood as the basis of all realities, symbol of the human being is composed of spiritual energy and physical energy in Bantu cosmology - is the basis for the tissue in an educational manner, teaches about the ways of living in society, the relationship between people and nature. The "V" sign is the focus in life, "her reproductive web and its value [...] Western scholars in African art and weaving industry were not able to explain these African icons. The lack of knowledge about Bantu worldview [...] not prepared them. "

The foundations of the Bantu people of belief arranged in the ancient art of tapestry, was not "read" by Westerners who, I have no knowledge of cosmology of this people, based on orality, they were unable to assign meaning to these symbols; not "read" the message of several "Vs" velvet fabrics, expressing different levels of structures - physical or not - and guiding lessons for that community.

III. SEMIOTICS OF THE FIRST CLUES ON DATA PROCESSING

"From symptoms to the written" (Ginzburg 1989, p. 154); this is the way that Ginzburg (ditto) travels mapping the ways that humans have used through time to understand and decipher what is behind certain events and phenomena. Through evidence unfolds the real; the tracks offer information that may be accurate, both to detect diseases through symptoms or the details of subtlety in artistic objects constituting evidence to be read.

Ginzburg (1998) speaks of the paradigm evidentiary or semiotic that begins with the primitive man looking animal footprints in the mud, evidence that would become signs, which are elements that make up the divination, and are also considered today in the semiotic study. Seeing signs and evidence, pictorial signs, materials offal, marginal data "revealing" elements that reflect reality, and this, always prone to inferences and readings, understandings, "the

reality is opaque, there are privileged zones - signs, signs - that allow decipher it "(GINZBURG 1998, p. 177).

For millennia, man was a hunter. During numerous chases he learned to reconstruct the shapes and movements of the invisible prey by the footprints in the mud, broken branches, manure acorns, tufts of hair, matted feathers, stagnant odors. Learned to sniff out, record, interpret and classify infinitesimal tracks like whiskers. He learned to make complex mental operations with lightning speed, inside a dense forest or in a clearing full of pitfalls(GINZBURG 1998, p 151).

The evidentiary paradigm, the search for evidence, can be seen as the first deciphering human writing. And such complex operations that speaks Ginzburg can be the beginning of that made possible the precise construction of the Egyptian pyramids, and the preparation of the binary combination that allows communication through computer, hypertext, exchange instant messages in different places on the planet.

The XXI century is marked by virtual communication, but also the disappearance of much of the oral language, which has been lost over time because, in many cases, the arrival of coloniz

action which, among other annihilations also promotes linguistic annihilation. The case of Africa is emblematic in this sense, but it is the same observation about the Americas. According to studies of Toledo and Barrera-Bassols (2015), Nigeria is the country where it is still registered a greater number of native languages.

In Brazil, the extermination of tongues occurred simultaneously to the extermination of native peoples, indigenous, and currently, according to the IBGE (2010) there are 270 indigenous languages spoken in Brazil. Maintaining linguistic diversity, is, in turn, maintaining biocultural memory of mankind (TOLEDO AND BARRIER-BASSOLS, 2015). According to the authors:

If homo sapiens managed to stay colonizing and expanding its presence on earth it is because it was able to recognize and take advantage of the processed elements of the natural world, a universe that contains an essential feature: diversity. This ability is due to the maintenance of individual and collective memory (TOLEDO AND BARRIER-BASSOLS, 2015, p. 57).

From the perspective of the authors, cultural diversity is given in three dimensions: genetics, linguistics and cognitive. Linguistic cultural diversity has been so damaged as the other, so that causes a depletion to the point of view of humanity's memory.

What are the possible meanings when using a language whose structural organization is not known? We have analyzed the power of the word sacred in the religious rituals of African origin, which is one of the tripods of religion, Word, guiding force, is expressed by the energy emission is the ax. The ritual prayers elements such as corners and are carried out by oral, by which constitutes the link with the sacred.

In this case, the speakers of those remaining African languages do not need any structural knowledge about these, but only use them within the rituality as learned and as the cult was organized. The language transmitted from older and that too at some point arrives via an entity or an ancestral spirit fills with his power, space symbolic of belonging and spiritual for those who are part of the Holy Family.

The divinatory power of the mechanisms available to the yard of religious is closely linked to the power of the word, it reveals and makes. So is the Ifa divination game, derived from the Yoruba tradition that has great prestige in Africa and is practiced by priests prepared to handle these shells and beads within the precepts learned in tradition. Also called Eridinlogun (meaning the number sixteen in Yoruba) this game has great importance for religions of African origin, and their knowledge is fully grounded in orality.

About it, says prof. Dr. Ajibola Isau Badiru (2017): "Ifa has links with social, cultural applications, etc. Links that make the time becomes a moment charmed. " The most important decisions are made by consulting the Ifa. The teacher and priest also says about the word and its power: "The word expresses the ax. If someone is bitten by a snake and know the name of the poison says "out" and the poison out. "

The practice of oral tradition in African languages (Yoruba, muxicongo, Kikongo, etc.) in Candomblé / Umbanda is a way to illustrate the importance of the symbolism contained in the word. Most people who use these languages do not have an exact idea of its grammatical structure or even from your lexicon. However, because it is a ritual language in which they are performed liturgies, prayers and songs of the festive moments of the house is the "language of the Orisha" or holy language in which you have a lot of respect and in which there is no concern with what might be right or wrong.

About this empirical use, Pessoa de Castro (1983) comments that the holy language, "comprises an operating religious terminology, magical-semantic [...] rests on lexical systems character of different African languages were probably spoken in Brazil slavery period "(Castro PERSON, 1983, p. 4).

The use of words in Yoruba and Bantu languages takes place in order to realize the relationship with the divine ones and the home community with each other. Are expressions that indicate reverence, salute, benediction, interdiction, consent, among other functions. They are also found, as Pessoa de Castro (1983), references to the name of objects, substances, places, flora, fauna, cuisine and names of deities and their respective greetings.

The author demonstrates that the practice of oral tradition, with its load of meanings, operates the symbolic-religious functionality and gives it significance by being linked to the supernatural. Thus, the realization of the service is by a word "deified" containing elements of power, and does not need to be "translated", but lived. Summarizes the author: "The language does not report the reality, but subjectively creates" (CASTRO, 1983, p.5). This is the word creation in Candomblé: orality carries loyalty to the ancestors through prayer, singing, containing the ax; and while the people dance, takes communion with the deity, with the sacred.

"From symptoms to the written" (Ginzburg 1989, p. 154); this is the way that Ginzburg (ditto) travels mapping the ways that humans have used through time to understand and decipher what is behind certain events and phenomena. Through evidence unfolds the real; the tracks offer information that may be accurate, both to detect diseases through symptoms or the details of subtlety in artistic objects constituting evidence to be read.

Ginzburg (1998) speaks of the paradigm evidentiary or semiotic that begins with the primitive man looking animal footprints in the mud, evidence that would become signs, which are elements that make up the divination, and are also considered today in the semiotic study. Seeing signs and evidence, pictorial signs, materials offal, marginal data "revealing" elements that reflect reality, and this, always prone to inferences and readings, understandings, "the reality is opaque, there are privileged zones - signs, signs - that allow decipher it "(GINZBURG 1998, p. 177).

For millennia, man was a hunter. During numerous chases he learned to reconstruct the shapes and movements of the invisible prey by the footprints in the mud, broken branches, manure acorns, tufts of hair, matted feathers, stagnant odors. Learned to sniff out, record, interpret and classify infinitesimal tracks like whiskers. He learned to make complex mental operations with lightning speed, inside a dense forest or in a clearing full of pitfalls(GINZBURG 1998, p 151).

The evidentiary paradigm, the search for evidence, can be seen as the first deciphering human writing. And such complex operations that speaks Ginzburg can be the

beginning of that made possible the precise construction of the Egyptian pyramids, and the preparation of the binary combination that allows communication through computer, hypertext, exchange instant messages in different places on the planet.

The XXI century is marked by virtual communication, but also the disappearance of much of the oral language, which has been lost over time because, in many cases, the arrival of colonization which, among other annihilations also promotes linguistic annihilation. The case of Africa is emblematic in this sense, but it is the same observation about the Americas. According to studies of Toledo and Barrera-Bassols (2015), Nigeria is the country where it is still registered a greater number of native languages.

In Brazil, the extermination of tongues occurred simultaneously to the extermination of native peoples, indigenous, and currently, according to the IBGE (2010) there are 270 indigenous languages spoken in Brazil. Maintaining linguistic diversity, is, in turn, maintaining biocultural memory of mankind (TOLEDO AND BARRIER-BASSOLS, 2015).

IV. CONCLUSIONS

The oral tradition has various ways to accomplish their communicative functions and expands into multiple possibilities. Ever since man has developed communicative processes, understood from indications, signs and other symbols, including the written forms. The writing does not necessarily represent the alphabetical conventional, Western writing, but is realized in fabrics, records like tattoos, drawings, paintings, and other mechanisms.

This broader understanding of the meanings of oral and written lies against what we have learned over time, a belief grounded in exclusionary vision that the people who do not need the writing - say in passing, Alphabetical - would be less "civilized" or less advanced than those others. It would be at least dangerous, consider inferior cultures that do not know, and even more inappropriate, do not attach importance to a set of symbolic elements, pictorial, body and performers that always accompanies the oral tradition.

It is not just speech, or writing as their representation; it is not possible to consider writing as a copy of the speech: between these processes there is a long chain of elements that greatly expands the discussion. The oral, oral languages are intangible heritage, participate in a cultural heritage of humanity that has been so dismissive about to go up losing. When you lose a language, you lose a big part of memory and identity of a people, the set of knowledge that belongs to it, that is, humanity is impoverished.

Liturgical ritualidades of religions of African origin exemplify the place of orality in the symbolism of these beliefs. It means a deep bond with the timeless, ancestry, in order to feed the "now" of the participants, but a connection with the before and after, that is expressed largely in languages that have survived through oral narratives.

Understanding the potential of language that has no written tradition and its importance as a cultural heritage of humanity is possibly a prerequisite to defend them in their materiality today as preservation factor of human diversity.

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Surface water Treatment for the attendance of Riverside Communities of the Brazilian Amazon

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Abstract— The present study allowed to verify the efficiency of the water treatment proposed by the INCRA - National Institute of Colonization and Agrarian Reform, to the riverside communities in the Agroextractive Projects Onças Island and Arapiranga Island, in the Municipality of Barcarena, State of Pará. Of treated water and one of raw water for each island, aiming to calculate the efficiency in the treatment through the evaluation of the parameters turbidity, apparent color, residual chlorine and total coliforms. With the results obtained, the good physical quality of the water provided through the low levels of turbidity and apparent color was verified, besides the absence of microbiological contamination and low residual chlorine content, guaranteeing water free of taste and odor. The good quality of the treated water and the high efficiency of the treatment proposed for sources of surface water abstraction can be verified.

Keywords— Water quality. Onças Island. Arapiranga Island.

I. INTRODUCTION

The Amazon region presents a considerable water availability, varying between 100,000 and 1,000,000 m³/hab.year depending on the State, when compared to the national average, close to 50,000 m³/hab.year. Due to this abundance, it becomes common to install water supply systems that use rivers and streams as a source of capture, a situation very common in most Amazonian municipalities [3].

The absence of basic sanitation, a recurring situation in the great majority of the riverside municipalities located in the Amazon Region, contributes annually to the deaths of thousands of people, mainly children and elderly people, with frequent outbreaks of waterborne diseases, due to the consumption of water without treatment, a situation invisible in the eyes of the great majority of the population in the great centers, because they occur in completely geographically isolated places. [2].

In general, surface water contains several components from the natural environment itself, as well as those introduced through anthropogenic activities, and the main impurities found in surface waters are dissolved solids in the ionized form, dissolved gases, dissolved organic compounds and materials in suspension, such as microorganisms and colloids, being kept in stable suspension for long periods of time, as a function of the negative charges, which provoke repulsion between these particles [13].

Such situations produce physical changes in water, visually characterized by increased turbidity, defined as the degree of reduction of the passage of light by water, and the presence of color, caused mainly by the decomposition of materials from residues of human activities. In addition, water serves as a vector for the transmission of diseases caused by bacteria, fungi and viruses [7].

There are common outbreaks of waterborne diseases in rural areas, due to the consumption of water without any previous treatment. The absence of basic sanitation contributes annually to the deaths of thousands of people, especially children and the elderly, and this situation is very common in the Amazon [2].

The Citizenship Territories Program was launched in 2008 to promote sustainable development in areas of low human development, with one of its guidelines being to guarantee access to sanitation and quality water [12].

The National Institute for Colonization and Agrarian Reform - INCRA, through its technical staff at the Regional Superintendence in Belém (SR-01), designed in 2009 a model of micro-water treatment plant - META, in order to guarantee the communities rivers within the potability standards established by current legislation. [4].

The treatment operation is based on the abstraction of water from rivers and streams of the region, to be treated and distributed individually or collectively, according to the local population density, as shown in Figures 1 and 2:

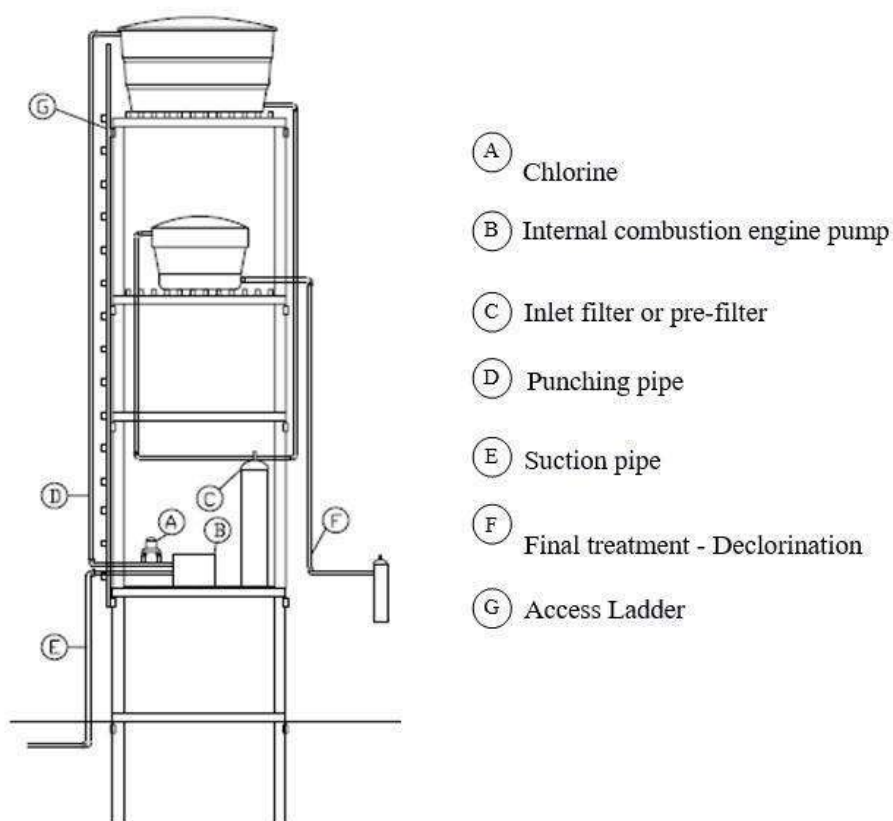


Fig.1 – Collective META Layout.

Source: Own Author

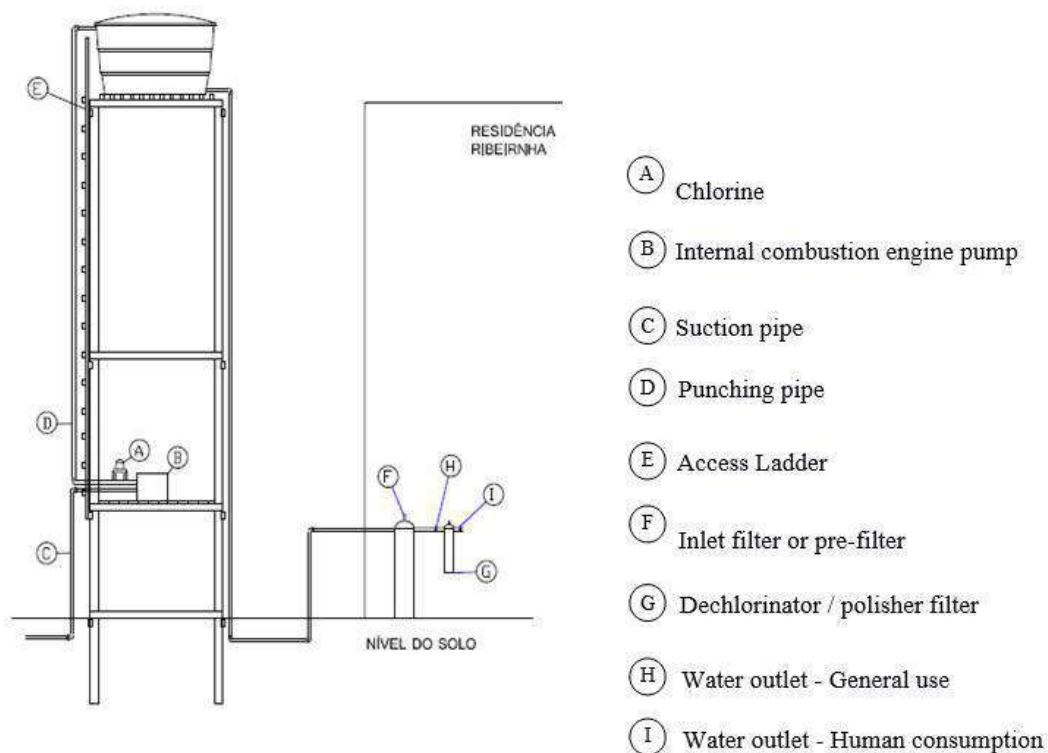


Fig.2 – Individual META Layout.

Source: Own Author

The proposed water treatment operation consists of the following steps, as shown in Figure 3:



Fig.3 – Operation flow diagram for the proposed water treatment.

Source: Own Author

The collective treatment system shown in Figure 1 basically consists of the capture of raw water directly from rivers and streams, and it is repressed to a high reservoir, installed on the top of the support structure and storage, in hardwood, with 6.40 m in height. The subsequent stage consists of chlorination and flocculation, aiming at the disinfection and clarification of the raw water, through the implantation of a chlorinator installed in the entrance barrel of the upper reservoir, in which flocculant and chlorine are added, obeying this order. Then the super-chlorinated water will fall by gravity and pass through an inlet filter, located at the base of the support structure, and later stored in an intermediate reservoir. In each residence there is installed an individual treatment center, to remove excess residual chlorine and suspended matter, guaranteeing the supply of treated water, according to the standards established by Ordinance No. 2.914, of 12/12/2011 of the Ministry of Health [8].

The individual treatment system shown in Figure 2 presents practically the same characteristics of the collective, differing in the height of the elevated reservoir, 3.00 m in height, besides the fact that super-chlorinated water falls by gravity directly to riverside residence, where an input filter is installed in series, followed by an individual treatment center, responsible for the clarification, polishing and removal of excess residual chlorine, guaranteeing the supply of treated water, in accordance with the standards established by Ordinance No. 2,914, of 12 / 12/2011 of the Ministry of Health [9].

Agroextractive Projects Onças Island and Arapiranga Island, located in the municipality of Barcarena, in the State of Pará, have several rivers and streams, which are strongly influenced by the waters of Guajará Bay, which have a high turbidity, are muddy and yellow-green coloration, a very evident situation in its tributaries, observed mainly under low tide [6].

This research aims to evaluate the efficiency of the water treatment systems proposed by INCRA through the analysis of physical-chemical and microbiological parameters in treated water samples from micro-water

treatment plants installed in riverside residences in Agroextractive Projects Onças Island and Arapiranga Island, belonging to the Municipality of Barcarena, in the State of Pará, taking as a basis the water potability parameters established by the current legislation.

II. METHODOLOGY

2.1- Sampling.

Forty samples of treated water were collected in META's installed in Agro-extractive Projects belonging to the Municipality of Barcarena, distributed as follows:

- Twenty samples from collective META's installed at Agroextractive Project Ilha das Onças, where a raw water sample was collected from the common source of abstraction for all treated water samples. In this case, the Igarapé Piramanha. Sampling period: June 5 to 15, 2016.
- Twenty samples from individual META's, installed in Agroextractive Project Ilha Arapiranga, and a sample of raw water from the main source of abstraction was collected, in this case the Cutaju-mirim river. Sampling period: September 5 to 15, 2016.

The sampling plan was defined according to the location of the META's installed in the same drainage, according to the maps shown in Figures 4 and 5. Each of the sectors had twenty sampling points, plus a point for collecting raw water in the drainage. The parameters adopted to evaluate the efficiency of the proposed system are directly related to the characteristics of the surface spring used as source of gross water capture, whose turbidity and the apparent color of the water present high values, as well as the presence of total coliforms characteristic of area without basic sanitation. The presence or absence of free residual chlorine is related to the last step of the treatment, the dechlorination. The protocol adopted obeyed Portaria no. 2,914, dated 12/12/2011 of the Ministry of Health, which provides for

procedures to control and monitor the quality of water for human consumption and its drinking water standard [4]. From the results obtained, the two proposed modalities were compared: individual and collective.

The location maps of the sampling points are shown in Figures 4 and 5, which were constructed using the GPS TrackMaker 13.8 software, used to georeference and identify the sampling points, and then finalize the map generation with the aid of the QGIS 2.4 software.

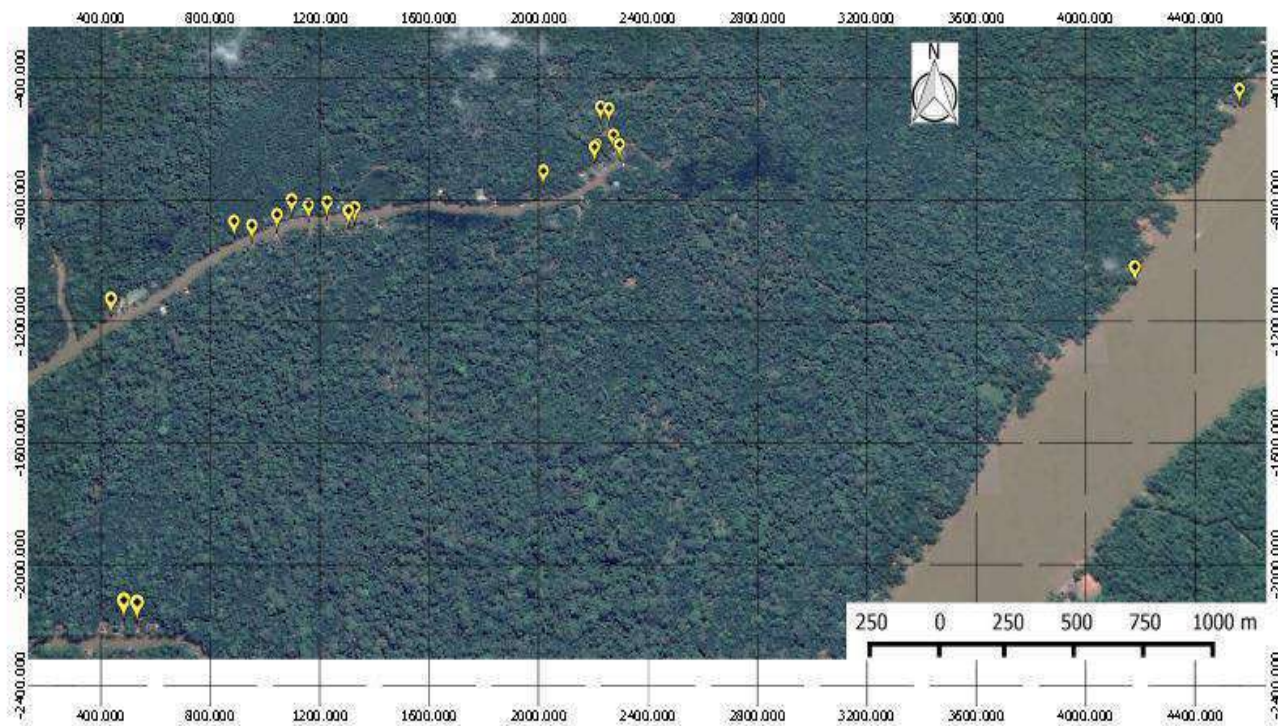


Fig.4 – META's individual sampling map (Arapiranga Island).

Source: Own Author

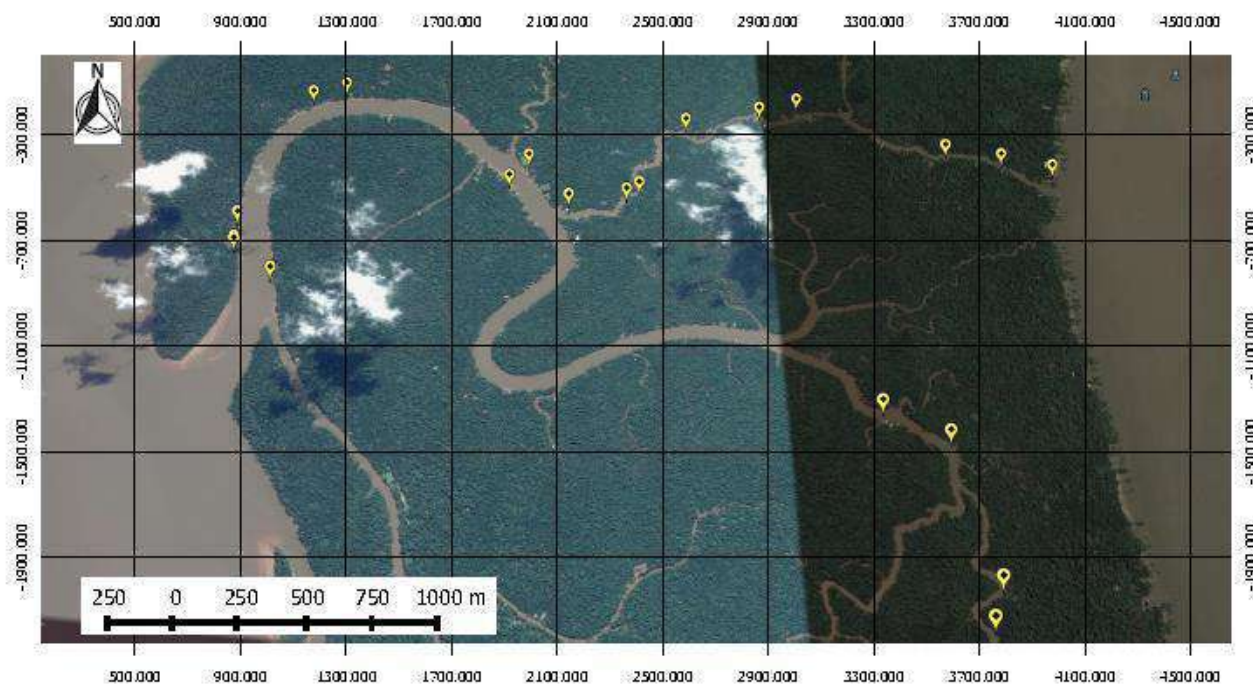


Fig.5 – META's collective sampling map (Island of Onças).

Source: Own Author

2.2- Assessment of the efficiency of the proposed water treatment.

The collected samples were analyzed in a laboratory contracted, Monitora Laboratories LTDA-ME, taking into account that the proposed water treatment follows the conventional methodologies of most of the processes adopted by water supply companies in cities spread throughout the national territory, which consists of the clarification and disinfection of raw water, and the parameters defined for the evaluation of the efficiency obeyed physical and microbiological determinants for acceptance of the final product of the operation: turbidity, through the method SMWW 22° Ed., 2130B 2012; apparent color, through the method SMWW 22° Ed., 2012 - 2120 C and total coliforms, through the method SMWW 22° Ed., 2012 - 9221 D; as well as residual free chlorine by the method SMWW 22° Ed., 2012 - 4500 Cl, since the treated water supplied will be used for human consumption [1].

The results obtained were then compared with the potability standards established in the current legislation. Subsequently, the treatment efficiency for each of the collection points was calculated. Then, the average

efficiency for the individual and collective system was calculated.

In order to determine the treatment efficiency in relation to each parameter evaluated, the following relation was used:

$$\text{Efficiency (\%)} = \frac{[(\text{gross water value} - \text{treated water value}) / \text{gross water value}] \times 100}{1}$$

Where:

- gross water value = before treatment;
- treated water value = after treatment, ready for human consumption.

III. RESULTS AND DISCUSSION

3.1- Collective water treatment plants.

3.1.1- EFFICIENCY IN THE REMOVAL OF TURBIDITY.

Through the results obtained, the efficiency in the removal of turbidity from the raw water in the collective META's was determined, whose results are presented in Table 1:

Table 1 – Results for efficiency in turbidity removal in the collective system - PAE Onças Island

SAMPLE	LOCALITY	COORDINATES (DATUM WGS84)			GROSS WATER TURBIDITY (uT)	POTABLE WATER TURBIDITY (uT)	EFFICIENCY OF TREATMENT (%)
		ZONE	E	N			
ON1	ONÇAS ISLAND	22M	0770562	9840785	32	0	100,00%
ON2	ONÇAS ISLAND	22M	0770435	9840590	32	0	100,00%
ON3	ONÇAS ISLAND	22M	0773899	9840776	32	0	100,00%
ON4	ONÇAS ISLAND	22M	0773191	9838580	32	0	100,00%
ON5	ONÇAS ISLAND	22M	0772813	9838788	32	0	100,00%
ON6	ONÇAS ISLAND	22M	0773331	9837671	32	0	100,00%
ON7	ONÇAS ISLAND	22M	0773246	9837443	32	0	100,00%
ON8	ONÇAS ISLAND	22M	0768912	9839803	32	2	93,75%
ON9	ONÇAS ISLAND	22M	0768624	9840046	32	1	96,88%
ON10	ONÇAS ISLAND	22M	0768605	9840259	32	0	100,00%
ON11	ONÇAS ISLAND	22M	0768935	9841418	32	2	93,75%
ON12	ONÇAS ISLAND	22M	0769171	9841499	32	1	96,88%
ON13	ONÇAS ISLAND	22M	0770855	9840410	32	2	93,75%
ON14	ONÇAS ISLAND	22M	0771254	9840458	32	0	100,00%
ON15	ONÇAS ISLAND	22M	0771342	9840517	32	0	100,00%
ON16	ONÇAS ISLAND	22M	0771681	9841120	32	2	93,75%
ON17	ONÇAS ISLAND	22M	0772220	9841235	32	0	100,00%
ON18	ONÇAS ISLAND	22M	0772497	9841321	32	1	96,88%
ON19	ONÇAS ISLAND	22M	0773519	9840865	32	0	100,00%
ON20	ONÇAS ISLAND	22M	0774228	9840675	32	0	100,00%
						AVERAGE EFFICIENCY	98,28%

Source: Own Author

3.1.2- EFFICIENCY IN REMOVING APARENT COLOR.

Through the obtained results, the efficiency in the removal of apparent color of the raw water in the collective META's was determined, whose results are presented in Table 2:

Table 2 – Results for efficiency in apparent color removal in the collective system - PAE Onças Island

SAMPLE	LOCALITY	COORDINATES (DATUM WGS84)			GROSS WATER APPARENT COLOR (uH)	POTABLE WATER APPARENT COLOR (uH)	EFFICIENCY OF TREATMENT (%)
		ZONE	E	N			
ON1	ONÇAS ISLAND	22M	0770562	9840785	178	1,0	99,44%
ON2	ONÇAS ISLAND	22M	0770435	9840590	178	1,0	99,44%
ON3	ONÇAS ISLAND	22M	0773899	9840776	178	1,0	99,44%
ON4	ONÇAS ISLAND	22M	0773191	9838580	178	1,0	99,44%
ON5	ONÇAS ISLAND	22M	0772813	9838788	178	0	100,00%
ON6	ONÇAS ISLAND	22M	0773331	9837671	178	0	100,00%
ON7	ONÇAS ISLAND	22M	0773246	9837443	178	0	100,00%
ON8	ONÇAS ISLAND	22M	0768912	9839803	178	1,0	99,44%
ON9	ONÇAS ISLAND	22M	0768624	9840046	178	5,0	97,19%
ON10	ONÇAS ISLAND	22M	0768605	9840259	178	0	100,00%
ON11	ONÇAS ISLAND	22M	0768935	9841418	178	1,0	99,44%
ON12	ONÇAS ISLAND	22M	0769171	9841499	178	2,0	98,88%
ON13	ONÇAS ISLAND	22M	0770855	9840410	178	6,0	96,63%
ON14	ONÇAS ISLAND	22M	0771254	9840458	178	6,0	96,63%
ON15	ONÇAS ISLAND	22M	0771342	9840517	178	4,0	97,75%
ON16	ONÇAS ISLAND	22M	0771681	9841120	178	6,0	96,63%
ON17	ONÇAS ISLAND	22M	0772220	9841235	178	0	100,00%
ON18	ONÇAS ISLAND	22M	0772497	9841321	178	5,0	97,19%
ON19	ONÇAS ISLAND	22M	0773519	9840865	178	0	100,00%
ON20	ONÇAS ISLAND	22M	0774228	9840675	178	0	100,00%
						AVERAGE EFFICIENCY	98,88%

Source: Own Author

3.1.3- EFFICIENCY IN DECLORATION.

In the chlorination operation carried out in the initial stage 2.5 mg / l of active chlorine is added to the disinfection of the raw water, and the dechlorination is carried out in the final stage of the process, thus generating the data shown in Table 3, proving the efficiency in this stage of treatment:

Table 3 – Results for dechlorination efficiency in the collective system – PAE Onças Island

SAMPLE	LOCALITY	COORDINATES (DATUM WGS84)			GROSS WATER CHLORINE (mg/l)	POTABLE WATER CHLORINE (mg/l)	EFFICIENCY OF TREATMENT (%)
		ZONE	E	N			
ON1	ONÇAS ISLAND	22M	0770562	9840785	2,5	0	100,00%
ON2	ONÇAS ISLAND	22M	0770435	9840590	2,5	0,01	99,60%
ON3	ONÇAS ISLAND	22M	0773899	9840776	2,5	0	100,00%
ON4	ONÇAS ISLAND	22M	0773191	9838580	2,5	0	100,00%
ON5	ONÇAS ISLAND	22M	0772813	9838788	2,5	0	100,00%
ON6	ONÇAS ISLAND	22M	0773331	9837671	2,5	0	100,00%
ON7	ONÇAS ISLAND	22M	0773246	9837443	2,5	0	100,00%
ON8	ONÇAS ISLAND	22M	0768912	9839803	2,5	0	100,00%
ON9	ONÇAS ISLAND	22M	0768624	9840046	2,5	0	100,00%
ON10	ONÇAS ISLAND	22M	0768605	9840259	2,5	0	100,00%
ON11	ONÇAS ISLAND	22M	0768935	9841418	2,5	0	100,00%
ON12	ONÇAS ISLAND	22M	0769171	9841499	2,5	0	100,00%
ON13	ONÇAS ISLAND	22M	0770855	9840410	2,5	0	100,00%
ON14	ONÇAS ISLAND	22M	0771254	9840458	2,5	0	100,00%
ON15	ONÇAS ISLAND	22M	0771342	9840517	2,5	0	100,00%
ON16	ONÇAS ISLAND	22M	0771681	9841120	2,5	0	100,00%
ON17	ONÇAS ISLAND	22M	0772220	9841235	2,5	0	100,00%
ON18	ONÇAS ISLAND	22M	0772497	9841321	2,5	0	100,00%
ON19	ONÇAS ISLAND	22M	0773519	9840865	2,5	0	100,00%
ON20	ONÇAS ISLAND	22M	0774228	9840675	2,5	0	100,00%
						AVERAGE EFFICIENCY	99,98%

Source: Own Author

3.1.4- EFFICIENCY IN THE DISINFECTION OF GROSS WATER.

In the chlorination operation carried out in the initial stage 2.5 mg / l of active chlorine is added to disinfect the raw water, thus generating the data shown in Table 4, proving the efficiency in this treatment step:

Table 4 – Results for the efficiency of disinfection of raw water in the collective system – PAE Onças Island

SAMPLE	LOCALITY	COORDINATES (DATUM WGS84)			GROSS WATER TOTAL COLIFORMS (P-A/100 ml)	POTABLE WATER TOTAL COLIFORMS (P-A/100 ml)	EFFICIENCY OF TREATMENT (%)
		ZONE	E	N			
ON1	ONÇAS ISLAND	22M	0770562	9840785	PRESENCE	ABSENCE	100,00%
ON2	ONÇAS ISLAND	22M	0770435	9840590	PRESENCE	ABSENCE	100,00%
ON3	ONÇAS ISLAND	22M	0773899	9840776	PRESENCE	ABSENCE	100,00%
ON4	ONÇAS ISLAND	22M	0773191	9838580	PRESENCE	ABSENCE	100,00%
ON5	ONÇAS ISLAND	22M	0772813	9838788	PRESENCE	ABSENCE	100,00%
ON6	ONÇAS ISLAND	22M	0773331	9837671	PRESENCE	ABSENCE	100,00%
ON7	ONÇAS ISLAND	22M	0773246	9837443	PRESENCE	ABSENCE	100,00%
ON8	ONÇAS ISLAND	22M	0768912	9839803	PRESENCE	ABSENCE	100,00%
ON9	ONÇAS ISLAND	22M	0768624	9840046	PRESENCE	ABSENCE	100,00%
ON10	ONÇAS ISLAND	22M	0768605	9840259	PRESENCE	ABSENCE	100,00%
ON11	ONÇAS ISLAND	22M	0768935	9841418	PRESENCE	ABSENCE	100,00%
ON12	ONÇAS ISLAND	22M	0769171	9841499	PRESENCE	ABSENCE	100,00%
ON13	ONÇAS ISLAND	22M	0770855	9840410	PRESENCE	ABSENCE	100,00%
ON14	ONÇAS ISLAND	22M	0771254	9840458	PRESENCE	ABSENCE	100,00%
ON15	ONÇAS ISLAND	22M	0771342	9840517	PRESENCE	ABSENCE	100,00%
ON16	ONÇAS ISLAND	22M	0771681	9841120	PRESENCE	ABSENCE	100,00%
ON17	ONÇAS ISLAND	22M	0772220	9841235	PRESENCE	ABSENCE	100,00%
ON18	ONÇAS ISLAND	22M	0772497	9841321	PRESENCE	ABSENCE	100,00%
ON19	ONÇAS ISLAND	22M	0773519	9840865	PRESENCE	ABSENCE	100,00%
ON20	ONÇAS ISLAND	22M	0774228	9840675	PRESENCE	ABSENCE	100,00%

Source: Own Author

3.2- Micro-individual water treatment plant.**3.2.1- EFFICIENCY IN THE REMOVAL OF TURBIDITY.**

Through the obtained results, the efficiency in the removal of turbidity of the raw water was determined in the individual META's, whose results are presented in Table 5:

Table 5 – Results for efficiency in turbidity removal in the individual system – PAE Arapiranga Island

SAMPLE	LOCALITY	COORDINATES (DATUM WGS84)			GROSS WATER TURBIDITY (uT)	POTABLE WATER TURBIDITY (uT)	EFFICIENCY OF TREATMENT (%)
		ZONE	E	N			
AR1	ARAPIRANGA ISLAND	22M	0769920	9847573	25	0	100,00%
AR2	ARAPIRANGA ISLAND	22M	0769524	9847056	25	0	100,00%
AR3	ARAPIRANGA ISLAND	22M	0767156	9846277	25	0	100,00%
AR4	ARAPIRANGA ISLAND	22M	0767186	9846273	25	0	100,00%
AR5	ARAPIRANGA ISLAND	22M	0768187	9847503	25	0	100,00%
AR6	ARAPIRANGA ISLAND	22M	0768164	9847508	25	0	100,00%
AR7	ARAPIRANGA ISLAND	22M	0768201	9847423	25	0	100,00%
AR8	ARAPIRANGA ISLAND	22M	0768218	9847394	25	0	100,00%
AR9	ARAPIRANGA ISLAND	22M	0768156	9847393	25	0	100,00%
AR10	ARAPIRANGA ISLAND	22M	0768151	9847386	25	0	100,00%
AR11	ARAPIRANGA ISLAND	22M	0767535	9847208	25	0	100,00%
AR12	ARAPIRANGA ISLAND	22M	0767277	9847157	25	0	100,00%
AR13	ARAPIRANGA ISLAND	22M	0767229	9847168	25	0	100,00%
AR14	ARAPIRANGA ISLAND	22M	0766962	9846960	25	0	100,00%
AR15	ARAPIRANGA ISLAND	22M	0767337	9847187	25	0	100,00%
AR16	ARAPIRANGA ISLAND	22M	0767461	9847223	25	0	100,00%
AR17	ARAPIRANGA ISLAND	22M	0768018	9847315	25	0	100,00%
AR18	ARAPIRANGA ISLAND	22M	0767414	9847215	25	0	100,00%
AR19	ARAPIRANGA ISLAND	22M	0767520	9847199	25	0	100,00%
AR20	ARAPIRANGA ISLAND	22M	0767368	9847229	25	0	100,00%
						AVERAGE EFFICIENCY	100,00%

Source: Own Author

3.2.2- EFFICIENCY IN REMOVING APARENT COLOR.

The efficiency of the removal of apparent color from the raw water in the individual system was determined by the results obtained. The results are presented in Table 6:

Table 6 – Results for efficiency in apparent color removal in the individual system - PAE Arapiranga Island.

SAMPLE	LOCALITY	COORDINATES (DATUM WGS84)			GROSS WATER APPARENT COLOR (uH)	POTABLE WATER APPARENT COLOR (uH)	EFFICIENCY OF TREATMENT (%)
		ZONE	E	N			
AR1	ARAPIRANGA ISLAND	22M	0769920	9847573	146	0	100,00%
AR2	ARAPIRANGA ISLAND	22M	0769524	9847056	146	0	100,00%
AR3	ARAPIRANGA ISLAND	22M	0767156	9846277	146	0	100,00%
AR4	ARAPIRANGA ISLAND	22M	0767186	9846273	146	0	100,00%
AR5	ARAPIRANGA ISLAND	22M	0768187	9847503	146	0	100,00%
AR6	ARAPIRANGA ISLAND	22M	0768164	9847508	146	0	100,00%
AR7	ARAPIRANGA ISLAND	22M	0768201	9847423	146	0	100,00%
AR8	ARAPIRANGA ISLAND	22M	0768218	9847394	146	0	100,00%
AR9	ARAPIRANGA ISLAND	22M	0768156	9847393	146	0	100,00%
AR10	ARAPIRANGA ISLAND	22M	0768151	9847386	146	0	100,00%
AR11	ARAPIRANGA ISLAND	22M	0767535	9847208	146	0	100,00%
AR12	ARAPIRANGA ISLAND	22M	0767277	9847157	146	0	100,00%
AR13	ARAPIRANGA ISLAND	22M	0767229	9847168	146	0	100,00%
AR14	ARAPIRANGA ISLAND	22M	0766962	9846960	146	0	100,00%
AR15	ARAPIRANGA ISLAND	22M	0767337	9847187	146	0	100,00%
AR16	ARAPIRANGA ISLAND	22M	0767461	9847223	146	0	100,00%
AR17	ARAPIRANGA ISLAND	22M	0768018	9847315	146	0	100,00%
AR18	ARAPIRANGA ISLAND	22M	0767414	9847215	146	0	100,00%
AR19	ARAPIRANGA ISLAND	22M	0767520	9847199	146	0	100,00%
AR20	ARAPIRANGA ISLAND	22M	0767368	9847229	146	0	100,00%
						AVERAGE EFFICIENCY	100,00%

Source: Own Author

3.2.3- EFFICIENCY IN DECHLORINATION.

In the chlorination operation carried out in the initial stage, 2.5 mg / l of active chlorine is added to the disinfection of the raw water, and the dechlorination is carried out in the final stage of the process, thus generating the data shown in Table 7, proving the efficiency in this step of treatment:

Table 7 – Results for dechlorination efficiency in the individual system - PAE Arapiranga Island

SAMPLE	LOCALITY	COORDINATES (DATUM WGS84)			GROSS WATER CHLORINE (mg/l)	POTABLE WATER CHLORINE (mg/l)	EFFICIENCY OF TREATMENT (%)
		ZONE	E	N			
AR1	ARAPIRANGA ISLAND	22M	0769920	9847573	2,5	0	100,00%
AR2	ARAPIRANGA ISLAND	22M	0769524	9847056	2,5	0	100,00%
AR3	ARAPIRANGA ISLAND	22M	0767156	9846277	2,5	0	100,00%
AR4	ARAPIRANGA ISLAND	22M	0767186	9846273	2,5	0	100,00%
AR5	ARAPIRANGA ISLAND	22M	0768187	9847503	2,5	0	100,00%
AR6	ARAPIRANGA ISLAND	22M	0768164	9847508	2,5	0	100,00%
AR7	ARAPIRANGA ISLAND	22M	0768201	9847423	2,5	0	100,00%
AR8	ARAPIRANGA ISLAND	22M	0768218	9847394	2,5	0	100,00%
AR9	ARAPIRANGA ISLAND	22M	0768156	9847393	2,5	0	100,00%
AR10	ARAPIRANGA ISLAND	22M	0768151	9847386	2,5	0	100,00%
AR11	ARAPIRANGA ISLAND	22M	0767535	9847208	2,5	0	100,00%
AR12	ARAPIRANGA ISLAND	22M	0767277	9847157	2,5	0	100,00%
AR13	ARAPIRANGA ISLAND	22M	0767229	9847168	2,5	0	100,00%
AR14	ARAPIRANGA ISLAND	22M	0766962	9846960	2,5	0	100,00%
AR15	ARAPIRANGA ISLAND	22M	0767337	9847187	2,5	0	100,00%
AR16	ARAPIRANGA ISLAND	22M	0767461	9847223	2,5	0	100,00%
AR17	ARAPIRANGA ISLAND	22M	0768018	9847315	2,5	0	100,00%
AR18	ARAPIRANGA ISLAND	22M	0767414	9847215	2,5	0	100,00%
AR19	ARAPIRANGA ISLAND	22M	0767520	9847199	2,5	0	100,00%
AR20	ARAPIRANGA ISLAND	22M	0767368	9847229	2,5	0	100,00%
						AVERAGE EFFICIENCY	100,00%

Source: Own Author

3.2.4- EFFICIENCY IN THE DISINFECTION OF GROSS WATER.

In the chlorination operation carried out in the initial stage 2.5 mg / l of active chlorine is added to disinfect the raw water, thus generating the data shown in Table 8, proving the efficiency in this treatment step:

Table 8 – Results for efficiency of raw water disinfection in the individual system - PAE Arapiranga Island

SAMPLE	LOCALITY	COORDINATES (DATUM WGS84)			GROSS WATER TOTAL COLIFORMS (P-A/100 ml)	POTABLE WATER TOTAL COLIFORMS (P-A/100 ml)	EFFICIENCY OF TREATMENT (%)
		ZONE	E	N			
AR1	ARAPIRANGA ISLAND	22M	0769920	9847573	PRESENCE	ABSENCE	100,00%
AR2	ARAPIRANGA ISLAND	22M	0769524	9847056	PRESENCE	ABSENCE	100,00%
AR3	ARAPIRANGA ISLAND	22M	0767156	9846277	PRESENCE	ABSENCE	100,00%
AR4	ARAPIRANGA ISLAND	22M	0767186	9846273	PRESENCE	ABSENCE	100,00%
AR5	ARAPIRANGA ISLAND	22M	0768187	9847503	PRESENCE	ABSENCE	100,00%
AR6	ARAPIRANGA ISLAND	22M	0768164	9847508	PRESENCE	ABSENCE	100,00%
AR7	ARAPIRANGA ISLAND	22M	0768201	9847423	PRESENCE	ABSENCE	100,00%
AR8	ARAPIRANGA ISLAND	22M	0768218	9847394	PRESENCE	ABSENCE	100,00%
AR9	ARAPIRANGA ISLAND	22M	0768156	9847393	PRESENCE	ABSENCE	100,00%
AR10	ARAPIRANGA ISLAND	22M	0768151	9847386	PRESENCE	ABSENCE	100,00%
AR11	ARAPIRANGA ISLAND	22M	0767535	9847208	PRESENCE	ABSENCE	100,00%
AR12	ARAPIRANGA ISLAND	22M	0767277	9847157	PRESENCE	ABSENCE	100,00%
AR13	ARAPIRANGA ISLAND	22M	0767229	9847168	PRESENCE	ABSENCE	100,00%
AR14	ARAPIRANGA ISLAND	22M	0766962	9846960	PRESENCE	ABSENCE	100,00%
AR15	ARAPIRANGA ISLAND	22M	0767337	9847187	PRESENCE	ABSENCE	100,00%
AR16	ARAPIRANGA ISLAND	22M	0767461	9847223	PRESENCE	ABSENCE	100,00%
AR17	ARAPIRANGA ISLAND	22M	0768018	9847315	PRESENCE	ABSENCE	100,00%
AR18	ARAPIRANGA ISLAND	22M	0767414	9847215	PRESENCE	ABSENCE	100,00%
AR19	ARAPIRANGA ISLAND	22M	0767520	9847199	PRESENCE	ABSENCE	100,00%
AR20	ARAPIRANGA ISLAND	22M	0767368	9847229	PRESENCE	ABSENCE	100,00%

Source: Own Author

The results showed that both systems present high efficiency for each parameter evaluated.

The collective system showed slightly lower efficiency for the parameters apparent color and turbidity in some samples. This situation may be related to factors such as operating time, reservation volume, among others [13].

Collective systems were installed on Onças Island in the year 2014, with a longer operating time, a fact that generates the need for system maintenance. The higher reservoir volume, 2,000 liters, requires a greater amount of reagent and a longer reaction time to achieve maximum efficiency in the treatment of raw water.

The individual system has a lower volume of reservation, 500 liters, which requires less reagents, as well as a shorter reaction time, besides having a lower

installation cost. Another important fact is that individual systems were installed in the year 2016.

Since the proposed treatment is equivalent in both cases, both in the collective and individual systems, we can verify that the pre-chlorination, flocculation, filtration and dechlorination / polishing operations present high efficiency in the clarification and disinfection of raw water coming from and sources of surface abstraction, widely used by riverine populations [9].

It is worth highlighting the fact that the reagents used in the proposed treatment are easy to acquire and of proven efficiency [10].

IV. CONCLUSIONS

The two varieties of the water treatment system proposed by INCRA evaluated are distinguished subtly as to the efficiency level for turbidity and apparent color

parameters, but both present maximum efficiency in the disinfection of raw water. The dechlorination and the polishing of the treated water in the final stage of the process guarantees a final product with appreciable organoleptic properties for the human consumption, being this very important characteristic for its acceptance by the main interested ones, the riverside ones.

It was evidenced the need for a stronger monitoring of the units already installed in order to ensure maximum efficiency in the process of obtaining treated water within the standards of potability required by current legislation.

In general, the water provided by the micro-water treatment plants designed by INCRA, used for domestic consumption in the riverside communities living in PAE Onças Island and PAE Arapiranga Island presents good physical quality evidenced by the low levels of turbidity and apparent color, both in the individual and in the collective mode.

The absence of microbiological contamination evidenced in the results can contribute to the reduction in the cases of waterborne diseases, so common in the rural environment. The low levels of residual chlorine ensure water free of taste and odor, which, most of the time, causes distrust in consumption by the riverside, which has the organoleptic parameter of mineral water.

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The Value of *Intellectual Capital* Applying the Andriessen's Method: The *Efacec Power Solutions* Case

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Abstract— The main objective of this paper is to present another way, simple and reproducible by any research, for measure the value of the intellectual capital, using the Andriessen's method (2004) [Netherlands]. This new approach, has the advantage of its simplicity: it is composed by six steps (in a short formulation from the original) and also is an integrated method. Therefore, it can be applied only by following the steps, described below. The lack of consensus about what is the intellectual capital can be overcome if we think it like all which is intangible from the intellect and create value translated in a monetary way. The results suggest that the method can be widely applied, and allow to achieve a specific value for the intellectual capital in a giving organization. In this case: 1.908 million € in a Portuguese company whose name is EPS, Efacec Power Solutions. The paper also defends that the proposed method can be applied to other technological companies, allowing to compare both its applications and results benchmark.

Keywords— Andriessen's Method, Core Competencies, (Value of) Intellectual Capital.

I. INTRODUCTION

One of the main topics in the intangible assets, is the intellectual capital. Some authors have been considering it alone like Gogan and Draghici (2016) [Romania] and Berzkalne, Zelgalve (2014) [Latvia] and Palacios and Galván (2007) [Spain].

While others, especially Sumedrea (2013) [Romania], Sekhar *et al.* (2015) [India], Nuryaman (2015) [Indonesia], and Abdullah and Sofian (2012) [Malaysia] for whom *intellectual capital* is a synergy. Comes from knowledge, experience, invention and innovation, with effects on business value.

These and others authors, until 2020, do not meet consensus, about the definition of what is the intellectual capital. Palacios and

Galván (2007) [Spain], state that the definition is not unique. For Gogan and Draghici (2016) [Romania] and Berzkalne and Zelgalve (2014) [Latvia] [*human, structural and customer capital*] there are differences regarding the semantic meaning of their components. And their number, as in Sekhar *et al.* (2015) [India].

The lack of consensus is also present regarding about how to measure it, like Arvan *et al.* (2016) [Australia and

USA], Gogan and Draghici (2016) [Romania], Rodov and Leliaert (2002) [Netherlands and Belgium], Pulic (2000) in Berzkalne e Zelgalve (2014) [Latvia] and Housel and Nelson (2005) [USA].

And how to know his value, especially inside the companies which have it, as can be seen in all authors with the lack of consensus about how to measure the intellectual capital.

If we don't have a widely accepted definition about what is, how to measure and how to calculate the value of intellectual capital in a company? Additionally, there is also a shortcoming: to know about how companies create value. And how they can achieve better business performance. And competitive advantages, between themselves, their markets and the countries. This is a (main) problem: how to know the value of intellectual capital in a company?

Previous work, in authors like Housel and Nelson (2005) [USA] and Rodov and Leliaert (2002) [Netherlands and Belgium], even though they make a contribution towards to know the value of intellectual capital, they are very complex and difficult to apply in the reality.

From the relevant literature, regarding the intellectual capital, one author can be highlighted: Andriessen (2004)

[Netherlands]. This author has a large work about the topic such as Andriessen (2003, 2005, 2007, 2008, 2011) [Netherlands] and also Andriessen and Van Den Boom (2007a, 2007b, 2009) [Netherlands].

Andriessen (2004) [Netherlands], proposes a method that can overcome some of the limitations mentioned about the intellectual capital. That is, problems with the definition, the way about how to measure it and to know the value of intellectual capital in a certain company. Three reasons form the basis for adoption it:

- 1) Definition: intellectual capital is an ability owned for a company to do something;
- 2) Measurement: can be by a systematic *Weightless Wealth Tool Kit*, in Andriessen (2004, p. 376), it turns to be less complex, and can be applied by everyone to several companies as long as they meet some requirements and is integrated (with 20 sequential steps);
- 3) Value: can be achieved in €, under certain reasoned assumptions, made by the researcher.

The empirical evidence from where the Andriessen's (2004)

[Netherlands] method is applied to a Portuguese company, on 31st December 2017: *Efacec Power Solutions, SGPS, SA (EPS) [Portugal]*¹.

There are seven reasons to have chosen this company: it is a Portuguese company with over 70 years old (founded by Portuguese), covers more than one sector of activity (energy, engineering, procurement, construction and electric mobility), is a technological company (capital intensive and strong weight of *intellectual capital*), is a large company² (> 250 employees, turnover > 50 million € and total assets > 43 million €), is internationalized, uses technology in relations between suppliers and customers, and creativity, innovation and technological development are important in the global offer of goods and/or services.

This provides an approach where literature is not abundant and hence the increased research relevance and interest.

The research question in this *paper* is the following: *How to apply the Andriessen's method in a given company and how to achieve also to a specific value of his intellectual capital in a moment of the time - on 31st December 2017?*

¹ Seventy-years old.

² In accordance with the legal concept in Portugal, in year 2019.

This question has arisen from the need to know how to apply the method to a Portuguese company, in this case. On the other hand, until 2019, there are no case studies concerning about Portuguese companies, and is reasonable to think that the current knowledge in the intellectual capital will be higher with such a case.

The purpose of this *paper* is to apply the Andriessen's (2004) [Netherlands] method, to a Portuguese company case, and find a specific value of the intellectual capital.

The contribution of the *paper* for the scientific knowledge is to enlarge the stock of knowledge in the field of intangible assets, especially, in the topic of the intellectual capital. This approach will be done by answer to the research question and also describing the main steps of the Andriessen's (2004) [Netherlands] method. Therefore, it can be applied by any researcher in other different cases.

The *paper* is organized as follows. Section 1, this Introduction, that presents the background about the topic of the intellectual capital, some previous work, why was chosen the Andriessen's (2004) [Netherlands] method, the research question, how and why it has arisen, the purpose of the paper and also is contribution for the scientific knowledge in the field and in the topic. Section 2, Method, presents the main issues of the Andriessen's (2004) [Netherlands] method to measure the value of intellectual capital regarding the *Efacec Power Solutions, SGPS, SA (EPS) [Portugal]* company, on 31 December 2017. Then, in Section 3, Results, are given the results of implementing the method on the organization. Section 4, Discussion, provides a discussion of the results achieved. The *paper*, in the Section 5, Conclusions, is finished presenting the main conclusions, some limitations and avenues for future research. A brief reference about the originality/value of the *paper* and his type, is also mentioned. In the Section 6, there are some acknowledgments regarding important people with suggestions and, last but not the least, the references which give the basic support to the *paper*.

II. METHOD

It is a case study (qualitative research method) in combination with quantitative research method (triangulation). The sources of gathering data, are the *Efacec Power Solutions, SGPS, SA (EPS) [Portugal]*, mainly, Financial Statements, regarding 2017 and 2016 – with secondary data. Some financial information for calculations in specific steps was also required: historical and forecast about interest rates, average cost of capital, and risk premium.

The method is embodied in the Andriessen's (2004) [Netherlands] method to measure and calculate the value of intellectual capital, in a particular company.

The original *Weightless Wealth Tool Kit*, by Andriessen (2004, p. 376) [Netherlands], has 20 steps. But, for simplicity and understanding beyond easy of use, only the most important six steps will be mentioned. The time is the beginning of the year 2018 and the goal is to calculate the value of intellectual capital, on 31 december 2017. The financial information (and other) about the EPS in 2017 (and before) is known and available.

Step One: definition of the number and core competencies³ of the EPS. In the basis, this company has eight business units⁴. The procedure is set a number of core competencies (based on a subjective assessment of the researcher – the most suitable). Each of them, must have a same function to produce a good and/or a service. In the case of EPS, four were defined (built on the imputation of each of the eight business units): *Hardware and Software Design and Development (Core Competence 1)*, *Technology Development, Equipment Behavior Simulation and Power Grid Management (Core Competence 2)*, *Transport Solutions (Rail, Road and Metro) and Energy for Electric Vehicles and Network Management (Core Competence 3)* and *Design and Operation of Water Systems and Industrial Facilities (Core Competence 4)*.

Step two: Calculation of the normalized (average) income (from sales or turnover). That is, income (only ordinary) minus costs (only ordinary), from financial statements. In this case, 2017, 2016 and 2015. For example, with a excel worksheet (WSPS1), it is possible build a first line (1L) and first column (1C) with the names. The 2L, 3L, and 4L, in 1C, with the observed values for the sales. In 1L and 5C the normalized sales (430 million €). In the 1L and 6C, 7C and 8C, 2018, 2019 and 2020, sales forecast, respectively. In 2L and 1C, is the nominal annual rate of change sales and/or services, which can be obtained from 1L and 3C and 1L and 4C. The average rate must be in 2L and 5C (1.84%). This average must be the basis for forecast sales in the year 2018 (1L and 6C), 2019 (1L and 7C) and 2020 (1L and 8C).

Step three: Calculation of the fair return rate. Open other excel worksheet (WSPS2). In 1L and 1C we should

put the names. From 1L to 4C, for the years 2015, 2016 and 2017, we should put the book values, respectively. In the 1L and 5C, we put the average of these three.

In 2L and 1C, we must put the real economic growth rate in Portugal (known and available). In 2L, from the 2C to 4C we put the rates. In the 1L and 5C, we put the average rate, calculated from these three.

In 3L, if we think that EPS sales grew at the same rates, from 2C to 4C, we put the same rates. Thus, in 3L, from 2C to 4C, we define the total fair return rate. In 3L and 5C we also put the average rate equal to the total fair return rate.

If we see the financial statements on 2017 of the EPS, we can see that the intangible and the tangible assets have a weight of 0.66 and 0.33, respectively. In this case, the rates, in the 3L from 2C to 4C, we must only consider the rates multiplied by these factors. Consequently, in 4L from the 2C to 4C we must multiply each percentage for 0.66 and in 5L for 0.33. The final value in 4L and 5C is, 1.23% and in 5L and 5C, is 0.61%. The sum of these values is equal to the average rate normalized: 1.84%. In step one, we calculated the average normalized. In this step calculate the value of tangible assets minus average normalized (142 million €) and also the value of intangible assets minus average normalized (288 million €). Both must be equal to the average normalized (430 million €). The value of the intangible assets minus average normalized is the intangibles-driven earnings (IDE) for the year 2017. For the past. Is also the basis to forecast for the next 10 years plus 1 (from 2018 to 2027 +2028).

Step four: With the help of another worksheet (WSPS3), we must build the forecasts suitable for the nominal annual rate of change sales and/or services from 2018 to 2028 for growing the sales (from 288 million €). And also, for the calculation of the discount rate in the same period (interest rate without risk plus average cost of capital and also the risk premium).

Step five: After all these calculations, we must calculate the net present value (NPV) of each forecast sales, from 2018 to 2028, to the year 2017 and, his sum, will be, at last, the value of the four core competencies which is the same like the value of intellectual capital.

Step six: The final value achieved must be distributed with a reasonable way by the four (in this case) core competencies.

³ Referring to December 31, 2017. Are *the skills for...* (doing something in a company).

⁴ If the basis is goods and/or services, the same procedure, *mutatis mutandis*.

III. RESULTS

In the main results, the total value of *intellectual capital* is equal to the sum of the value of the four *core competencies* and his distribution, can be seen in Figure 1.

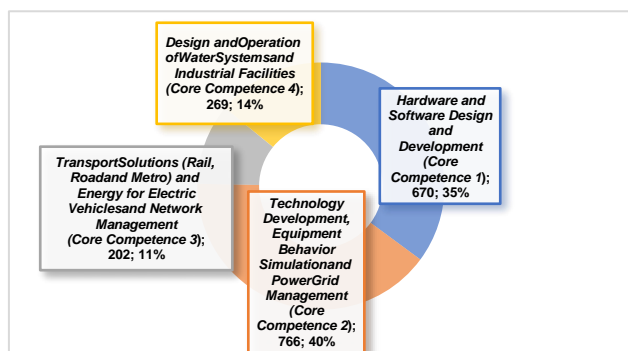


Fig.1. - Four Core Competencies = Value of Intellectual Capital (Million of € and partial percentage of total) (31st December 2017)

Source: Own Construction.

It should be noted that, the total value of EPS's intellectual capital on 31 December 2017 is, 1.908 million €. It is the sum of the partial value, in millions €, in each of the four core competencies identified: C1 = 670 Million€, C2 = 766 Million€, C3 = 202 Million€ and C4 = 269 Million€.

IV. DISCUSSION

The results above need some comments. The total value of the intellectual capital, is sensitive to some basic assumptions: some of them are the nominal annual rate of change sales and/or services, the basis for forecast sales and the normalized sales.

On the other hand, can still be highly sensitive to the, initial value of intangible assets minus average normalized. The assumptions about interest rate without risk plus average cost of capital and also the risk premium, are another important in the same context.

All of these must be very well supported and explained. For achieve feasible results about the value of the intellectual capital, in a certain moment of time.

Some work of authors like Housel and Nelson (2005) [USA] and Rodov and Leliaert (2002) [Netherlands and Belgium], built some strange and complex concepts to understand that are very confused and impossible to apply in particular and even general situations. These authors and others, given not a contribution to clarifying what is the intellectual capital and to use it but, rather the final outcome is leaving someone to refuse applying it. Their

papers are to be of less application as their contribution to the scientific knowledge in the field of intangible assets and, in particular, about the intellectual capital is difficult to apply and reproduce.

Contributions like the one proposed by Andriessen (2004) [Netherlands], turn possible to use it in several activity sectors, is simple to use even that can bring some complexity about their assumptions. Other advantage is visible when it allow a researcher the possibility to make sensitive analysis.

The value of 1.908 million € of intellectual capital in EPS, on 31st December 2017, is a number in line what was expected because it is a company highly intensive in capital, specially, gray matter. It is the gray matter, and the inside motivation over the workers, to bring for long time, new ideas, by creativity, and innovation that can explain a high value of the intellectual capital. Thus, this profile can be a stimulus to improve what have been done by EPS and also produce another news goods and/or services for satisfaction the needs of the customers (current and future).

V. CONCLUSIONS

The research question initial was: *How to apply the Andriessen's method in a specific company and how to achieve also to a specific value of his intellectual capital in a moment of the time?*

By describing in deep, in six steps, from the Andriessen's (2004) [Netherlands] method, we managed to reach a specific value to a specific company: the EPS intellectual capital, on 31st December 2017, was 1.908 million €.

Therefore, we could explain how to apply, by describing their method in a developed way, such that another researcher can apply it, whether replicating to the same company or a different one. In this case we answered to the questions about how to apply the method.

Because there is no case studies regarding Portuguese companies, that's way we have chosen EPS. In doing so we think we start a study and allow future benchmarking for measuring intellectual capital in Portugal.

Regarding the contribution of the *paper*, we stand out that, the research question was answered in a suitable way. This way could overcome some difficulties of approaches that come from Gogan and Draghici (2016) [Romania] and Berzkalne and Zelgalve (2014) [Latvia], Sekhar *et al.* (2015) [India] and Housel and Nelson (2005) [USA]. Those previous work has almost no real life application.

One explanation for that is the complexity of them. They, precisely, don't give a real contribution to enlarge the scientific knowledge either in intangible assets or in intellectual capital other than the theoretical discussion of intellectual capital.

The application of Andriessen's (2004) [Netherlands] method, in six steps, was achieved. We need to alert that if business information is insufficient or unreliable, it is not possible to apply the method. Business age is indifferent as long as required information is available. Finally, we cannot be able to use defined indicators, because some information is prospective (most be forecasted) in nature.

In the Limitations, we highlight the definition of subjective assumptions, associated with the six steps resumed of the method, which leads to unified results. On the other hand, there is some subjectivity in defining the number and the content of core competencies. And there is knowledge that is common to many core competencies. So, the definition of these could have been different and a spatial scope of application is not delimited.

In the Implications, by reason of the aforementioned subjectivity, the discount rate, the risk premium and the (forecast) inflation rate without risk, used in the event of minor variations may under or over assess the value of intellectual capital obtained (at the time considered). So, it is not unique. Thus, although one value has been reached, another ($>$ or $<$) is possible as long as it is well founded. This value is actually dynamic because the fundamentals of calculation vary each day. Thus, it only makes sense on December 31, 2017, in light of the assumptions adopted.

As Avenues for Future Research, its application stands out to other technological companies, domestic and foreign, to know and compare the values achieved.

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Mechanical properties of sisal/ fiberglass reinforced composites

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Abstract—The use of plant fibers to replace artificial fibers such as carbon fiber or glass fiber is the subject of studies by many researchers today. Vegetable fibers are considered for their renewability, degradability, low toxicity and low cost. In this work, the mechanical properties of tensile and flexural strength and modulus of elasticity of hybrid composites of sisal fibers with glass fiber in an epoxy polymer matrix were evaluated. The fibers were treated in a 10% by weight sodium hydroxide solution and subjected to tensile tests in a universal testing machine according to the ASTM D3039 and D790 standards. The best performing composites were the sisal + fiberglass hybrids, at 86% for the tensile strength and 64% for the elastic modulus. In the bending tests the results showed a performance of 119% for the maximum stress and 138% in the greater breaking stress for the hybrid composites.

Keywords— sisal, composites, mechanical Properties, vegetal fibers.

I. INTRODUCTION

Natural fibers have been used in composites as substitutes for materials such as glass and carbon fiber for providing advantages such as low price, renewability, recyclability, low abrasiveness, biodegradability and low cost, low density (Bisaria, Gupta, Shandilya, & Srivastava, 2015; Braga & Magalhaes, 2015; Pickering, Efendy, & Le, 2016; F. M. R. do. Santos, Souza, Barquete, & Amado, 2016).

In addition, vegetable fibers are environmentally friendly and have less risk to humans during handling (Misra, Saw, & Datta, 2011).

Several natural fibers such as kenaf, jute, linen, sisal, have been studied for use as potential substitutes for synthetic fibers (Senthilkumar, Saba, Chandrasekar, Jawaaid, & Siengchin, 2018).

The main constituents of vegetable fibers are cellulose ($C_6H_{10}O_5$) n classified as polysaccharide, lignin and pectin, in addition to other constituents to a lesser extent. Cellulose is a polymer composed of numerous glucose units ($C_6H_{12}O_6$) n.

Composites are hybrid materials formed by combining components with different characteristics giving rise to a

new substance with different properties of the constituent materials (Cunha, Filho, Carlos, & Mota, 2018). In this composition, two distinct phases are evident. A matrix phase and a reinforcement phase, which is embedded in the matrix (Arpitha & Yogesha, 2017). Vegetable fiber-containing composites have been widely used in various applications in the automotive, marine and sports industries (Gopinath, Senthil Kumar, & Elayaperumal, 2014).

However, this combination is not always successful and to improve the compatibility between the compounds in a composite, treatments are needed to improve the adhesion between the polymer matrix and the reinforcement (Joseph, Thomas, & Pavithran, 1996).

In this work, they evaluate sisal fibers in a polymeric epoxy matrix, evaluating their mechanical properties of tensile and flexural strength.

II. THE SISAL FIBER

The fiber of sisal is obtained from the variety agave sisalana. Many studies have been carried out to improve the performance of sisal fiber in polymeric matrix composites. Rana et al (Rana, Ashish, Rana, & Purohit,

2017) analyzed varied levels of sisal in an epoxy matrix (0%, 2%, 4%, 6%) and the tensile strength improves above 4%.

Composites of sisal and epoxy, with fiber treatment with NaOH (18%), showed 110% improvement in tensile strength property (Padmavathi, Venkata Naidu, & Rao, 2012).

Fibers treated with sodium bicarbonate (10%) were used in epoxy matrix composites and showed better results in a 120 h treatment with better interfacial adhesion between the fiber and the resin (Fiore, et al., 2016).

III. MATERIALS AND METHODS

A medium viscosity epoxy resin code 969 MVORGIBX and epoxy hardener code 289 ORGBACMIBX, purchased from IBEX Químicos e Composites. As reinforcement, sisal fibers in the form of mesh purchased from the company SisalSul, fiberglass in the form of mesh and grass of 300 g / m², purchased from the company IBEX were used. For the treatment of fibers, sodium hydroxide (NaOH) J T Baker was used. The manufacturing and testing procedures will be discussed below.

3.1 Fiber treatment

The sisal tissue was washed with distilled water, dried in an oven for 24 hours, at 40°C. Then, it was immersed in a solution of 10% by weight of sodium bicarbonate in distilled water for 5 days at room temperature. After that, they were washed to remove excess solution and placed for drying for 24 hours (Fiore, et al., 2016). The next step was the preparation of the Composite. This treatment was applied to remove lignins, waxes and resins that covering the external surface of the fiber walls and to expose (better access) the hydroxyl groups (Essabir, XIa, Garcia, & Shi, 2018).

3.2 Preparation of composites

Composites were manufactured molded in a flat plate format in an epoxy matrix in the proportion 2: 1 resin / hardener with dimensions 250mmx20mmx4mm. composed with a layer of sisal fiber in bidirectional mesh.

In the hybrid composites, a layer of sisal mesh and two layers of fiberglass mesh were used, in the form of a sandwich, with the sisal in the middle of the reinforcement.

For the manufacture of the composite, the resin / hardener mixture was poured into a glass plate mold, a layer of fiberglass, then a layer of sisal fiber and then

another layer of fiberglass, again, resin / hardener for complete fiber coverage.

After molding, the composites remained at rest in the air for 24 h, when they were demoulded and later cut to make the specimens. Fig. 1 shows the composite ready to be cut.



Fig.1: Sisal fiber composite

3.3 Characterization

3.3.1 Mechanical tests

The tensile and flexion tests were conducted in a Time Group universal testing machine, model WDWEB according to ASTM D3039 and ASTM D790 standards. For the tensile test, the velocity of 2 mm / min was used and for the flexion tests, the three point flexion test speed was 2 mm / min, with a distance of 50 mm between the points.

3.3.2 Density

After being cut and sanded, the specimens were measured for dimensions of width and thickness, the masses were measured at a temperature of 24°C and the average densities of the specimens were calculated. Densities were calculated from measurements of dimensions of width, thickness and length. The width and thickness were measured with a pachymeter in three positions on the specimen defined at the ends and in the middle. The mass of each specimen was measured on a semi-analytical balance. The density was calculated according to the equation

$$D = \frac{m}{V} \quad (1)$$

where D is the density (g / cm³), m (kg) the mass of the and V (cm³) the volume of the specimen respectively.

IV. RESULTS AND DISCUSSIONS

4.1 Average densities

The average densities of the manufactured specimens are shown in Table 1

Table 1: Average density o specimens

	Sisal	Sisal+ Fiber Glass	Fiber Glass
Average density ρ (g/c m ³)	1.129 \pm 0.0 2	1,214 \pm 0.06	1.300 \pm 0.0 70

The average densities were obtained by calculating the ratio between the mass of the specimens and the dimensions of height, width and thickness of each of the tested specimens.

4.2 Tensile tests

The average results of the tensile tests are shown in Table 2. The values of maximum force applied to the traction (FM), maximum stress (TM), breaking stress (TR) and module (E) are shown.

Table 2: Average results of tensile tests

	FM (kN)	TM (MPa)	TR (MPa)	E (GPa)
Sisal	1.939 \pm 0.096	25.756 \pm 1.005	22,384 \pm 3.392	2,270 \pm 0.275
Sisal+Fiber glass	3.712 \pm 0.392	44,847 \pm 8.718	41,718 \pm 8.748	3,733 \pm 0.958

The tests showed that hybrid sisal fibers with glass fiber performed better than composites with only sisal fiber in the polymeric matrix. The maximum force supported by the hybrid specimen was 91.4% greater than the non-hybrid

The maximum stress was 74% higher in the hybrid specimen.

Breaking stress was 86.4% higher in hybrid specimens. The module was 64.4% higher in the hybrid composite of sisal + fiberglass.

Fig. 2 shows the graph of average tensile stresses versus strain for composites of sisal and hybrid sisal with fiberglass and composites with only fiberglass.

The graph shows that the hybrid composites had greater tensile strength

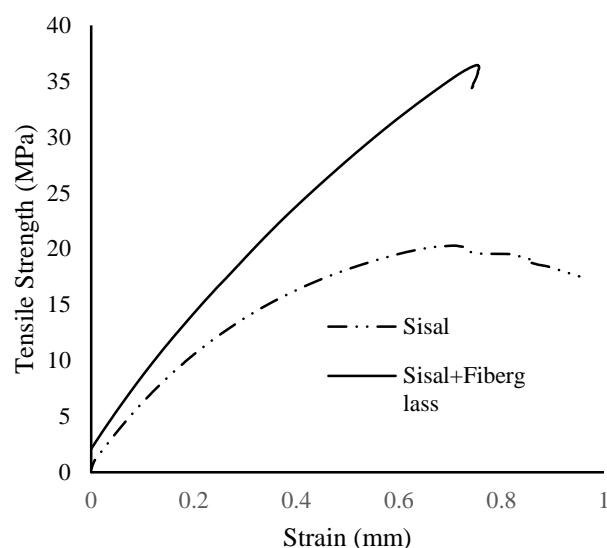


Fig.2: Stress x deformation of the tests of sisal fiber + glass fiber composites.

4.3 Bending tests

The average results of the flexion tests are shown in Table 3 below:

The results show that hybrid specimens performed better than non-hybrid composites. The maximum strength (FM) for the fiberglass composite had an increase of 148%, while in the maximum stress (RM) the increase was 119%. The tensile strength was 138% higher than non-hybrid composites.

Table 3: Average bending test results

	FM (kN)	RM (MPa)	RP (MPa)
Sisal	0.165 \pm 0.02 9	1.926 \pm 0.28 0	1.143 \pm 0.18 7
Sisal+Fiberglass	0.410 \pm 0.02 0	4,236 \pm 0.27 0	2,722 \pm 0.18 6

In Fig. 3, the graph of the average bending stresses is presented for the composites of sisal, sisal with fiberglass and composites with only fiberglass. It is observed that, in the case of bending stresses, composites with sisal hybrids with fiberglass performed better than other types of composites.

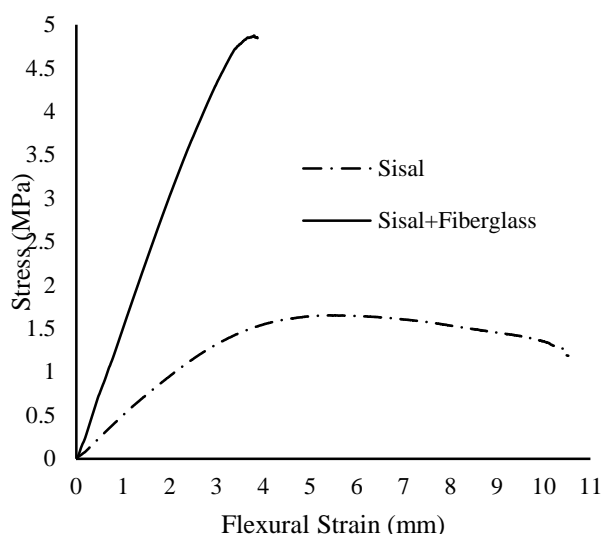


Fig.3: Resultados dos ensaios de flexão de corpos-de-prova compostos com sisal, sisal + fibra de vidro.

V. CONCLUSIONS

Vegetable fibers have reappeared as important substitutes for fiberglass and carbon in several economic sectors. This work aimed to analyze the mechanical properties of composites containing sisal fiber in a polymeric epoxy matrix, compared with a hybrid composite containing sisal fiber with glass fiber. The results showed that hybrid composites containing sisal and fiberglass performed better in the tensile and flexion tests and modulus of elasticity than composites with only sisal fibers in an epoxy polymer matrix. Further studies addressing percentage variations of plant fibers to assess the mechanical behavior of fibers in the composite are needed. In addition, studies are needed to evaluate the inclusion of sisal fibers from an economic point of view.

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The use of Facebook as a Collaborative Knowledge Construction

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Abstract— The present research aimed to verify the effectiveness of the use of Facebook in education, as well as to verify the possibilities of using this application to knowledge construction, making the teaching-learning process provoking and motivating. A case study with emphasis on qualitative and quantitative research was applied in order to investigate the acceptance of the use of Facebook as a collaborative teaching-learning support for integrated high school students, through a questionnaire for first grade students from Instituto Federal de Educação, Ciência e Tecnologia do Sertão Pernambucano (IFSERTÃO-PE), from Campi Petrolina and Petrolina Zona Rural, totaling 66 students, that sought to consider the acceptance of students regarding the use of Facebook as a support for learning in a collaborative way. The readings of André (2017), Lakatos (2008), Lorenzo (2013), Moran (2013), Spadaro (2013) and others were relevant to the theoretical basis of the research. It was concluded that, despite the low use of social networks by teachers in the classroom, students believe that Facebook presents itself as a resource with great educational potential and that stimulates more active participation of students in their learning, favors generation and sharing of information, and also improves the interaction between teacher, students and parents.

Keywords— Education, Teaching-Learning, Teaching Practice, Social Networks.

I. INTRODUCTION

The traditional models of education, as well as teaching practice, are being rethought, to account for the transformations resulting, among other factors, from economic modernization, the strengthening of citizenship rights and the dissemination of information technologies. The school needs to break with the curriculum models centered on the hierarchical organization of static content under the command of the teacher and be attentive to society's practices, stimulate the students' critical sense and build their curriculum from the local context, valuing the collective construction and knowledge sharing.

Technologies have been modifying daily life in an extraordinary way. Cell phones, tablets, computers and other devices are responsible for living in a network and constantly connected. It is a fact that this technological revolution has already reached the school environment so that the teaching-learning process can no longer be exercised as it used to be. Learning activities and methodologies can be used differently with the help of new technologies. Learning by being together in distant places, without the need to always be together in a room for this to happen (MORAN, 2013).

The advances in information and communication technologies and the emergence of social networks, which are increasingly interactive and collaborative, have been

influencing social relationships, creating new patterns of behavior and greatly interfering in school practices.

With the use of a collaboration space, such as social networks, the teacher in turn will have the opportunity to check aspects that are often difficult to identify in a classroom, such as the ability to write texts, improve development in writing, research on a subject, the presentation of an opinion and the debate among students. (LORENZO, 2013, p.30)

The educational potential of social networks, especially Facebook, is enormous, as it favors the sharing of information, develops more dynamic and interactive, open and creative teaching and learning strategies, enabling student participation in the construction of knowledge, the use of resources and more mobility of information and knowledge.

The use of digital technologies in the classroom is still a topic that requires a lot of discussion and still faces some resistance; however, we cannot ignore the fact that social networks are the habitat of the new generation that we receive today in schools. For this reason, keeping up with technological advances seems to be a sine qua non condition for maintaining proximity to our students.

It is essential to emphasize that technologies are not necessarily created to be used in education, but nothing prevents them from becoming educational instruments.

Digital technologies bring transformations to the classroom, causing changes in the teaching-learning process in such a way that it is flexible, pluralistic, diversified. Thus, it is perceived the importance of the insertion of technologies in an environment of knowledge exchange, either as mediators, moderators or amplifiers of the same.

Once connected, in possession of digital technologies and free for interaction, students stop being mere recipients of information and become actors in the construction of their knowledge. In a network of contacts, it is possible to exchange ideas, as well as share knowledge, provide a differentiated form of learning through collaboration between individuals with common interests. In this context, the teaching-learning process can alternatively benefit from this tool, aiming to stimulate collaborative learning and foster the construction of collective knowledge.

In this sense, the present study aimed to investigate and reflect on the acceptance of the use of Facebook as a collaborative teaching and learning environment by students in the 1st grade of integrated high school at Instituto Federal de Educação, Ciência e Tecnologia do Sertão Pernambucano (IFSERTÃO-PE).

II. SOCIAL NETWORKS

It cannot be denied that currently the internet is part of the daily lives of individuals and from their immersion in this environment, a new way of communication has gained prominence: social networks. It is worth mentioning that the concept of social networks is not directly linked to the internet, since the most remote times we have lived in a network, since we interact, exchange, share and communicate. The emergence of social networks came from the need for man to share with others and create social bonds based on the affinities between them.

When social interaction goes online, we have the digital social network. Digital social networks occupy an increasing space in people's lives, especially with the popularization and diversification of the ways of producing and sharing knowledge, which can be used in the most varied contexts, such as entertainment, communication, teaching, research, interaction and obtaining information.

Franco (2012, p.117) defines social networks as “a socialization process, some type of collective and social interaction, in person or virtual, which presupposes the sharing of information, knowledge, desires and interests”. Thus, we think of social networks as groups on the Internet, which share data and information, in different ways and through them it is possible to post different files,

texts, photos, images, videos, among others. It should also be emphasized that the use of social networks had as main objective the relationship between friends or people with unusual interests, however with the rapid expansion, these networks have come to have a distinct role in society, in politics, in the media and also, On education. Thus, we verified that social networks are collective and collaborative spaces for communication and exchange of information that favor the development of educational practices.

These virtual communities have asserted themselves as an important alternative to learning and traditional organizational contexts and, being supported by technologies, they have become more visible today. They represent intellectual, cultural, social and psychological environments that facilitate and sustain learning, while promoting interaction, collaboration and the development of a sense of belonging of its members (MOREIRA and JANUÁRIO, 2014, p.74).

Understanding virtual environments as innovative possibilities for creating learning communities implies recognizing the primordality of thinking about new learning contexts, causing teachers to promote interaction and collaboration, using social networks, especially Facebook, as a teaching environment and learning.

According to Lorenzo (2013), some institutions have found useful applications of social networks in Education and, currently, they have become important teaching and learning tools. According to the author, through networks, it is possible to share information on topics studied or proposed in the classroom, as well as to strengthen the involvement of students and teachers, through a new communication channel, making it an efficient option for building the relationship between students and teachers.

With the use of a collaboration space, such as social networks, the teacher in turn will have the opportunity to check aspects that are often difficult to identify in a classroom, such as the ability to write texts, improve development in writing, research on a subject, the presentation of an opinion and the debate among students (LORENZO, 2013, p.30).

We found that it is possible to share with the students a multitude of materials related to subjects to be worked on in the classroom, such as multimedia, news from newspapers, videos, music, excerpts from films, etc. In addition, teachers can use social networks in different ways in the teaching and learning process. According to Pechi (2013, p.01) “Taking advantage of the time that students spend on the internet to promote interesting debates on everyday topics helps students to develop

critical sense and encourages the most timid to express their opinions”.

We believe that the use of social networks has become indispensable for a transformative teaching proposal. However, the traditional educational process must be respected, since the use of technological proposals through information and virtual communication is not to replace it, but to serve as a complementary instrument to teaching practice. Currently, there are several types of social networks, the most known and used have been Facebook, Twitter, Instagram, LinkedIn and Blogs.

2.1 FACEBOOK AND THE EDUCATIONAL CONTEXT

Facebook was created in 2004 by Mark Zuckerberg and a group of students at Harvard University at the time, whose initial project was to network students' profiles at this university. The success of this network was so fast, that in 2006, the network was opened to all people who had completed, at least 18 years of age, or were studying higher education, with the basic idea of connecting students and socializing them. (SPADARO; 2013).

It is an application that allows people to connect through the web and choose those who will participate in their group of friends, allowing them to view and share all their publications. Thus, for Spadaro, “The ability to connect people is, therefore, the strength of Facebook” (2013, p.95). This is configured as an effective tool for the teaching and learning process due to the large number of resources available and its power to connect people.

Facebook adds a significant amount of resources, functionalities and applications that allow interactive actions on the web, having become, nowadays, an innovative space in which interactions, sociability and learning are created and developed, these collaborative in network, through dialogue and the collective construction of knowledge (EDUCASE, 2007).

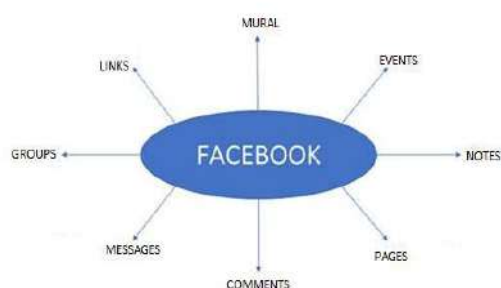
According to research by Llorens and Capdeferro (2011), the main pedagogical potentialities of Facebook for collaborative learning are: favoring the culture of virtual community and social learning, as this is based on values around a common goal that generates feelings belonging and social learning; allowing innovative approaches to learning, given that the construction of knowledge and the development of skills, supports lifelong learning and professional updating through the collaboration of peers; and the possibility of presenting content using “real” materials. The information that is transmitted may come from the members of the social network. With videos, multimedia products, links to documents and blog articles, etc.

This application allows some alternatives of activities that can be used by the teacher to make the classes more thought-provoking and motivating, to quote, the creation of groups with the students of the class to post information, activities, curiosities and reactions. Groups can favor a new type of interaction between the class; creating pages or events can be an excellent opportunity to share information and bring teachers, students and parents together; referral from other sources of research can serve to expand the student's learning horizon and use Facebook to encourage students to share their productions, creating a practice of mutual enrichment.

For Bettio et al. (2012), when using Facebook, it is also possible to create a profile by class, and groups by discipline, where it is possible to assist the activities carried out by teachers, and also add and encourage the involvement of companies related to the course area. For these authors, teachers can still ask questions of students, publish lists of exercises, monitor and evaluate works, publish an activity schedule, among others; it is possible for students to ask questions of the teacher, communicate with other students, share knowledge through groups, expose their curriculum, among others.

The software in question provides some basic tools that contribute to the construction of a stimulating learning space:

- Mural - space for communication and discussion of texts, videos, images and comments;
- Groups - online spaces created with the particular objective / interest that stimulate work in a collaborative way;
- Links - allow connections to pages outside the application;
- Events - used to remember deadlines, meetings, seminars, courses, etc.;
- Messages - an important communication channel that makes it possible to send and receive information;
- Pages - allow interaction among its members, allowing the sharing of links;
- Notes - allow small notes;
- Comments - allow the socialization of opinions about the issues in question.



Basic learning tools on Facebook

Source: Alessandra Latorre and Adriana Santana (2019)

Institutions and educators have increasingly used Facebook, in order to improve the educational process and communication with students, because, according to the author, "There are countless ways to use the most popular network in the world in the classroom". (LORENZO, 2013, p.73). All in all, it turns out that Facebook is an available tool, with enormous pedagogical potential and quite valuable for the teaching-learning process.

III. METHODOLOGY

3.1 STUDIED LOCATION

The field research was carried out at Instituto Federal do Sertão Pernambucano in Campi Petrolina and Petrolina Zona Rural, in the period from February to March 2017, where a questionnaire was applied containing eight questions that sought to verify the acceptance of students regarding the use of Facebook as support for collaborative learning. The questionnaire was answered by students aged 14 to 17 years, students of the 1st grade of integrated high school, totaling 66 students. Of these, 31 are from high school integrated in agriculture and 35 from high school integrated into buildings, resulting in 100% of the questionnaires answered.

The methodological path defined was the case study, as it is a valuable instrument that makes it possible, through the researcher's direct and prolonged contact with the investigated events and situations, to describe actions, behaviors, capture meanings, analyze interactions, understand and interpret languages, study representations, without detaching them from the context and circumstances in which they manifest themselves. Thus, they allow us to understand not only how these phenomena arise and develop, but also how they evolve over a given period of time (André, 2013).

Stake (1995), cited by Creswell (2007), clarifies that in the case study, the researcher extensively studies a fact, phenomenon or activity with one or more individuals,

seeking accurate information from the diversity of procedures during a given time.

For data collection, the quantitative approach was chosen, where "(...) the researchers use large samples and numerical information (...) 'and qualitative whose purpose is "to provide a more detailed analysis of the investigations, habits, attitudes, behavioral trends, etc. (MARCONI, LAKATOS, 2008, P.269).

3.2 CASE STUDY

This work is the result of a case study with an emphasis on qualitative and quantitative research, which investigated the acceptance of the use of Facebook as a support for teaching-learning in a collaborative way for students of integrated high school.

The study was based on the following hypotheses:

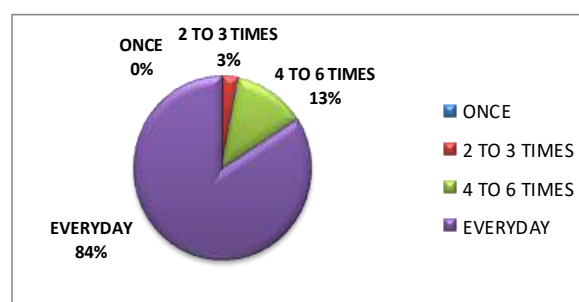
- Hypothesis 1: the student's knowledge and use of the application;
- Hypothesis 2: students would approve the use of Facebook, given the innovative nature of learning;
- Hypothesis 3: Facebook would prove to be effective as a support for classroom support;
- Hypothesis 4: the use of the application would contribute to the construction of knowledge in a collaborative way.

The choice of Facebook as a research tool was due to its functionality, the possibility of creating groups with common goals, the interaction and familiarization of young people with this application.

IV. RESULTS AND DISCUSSIONS

The results showed that 97% of the students participating in this research know the Facebook application and that they use it 4 to 7 times a week, which means that young people are connected, exchanging information, generating knowledge, learning and interacting at all moment (Graph 1).

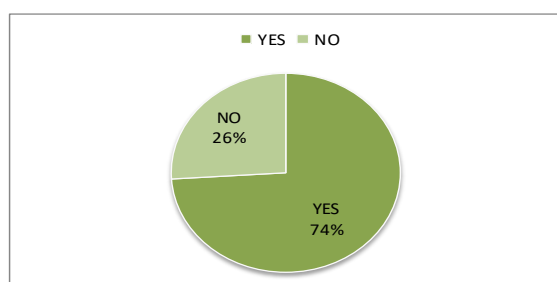
Graph 1 – Weekly Frequency use of Facebook



Source: Alessandra Latorre and Adriana Santana (2019)

It was found that the main purpose of using Facebook is to read the posts, followed by posts of photos and texts, information sharing, chats and exchange of messages (graph 2). Still, 26% of students stated that they use the application for other purposes such as: sharing memes, watching videos, participating in groups, following websites of higher education institutions.

Graph 2 - Facebook's utility pattern for users



Source: Alessandra Latorre and Adriana Santana (2019)

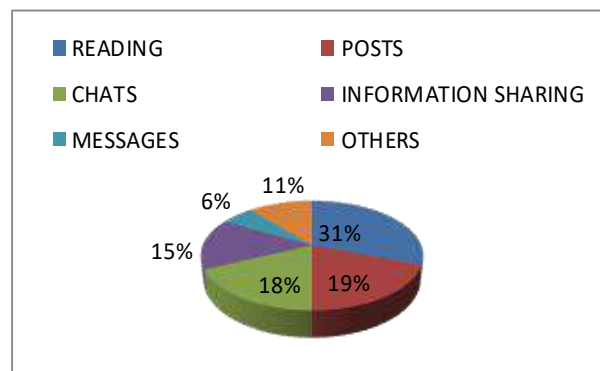
Technologies are making people more connected by providing new ways to learn and teach. The use of Facebook as a learning environment allows the teacher to reframe his teaching practice, in a more interactive, participatory and collaborative context. 71% of students consider that the discussion in a non-formal space like Facebook can contribute positively to their learning (Graph 3). This result indicates that students believe in Facebook as an educational platform that allows them to resize, streamline and add meaning to learning. Lima (2010) says that the practices of reading and writing in these virtual environments, in the context of teaching-learning, multiply social interactions and provide changes in the behavior of the actors involved.

The applications used on Facebook assist and enhance the teaching work, working as stimulating didactic resources for the teaching-learning process. 74% of participants believe that the use of technology makes classes more profitable and motivating.

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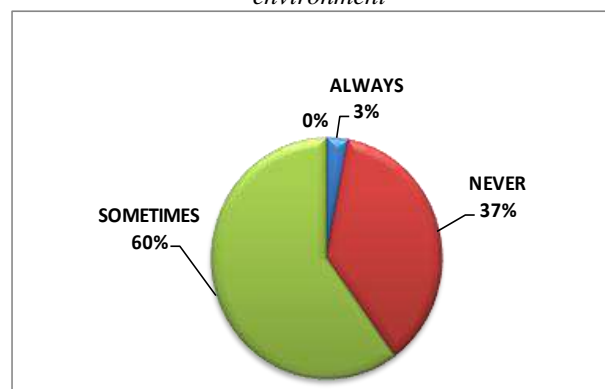
Graph 3 - Impact of technologies to motivate classes.



Source: Alessandra Latorre and Adriana Santana (2019)

The use of technologies is a reality at school, however, a large number of teachers are not prepared to insert these technologies in their classes. This fact was confirmed in the students' responses, when they declared that 37% of teachers do not use Facebook or other social networks as a learning tool and 60% sometimes use these resources (Graph 4). Silva and Vieira (2010) say that "technology does not underestimate neither the educator nor the student, it only modifies the relationships between those involved, and thus providing a new environment for sharing knowledge where the domain over the machine and cyberspace is makes it essential". The use of social networks in the school context still faces some resistance, either because it is a relatively new technology and still not understood as a didactic environment or due to the lack of investments in the training of teachers by the institution to deal with this new reality.

Graph 4 - Use of Facebook by teachers as a learning environment



Source: Alessandra Latorre and Adriana Santana (2019)

When asked how the use of Facebook could contribute to their learning, IFSERTÃO-PE students participating in the research, in their majority, declared that: online activities could occur with communication between students and teachers; teaching should take place in a contextualized way, working with facts and daily news; pages should be created to share stories, with texts, images and videos; programs to assist learning could be developed; groups for discussion and sharing of information could be created; the Facebook space called “did you know” should be used and, finally, the environment should be used to answer questions and obtain an explanation of the contents in real time, through chats; make posts regarding the content; talk to people from other countries to learn other languages.

V. CONCLUSION

The results demonstrated the great influence of Facebook in the students' lives. Of the interviewees, about 97% know the Facebook application, making use of it 4 to 7 times a week. The main purpose is to read the posts, followed by posts of photos and texts, sharing information, chats and exchanging messages. The vast majority that totaled 71% of students consider that the discussion in a non-formal space such as Facebook can contribute positively to their learning, however there is still a percentage of 37% of teachers who still do not use Facebook or others social networks as a learning tool and 60% sometimes use these resources.

Technology, by itself, will not be able to carry out the necessary transformations to streamline the teaching-learning process. The school needs to go hand in hand with technological advances. We know that the use of social networks as a learning environment has intensified in recent years, as it is a resource with immense pedagogical potential that favors collaborative and interactive teaching; and because they stimulate in the student an active subject posture that builds their knowledge in a network culture. Thus, the insertion of technologies in the educational environment, using social networks, specifically Facebook, as a pedagogical tool to innovate teaching practice requires a change in the way of thinking and doing education.

Educating is a complex process, which requires significant changes, investment in teacher training, to master the communication processes of the pedagogical relationship and to master the technologies. Only then will we be able to move faster, with the awareness that, in education, it is not so simple to change, because there is a connection with the past, which is necessary to maintain, and a vision of the future, which we must be aware of. (MORAN, 2012, p. 168).

It is increasingly clear to educators that the knowledge belongs to everyone, not just the teacher. It is essential to adapt to the new reality. There is no more space to work with young people today in structures where they do not recognize themselves and do not have the feeling of belonging. Buildings, playgrounds, classrooms, auditoriums, laboratories and even knowledge itself, there is no point in using structures from an era, which fit in a time when human beings and the world were something they are no longer.

In this context, Facebook is configured as an environment rich in possibilities of use to make classes more meaningful and attractive, as it favors the connection between network participants, allows content to be organized in us for quick and easy access shared collaboratively and participatively.

Education is inconceivable without the use of technology. The insertion of these in the classroom does not only refer to the use of technologies that are too innovative or directed to some discipline, but it is also about reinventing, adapting to the school reality that needs to be rethought.

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Draining Half-Wire with Bamboo Fibers applied in the Search of Reducing Damage Occasioned to Asphalt in the City of Rialma

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Abstract— Some construction problems are related to hydrology. Water, whether it comes from precipitation or from homes, is always creating challenges for engineers. Residential water, used and subsequently discarded from households to the streets, even if they do not seem to be a hindrance, as it does not drain into the usual drainage means, thus forming concentrations of water that in the long run tend to damage the asphalt. It was thought of a solution for this that the draining curb was idealized, with the objective of becoming a mechanism in the drainage system that helps, and, solve these problems that may seem small, but end up causing inconvenience. As a proposal for a sustainable material that adds quality, the bamboos of the Imperial and Taquara species were included in a prototype of draining curb tested in the laboratory to determine the best proportion of addition of this material to indicate the most suitable concrete for the preparation of the prototype.

Keywords— Urban Drainage. Curb. Bamboos. Sustainability.

I. INTRODUCTION

The city of Rialma-Goiás, located on the banks of the BR-153, has undergone changes in its urban space, since its emancipation by the growth of the habitable area. The expansion of urban space has generated demands for infrastructure that have rarely been realized. Proper city planning provides for risks that can be avoided, an example of which is the rainwater drainage system. An adequate drainage system unites all the mechanisms of urban infrastructure for the proper conduct of wastewater.

The city of Rialma has often experienced difficulties because most of it has a deteriorated asphalt pavement due to the absence of an adequate drainage system to support the inserted flow. The need to drain the water discharged on the city streets provided the search for different means of driving; the curb is an example present in the urban infrastructure that can be used to carry out drains from homes to the drainage system along the

channels, avoiding wear and tear in the moisture on the asphalt.

Therefore, a draining curb with bamboo fibers was developed in order to reduce the damage caused by the flow of water from homes with a focus on the area in front of the garages, which is usually where the water that damages the asphalt flows. We wanted to demonstrate the reality of the municipality of Rialma in relation to the drainage system, estimate the damage in the asphalt resurfacing and make a proposal to adapt a curb that helps in the flow of liquids and reduces the asphalt degradation with the best addition among the bamboo species studied.

II. METHODOLOGY

Data were collected from a field study to understand the existing drainage system and the drainage system being implemented, and damage to the asphalt possibly caused by the inefficiency of the existing drainage

system was observed. Proceeding with searches in bibliographic references with qualitative character in articles and projects in development process provided by the city hall of Rialma.

In the research on bamboo to assist in the elaboration of a curb capable of adding quality, experiments were carried out in the laboratory in order to create a draining curb. The extraction of the fiber from this material was carried out by scraping and grinding. Another relevant aspect was the design of the curb shape, in the AutoCAD software, seeking to allow the passage of water and adaptation to the drainage system.

III. RESULTS AND DISCUSSION

The disordered occupation of urban areas and the consequent coverage of large areas of the soil, cause an increasing reduction of rain infiltration, thus an effective drainage system is extremely necessary, because in addition to helping to solve these problems, it will channel part of water in order to redirect the external flow to the internal drainage system. According to TUCCI (2003, p. 36) the urban drainage policy is based on draining the precipitated water in the best possible way, but the abandonment of this principle in the 70s caused immediate consequences such as the increase in floods.



(A)



(B)

Photo1 (A): Deterioration of 32nd Street. Photo1 (B): Deterioration of 29th Street.

Source: Authorship. Source: Authorship.

Rialma goes through the process of installing urban drainage that does not exist in almost all sectors. The city is located in mountainous terrain, measures for dimensioning the drainage system are necessary. The roads, which are significantly damaged, have hindered the daily life of the population, whether in traffic, material damage due to wear on the sidewalk or even by flooding in houses (photos 1A, 1B).

The absence of an efficient drainage system, in addition to causing damage to asphalt, gives society diffuse pollution that is generated by runoff in urban areas from the disposal of pollutants (BRITES, 2005, p.65), as waste emitted by the population and launched on the roads. The problems due to the absence of an adequate drainage system show its relevance, according to data from the Brazilian Institute of Geography and Statistics (IBGE), the city has only 2.1% of urban households on public roads with adequate urbanization.

The city is in the late stages of building the drainage system, which is mostly present in the central sectors of the city. The need for methods to reduce damage to city roads is evident. The curb is a device capable of reducing such damage, as it assists in driving and redirects liquids, as it has a rectangular or trapezoid shape, there may be gutters and water inlets through which the inserted discharges are conducted (ROCHA, 2006, p. 4).

The curb prototype was dimensioned 50 cm long and 30 cm high, with 3 40 mm diameter holes for water inlet and a 100 mm pipe to drain all the liquid. The volume of the prototype was approximately 28.2 liters. Materials such as metal plate, wood and expanded polystyrene (EPS) were used to manufacture the form. Bamboo was used to add water resistance and absorption to the draining curb; the species used to define the best result of the molds were Taquara and Imperial.

The structural composition provides bamboo stems with a high physical-mechanical resistance, lightness, flexibility and discrepancies according to the species, hence the relevance of studying different species to analyze variations according to their characteristics (BRITO et al. 2015, p. 560). Other materials used and their measurement ratios were cement with 25.74%; gravel 0 and gravel 1 with 61.13%; additive with 0.26%, and water with 12.87% and 5% Imperial bamboo. The mass ratio was 1: 3. The process of elaborating the curb can be demonstrated in Figure 1.

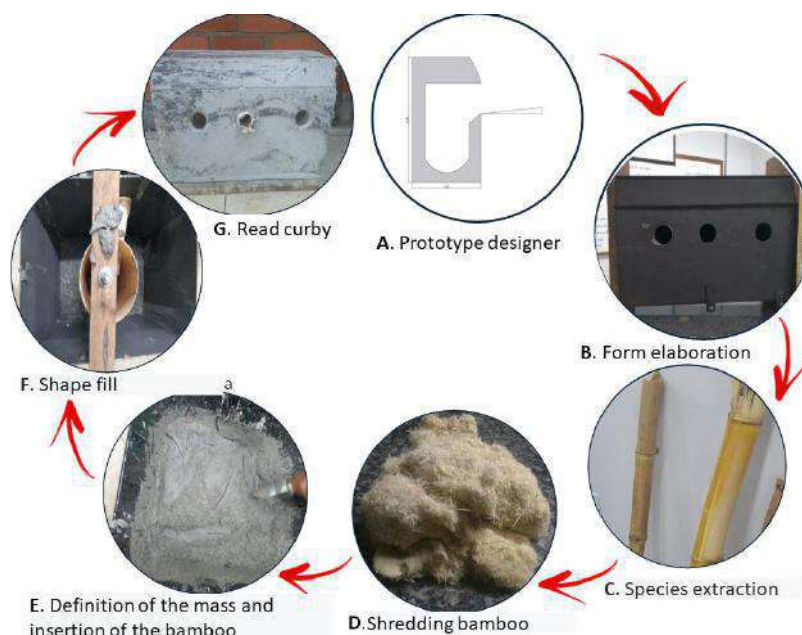


Fig.1: Curbdevelopment.

The compressive strength test allowed to verify the strength of the bamboo, with Imperial bamboo with an external diameter of 70 mm having a resistance of 24.45 MPa, while Taquara bamboo with an external diameter of 45 mm had a resistance of 27.86 MPa. According to the National Department of Transport Infrastructure (DNIT) 020/2006 the concrete for the curb must have a minimum compressive strength (fck) at 28 days of 15MPa. It was decided to use Imperial bamboo to observe the bamboo's ability to add quality. The test with the specimens was carried out in cylindrical molds, at 8 days, the specimen without bamboo had a resistance of 16.92 MPa and the specimen with bamboo, a resistance of 13.20 MPa, and, at 16 days, the specimen without bamboo showed a resistance of 14.71 MPa and with bamboo a resistance of 14.84 MPa.

For the water absorption tests the cylindrical specimens were immersed in a bucket of water for 30 minutes, tests were carried out on specimens calculated in volume, with 10% bamboo that obtained absorption of 22.4g of water, 20 % of bamboo with absorption of 41.3g of water, 30% of bamboo with absorption of 52.5g of water and 40% of bamboo with absorption of 67.6g of water, verified that the greater the addition of bamboo in the mass, the greater the water absorption in concrete.

IV. CONCLUSION

It is essential to have methods that reduce the accumulation of fluids in the streets, the draining curb for containing a diameter of 100mm allows a flow of up to 8L / s which significantly reduces the amount of water installed on the asphalt pavement. The tests carried out

with Imperial bamboo made it possible to verify that it is possible to aggregate greater water absorption and resistance to the material, the lightness that bamboo can provide also stands out because the more bamboo added to the concrete, the material becomes even lighter. The bamboo draining curb is a proposal for the drainage system capable of adapting the quality and better water targeting of the system, allowing the reduction of water in the asphalt pavement, and, consequently, streets less prone to deterioration.

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Maternal Death in the Metropolitan Region of Belém, Pará – Brazil, between 2013 and 2017

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Abstract—Objective: The present study aims to identify maternal deaths in the Metropolitan Region of Belém do Pará, Brazil, between the years 2013 to 2017 and to analyze the clinical-epidemiological profile of these women with maternal death. **Method:** This is a retrospective epidemiological, descriptive study with a quantitative approach, conducted in February 2020, with information from secondary data from the Mortality Information System (SIM). **Results:** Between 2013 and 2017, 142 maternal deaths were found in the metropolitan region of Belém, with the highest number of cases occurring in 2013, with a total of 38 maternal deaths. As for the clinical-epidemiological profile, there was a predominance of the age group between 20 to 29 years old, brown race and single marital status. Most deaths occurred during the puerperium, in a hospital setting and cause of death from pregnancy, childbirth or the puerperium. **Conclusion:** In view of this, actions are needed to promote the improvement of living conditions and assistance to women of reproductive age, both in preventing unwanted pregnancies and in preventing complications during the period of pregnancy and the puerperium.

Keywords—Maternal deaths, women's health, pregnancy.

I. INTRODUCTION

Maternal mortality (MM) is defined by the World Health Organization as the death of a woman during pregnancy or within 42 days after the end of pregnancy, regardless of duration or location, due to any probable cause with or aggravated by pregnancy or by measures in relation to it, but not by accidental or incidental causes (WHO, 2012).

Currently, the global maternal mortality rate is about 210 deaths per 100,000 live births. According to the Epidemiological Surveillance Guide for Maternal Death, the reduction in the maternal mortality rate in the world and, especially in Brazil, still represents a major challenge for health and society. Despite advances in decreasing rates, high mortality rates from preventable causes have been observed that affect Brazilian regions in different ways (WHO, 2015; Ministry of Health Brazil, 2009).

In Brazil, there was a reduction of approximately 56% in the maternal mortality ratio, between 1990 and 2015. In 2016, 1.463 cases were recorded, which represented a 16% decrease in relation to the previous year, but it still remains high when compared to developed countries (Ministry of Health Brazil, 2018).

The causes of maternal mortality can be direct, such as: obstetric complications in the pregnancy-puerperal period resulting from injuries, omissions, incorrect treatment or sequence of events in any of these situations and indirect, resulting from pre-existing diseases or during treatment during pregnancy and that were aggravated by their physiological effects (PAHO, 2018).

Maternal death is a strong indicator of a country's socioeconomic conditions and the quality of life of the population, expressing a devaluation and disrespect for life, or that can be translated as a provision of low quality humanitarian assistance. In addition, it indicates a country's "political determination" to carry out "collective and socialized actions" in this segment, constituting an indicator of social inequities (Souza, 2015).

Given this reality, the new Sustainable Development Objetivos which followed the Millennium Development Goals, emerged with the goal of eliminating maternal mortality from preventable causes, between the years 2016 and 2030. In Brazil, the target is reduced to approximately 20 deaths for every 100,000 live births (United Nations, 2015).

Based on the above, the present study aims to identify maternal deaths in the Metropolitan Region of Belém

Pará, Brazil, between the years 2013 to 2017 and to analyze the clinical and epidemiological profile of these women with maternal death.

II. METHOD

This is an epidemiological, descriptive retrospective study, with a quantitative approach, carried out in February 2020 with secondary data information from the Mortality Information System (SIM), referring to maternal mortality in the metropolitan region of Belém in the State of Pará, between the years 2013 to 2017. The data collected are available for public consultation at DATASUS - Information Technology at the Service of SUS, at the electronic address <http://tabnet.datasus.gov.br/cgi/defthtm.exe?sim/cnv/obt10uf.def>.

SIM is a system of regular data search on mortality in Brazil. From it, it is possible to capture data on mortality, in a comprehensive and reliable way, to subsidize different scales of public health management. Based on this information, it is possible to carry out situation analysis, planning and evaluation of actions and programs in the area.

For this study, data were collected on 142 cases of maternal deaths in the metropolitan region of Belém do Pará, on the SIM website. The metropolitan region covers the municipalities of Ananindeua, Belém, Benevides, Castanhal, Marituba and Santa Izabel, between 2000 and 2017. The following sociodemographic variables (total number of cases; age group; race and marital status) and Epidemiological variables (death during pregnancy or puerperium; place of death; investigated death and cause of death (CID-10).

From the collected data, a descriptive analysis of the studied population was performed, the data are arranged in tables, using statistics related to the median and standard deviation of the selected variables. The use of open data is available to the public and is available for consultation on the DATASUS - SUS Service Information Technology website, without the need for an estimate by the Research Ethics Committee.

III. RESULTS

Between 2013 and 2017, 142 maternal deaths were found in the metropolitan region of Belém, with the highest number of cases occurring in 2013, with a total of 38

maternal deaths. As for the location with the highest number of cases, the municipality of Belém stands out with 92 deaths, which corresponds to 65% of the total deaths.

Table 1 shows the total number of maternal deaths in the metropolitan region of Belém between the years 2013 to 2017.

Table 1: Distribution of the number of maternal deaths in the metropolitan region of Belém, Pará, Brazil, between the years 2013 to 2017.

COUNTIES	n= 142					TOTAL	%
	2013	2014	2015	2016	2017		
Ananindeua	5	5	7	3	5	25	18%
Belém	27	17	16	13	19	92	65%
Benevides	1	1	1	1	1	5	4%
Castanhal	3	3	2	0	0	8	6%
Marituba	1	1	1	1	3	7	5%
Santa Izabel	1	2	0	1	1	5	4%
Total	38	29	27	19	29	142	100%

Source: MS / SVS / Mortality Information System – SIM, 2020.

As for the clinical-epidemiological profile of women with maternal death in the metropolitan area, there was a predominance of the age group between 20 and 29 years old, with 63 cases (44%), 107 were of brown race (75%) and were single (39%). Regarding death during pregnancy or the puerperium, 101 cases (71%) occurred

during the puerperium, 138 cases (98%) were in the hospital, 132 (93%) with an informed summary form and in 132 cases (93%) the cause of death (ICD-10) is related to CAP XV - Pregnancy, childbirth or the puerperium. Table 2 expresses the characterization of the clinical-epidemiological profile.

Table 2: Clinical-epidemiological profile of women with maternal death in the metropolitan region of Belém, Pará, between the years 2013 to 2017.

VARIABLES	Total n = 142	
	Nº	%
Age		
15-19	18	13%
20-29	63	44%
30-39	52	37%
40-49	9	6%
Breed		
White	25	18%
Black	10	7%
Brown	107	75%
Marital status		
Single	56	39%
Married	39	27%
Other	42	30%
Unknown	5	4%
Death During Pregnancy and Puerperium		

During the pregnancy	41	29%
During the postpartum period	101	71%
Place of Death		
Hospital	138	97%
Residence	3	2%
Others	1	1%
Death Investigated		
With informed summary sheet	132	93%
Without plug informed synthesis	1	1%
Death not investigated	9	6%
Cause of Death - CID - 10		
CAP I - Infectious and parasitic diseases	10	7%
CAP XV - Pregnancy, childbirth or the postpartum period	132	93%

Source: MS / SVS / Mortality Information System – SIM, 2020.

IV. DISCUSSION

When analyzing the data of this study, it was found that between 2013 and 2017 142 maternal deaths were reported in the metropolitan region of Belém. It was found that the largest number of cases occurred in 2013 with 38 deaths, showing a decrease in following years, reaching a total of 19 deaths in 2016. However, in 2017 the number of deaths increased, reaching 29 deaths.

The municipality of Belém has the highest number of deaths, with 92 cases (65%), the result is similar to a study that evaluated the epidemiological profile and causes of maternal mortality in the State of Pará between the years 2012 to 2016, stating that among 18 municipalities in Pará, the city of Belém suffered 99 deaths. In addition, it showed that among the regions of the State of Pará, deaths are concentrated mainly in the Metropolitan Region, with a total of 254 cases (Miranda, Botelho, Tsuchiyama, Luz, & Veras, 2019).

Despite the significant drop in the number of cases, the state of Pará still faces the high number of maternal deaths. Pará went from 173 deaths in 2015 to 92 in 2016, however, it increased to 119 cases in 2017, which means one death every 3 days. In view of this, the State Secretariat of Public Health (SESPA), with the support of the Pan American Health Organization, signed the Pact for the Reduction of Maternal Mortality, with the aim of reducing maternal deaths by 30% only in first year (SESPA, 2019).

The mortality rate was predominant in the age group between 20 and 29 years, as in a study that characterized

the epidemiological profile of maternal deaths in the reference hospital for high-risk pregnancies, without qualifying the total of 47.3% of maternal deaths in the same age group (Menezes, Bezerra, & Bezerra, 2015). This fact can be explained by the fact that it is the peak of reproductive age and represents the period in which women become pregnant due to greater fertility, thus increasing the number of maternal deaths in this age group considered young (Szwarcwald, Escalante, Rabello Neto, Souza Junior, & Victora, 2014).

Other aggravating factors for cases of mortality in this age group may be the higher frequency of family rejection due to pregnancy, the presence of social and economic restrictions, low schooling and absence of previous gynecological consultations, when comparing the older age groups, or those who can increase maternal morbidity and mortality (Passos et al., 2016).

As for race, the highest maternal mortality rate occurred in women of the brown race. This finding is similar to the study carried out by Carvalho et al (2016), who, when characterizing maternal deaths in a northeastern Brazilian municipality, found that 46% of maternal deaths occurred in women of brown race.

Brown women, as well as black women, are more vulnerable to maternal death, due to factors related to biological predisposition to diseases such as hypertension / pre-eclampsia. In addition to the genetic factor, they are the most prevalent breeds in Brazil, mainly in the state of Pará, which has great indigenous and African influence, being

several times related to social inequalities that influence the difficulties that affect women with access to quality health (Botelho, Silva, Tavares, & Lima, 2013; Santos et al., 2017).

When analyzing marital status, it was found that 39% of maternal deaths occurred in single women. The study by Martins & Silva (2018) in Juiz de Fora - MG, also showed a prevalence of deaths in single women with 57.66%. Note that the presence of a partner can bring safety, speed and access to the most effective and efficient health services, avoiding serious complications that can cause death. Thus, the presence of the partner in the pregnancy-puerperal period can be considered a protective factor in reducing maternal morbidity and mortality (Vega, Soares, & Lourenço, 2017).

As in a study conducted in Bahia (43.1%), deaths in the puerperium prevailed, with a total of 101 cases, totaling 71% (Coelho, Andrade, Sena, Costa, & Bittencourt, 2016). The puerperal period is a phase that requires attention from professionals, with primary care being held two postpartum consultations, in which these professionals must check and guide women as to the appearance of signs and symptoms that may indicate complications, such as fever, pain or infection in episiotomy or cesarean section, intense vaginal bleeding, among others (Brasil, 2012).

The place of death, as in the study by Carvalho et al (2016) (78%), was in the hospital environment with 97% of cases of maternal deaths. This study corroborates that the hospital stay of most women occurred less than 24 hours, which indicates a delay in seeking care. Factors such as the precarious functioning of services, together with the presence of incapacity for a correct diagnosis, upon admission, can lead to the evolution of the case to death (Miranda, Botelho, Tsuchiyama, Luz, & Veras, 2019).

Among the main causes of maternal deaths is the Specific Hypertensive Syndrome of Pregnancy (SHEG), which is highly prominent throughout Brazil. A study by Camacho (2017) found greater emphasis on hypertension, a result that contributed to a percentage of 56.60% of maternal deaths from direct obstetric causes (in 2013, 57.78% in 2014 and 60% in 2015). Data from the Ministry of Health also show hemorrhages, infections, complications of hypertensive syndromes and abortion, in addition to thromboembolic problems and anesthetic accidents, comorbidities in maternal deaths (Brazil, 2009).

V. CONCLUSION

In this study it was possible to identify that maternal deaths in the metropolitan region of Belém showed a decrease in cases, however it still has high rates. Most of

the pregnant women who died were between 20 and 29 years old, brown race and single. Most deaths occurred in the hospital during the puerperium, and the cause was related to pregnancy.

The decrease in maternal deaths is directly related to the improvement in living conditions and assistance to women of reproductive age, both in terms of preventing unwanted pregnancies and preventing complications during the period of pregnancy and the puerperium. For this, procedures are needed to reduce cases of maternal deaths based on preventive measures, comprehensive family planning, which causes the occurrence of unwanted pregnancies, adequate prenatal care, qualified staff to assist in obstetric emergencies and with frequent use puerperal.

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Share price Valuation model of Automotive Company in Indonesia

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Abstract— Stock price valuation is a common thing done by a public company that sells its shares on the Stock Exchange or a company that will conduct mergers and acquisitions. This study aims to build a valuation model for automotive companies in Indonesia that trade their shares on the Indonesia Stock Exchange. The design of this study uses proposed sampling data of automotive companies on the Indonesia Stock Exchange. The results of the multivariate price to earnings ratio model showed that return on assets ($P = 0.0081 < 0.5\%$) had a significant effect on price to earnings ratio while the other four variables dividend pay out ratio, cost of debt, debt to equity ratio, and risk (beta) the effect on the price to earnings ratio for automotive companies is less significant. The result of the determination test shows the R-square value = 0.1603 or around 16.03% the stock price is determined by the independent variable used in the study and the rest (83.97%) is determined by other factors this is because the variable used in this study is still purposed sampling of the financial historical data, so that researchers can then do valuations using variables other than those used in this study.

Keywords— Valuation, Free Cash Flow, Price to Earning, undervalued.

I. INTRODUCTION

The automotive market in Indonesia still has a growing potential because motorization rate is still low at level 82 compared to the global average condition which has

reached 187 car units per 1,000 population (OICA: Organization Internationale des Consturctuerus d 'Automobiles, 2015).

Table 1. Growth of Automotive Market (OICA, 2017)

		Rata-Rata Pertumbuhan								2016 vs 2006 (10 years)			
Global		3.4%								1.4 x			
Indonesia		10.0%								3.3 x			
No	Negara	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2016 vs 2006
1	China	7,215,972	8,791,528	9,380,502	13,644,794	18,061,936	18,505,114	19,306,435	21,984,079	23,499,001	24,661,602	28,028,175	388.4%
2	Jepan	5,739,520	5,309,200	5,082,233	4,609,333	4,956,148	4,210,224	5,369,721	5,375,513	5,562,888	5,046,510	4,970,260	86.6%
3	India	1,750,892	1,993,721	1,983,071	2,266,269	3,040,390	3,287,737	3,595,508	3,241,302	3,177,005	3,424,836	3,669,277	209.6%
4	Korea Selatan	1,176,919	1,278,624	1,246,086	1,461,865	1,511,373	1,586,405	1,532,087	1,543,564	1,661,868	1,833,786	1,823,041	154.9%
5	Iran	971,000	1,037,900	1,190,000	1,320,000	1,642,843	1,688,194	1,044,430	804,750	1,287,600	1,222,000	1,448,500	149.2%
6	Australia	962,666	1,049,982	1,012,165	937,328	1,035,574	1,008,437	1,112,032	1,136,227	1,113,230	1,155,408	1,178,133	122.4%
7	Indonesia	318,904	433,341	603,774	486,088	764,710	894,164	1,116,230	1,229,811	1,195,409	1,031,422	1,048,135	328.7%
8	Thailand	674,953	631,181	615,270	548,870	800,357	794,081	1,423,580	1,330,672	881,832	799,632	768,788	113.9%
9	Sudi Arabia	556,100	554,400	540,000	520,000	600,000	590,000	705,000	740,000	828,200	830,100	655,500	117.9%
10	Malaysia	490,748	487,176	548,115	536,905	605,156	600,123	627,753	655,793	666,487	666,677	580,124	118.2%
11	Global	68,347,350	71,557,035	68,308,254	65,562,665	74,958,974	78,157,371	82,116,462	85,594,307	88,325,620	89,707,322	93,905,634	137.4%

This condition makes many brands of vehicles enter to Indonesia market to get the opportunity to enjoy the growth of the automotive market in Indonesia. According to (Joyce

Dargay, Dermot Gately and Martin Sommer, 2015) who examined data based on 1960-2002 in 45 countries projected that vehicles in the world would increase from

800 million units in 2002 to 2 billion units in 2030. GDP per capita also has a relationship with an increase in the number of vehicles (Joyce Dargay, 2015) when income the per capita income is between \$ 3,000, - - \$ 10,000, - the growth of vehicles is almost 2 times the growth of income while income per capita is \$ 10,000 - \$ 20,000 - growth is relatively the same as GDP growth.

Most of the companies on the Indonesia Stock Exchange (around 72%) offer their shares in a condition that is undervalued or lower than its intrinsic value (Paramitha et al., 2014) but other studies (Daljono, 2000), consider that company owners to avoid undervalued because of this will result in the transfer of wealth from the owner to the investor. This research will be interesting because it builds a model that will be used to assess the

stock prices of automotive companies both those already on the Indonesia Stock Exchange and those that will make an initial public offering.

II. MATERIALS AND METHODS

Location and Research Design

This research was conducted in companies listed on the Indonesia Stock Exchange. For this study begins with an analysis of the financial statements of 10 selected companies which are used as samples to determine the variables that will be used in the company's analysis to determine the intrinsic value of shares of automotive companies in the Indonesia Stock Exchange.

Table 2. Automotive Company in Indonesia Stock Exchange

No	Kode Saham	Nama Perusahaan	IPO Date
1	ASII	Astra International Tbk	04-Apr-90
2	AUTO	Astra Otoparts Tbk	15-Jun-98
3	IMAS	Indomobil Sukses Internasional Tbk	19-Sep-93
4	TURI	Tunas Redian Tbk	06-May-95
5	GDYR	Goodyear Indonesia Tbk	01-Dec-80
6	GJTL	Gajah Tunggal Tbk	08-May-90
7	INDS	Indospring Tbk	10-Aug-90
8	MASA	Multistrada Arah Sarana Tbk	09-Jun-05
9	NIPS	Nipress Tbk	24-Jul-91
10	SMSM	Selamat Sempurna Tbk	09-Sep-96

The valuation model used is the valuation of the multivariate regression model of price to earnings ratio (PE) by using 5 independent variables calculated from the financial ratios of 10 automotive companies on the Indonesia Stock Exchange namely proxy risk (BETA), debt to equity ratio, cost of debt, dividend pay-out ratio and operation-return on assets.

Population and Sample

The population is 10 automotive sector companies (Table 2) which are already on the Indonesia Stock Exchange which have automotive related business units both manufacturing, distribution and dealers. The method used

is purposive sampling / non probability sampling method, which means that the selection of 10 companies is done by ignoring the principles of probability, and only looking at the desired elements of existing data and with specific intentions. The selected company is a company that has made an initial offer (IPO) before December 31, 2005 to obtain sample adequacy on valuation using a multivariate regression model.

Data collection for fundamental top down approach analysis is done by retrieving the data of the website of the institution and department related to the automotive industry.

Table 3. Agency Websites and related research departments

Lembaga	Website
Bank Indonesia	www.bi.go.id
Badan Pusat Statistik	www.bps.go.id
Bursa Efek Indonesia	www.idx.co.id
Yahoo Finance	https://finance.yahoo.com

Data on economic growth and projections used are economic growth data issued by the International Monetary Fund (IMF, 2017) and automotive market growth data is taken based on data released by the Organization

Internationale des Constructeurs d'Automobiles (OICA). The collection of sample data of financial statements was taken from the official website of the related company for the period 2006-2016.

Table 4. Website sources of financial statements of automotive companies

Nama Perusahaan	Website
Astra International Tbk	www.astra.co.id
Astra Otoparts Tbk	www.astra-otoparts.com
Indomobil Sukses Internasional Tbk	www.indomobil.com
Tunas Redian Tbk	www.tunasgroup.com
Goodyear Indonesia Tbk	www.goodyear-Indonesia.com
Gajah Tunggal Tbk	www.gt-tires.com
Indospring Tbk	www.indospring.co.id
Multistrada Arah Sarana Tbk	www.multistrada.co.id
Nipress Tbk	www.nipress.com
Selamat Sempurna Tbk	www.smsm.co.id
Bintraco Dharma, Tbk	www.bintracodharma.com

In addition to the financial statements of the related companies researchers also took stock price data at the end of each month from December 2005 to December 2016 (133 data) for each company from <https://finance.yahoo.com>. Financial report data and stock prices that have been collected are then processed using Microsoft excels software to obtain financial ratios used for multivariate regression analysis, namely price to earnings ratio (PE), risk proxy (BETA), debt to equity ratio (DER), interest rate (I_R), dividend pay-out ratio (POR) and operation return on assets (ROA). Characteristics of samples and to assess the relationship of independent variables with PE were processed using Microsoft excels and EViews® 10+. As a comparison, the application of the model was chosen by two automotive companies in the Indonesia Stock Exchange that conducted IPOs in 2015 for the manufacturing sector, namely PT. Garuda Metalindo, Tbk (BOLT) and PT. Bintraco Dharma, Tbk (CARS) for the trade sector.

III. RESULTS

Sample Characteristics

The sample data period from 2006-2016 passed several economic conditions including the global financial crisis in 2008, commodity price boom between 2010-2012 and the decline in commodity prices in 2014. Conditions resulted in some stock returns and earnings being negative during the global financial crisis and when a significant decline in commodity prices. In this condition the researcher eliminated all that resulted in negative price to earnings ratio (PE) from the sample, so that out of 110 samples (10 companies x 11 years) were reduced to 70 samples.

Proxy Risk (BETA) is calculated based on the slope of the value of market return on stock returns of each company based on monthly data in a particular year (Table 9), debt to equity is obtained based on debt and equity data in the year-end balance sheet, the interest rate is calculated based on the interest rate on loans paid in a certain year (in the income statement) to the value of the debt at the end of the year, dividend pay out ratio is obtained from the dividend value paid for a given year (cash flow statement) to the value of earnings (income statement) and operation return on assets is calculated from EBIT value compare to total assets based on the annual report of each company.

Table 5. Variable of Multivariate Regression

No	PE	BETA	DER	D_Int	Pay Out	ROA	No	PE	BETA	DER	D_Int	Pay Out	ROA
1	1,24	1,87	0,98	3,5%	53,4%	8,6%	36	24,21	1,59	0,14	12,0%	87,8%	2,6%
2	1,70	1,79	0,74	3,4%	27,9%	13,4%	37	23,63	1,61	0,10	12,4%	30,0%	3,1%
3	0,46	1,69	0,71	2,2%	34,5%	14,7%	38	0,60	1,49	0,45	6,1%	13,3%	7,6%
4	1,40	2,13	0,54	2,2%	34,7%	14,3%	39	2,58	0,74	0,28	6,5%	55,9%	2,8%
5	1,54	1,54	0,64	1,5%	44,5%	13,0%	40	2,69	0,79	0,07	6,0%	47,9%	3,3%
6	1,68	0,81	0,59	1,6%	46,1%	11,6%	41	28,01	1,51	0,10	15,9%	0,0%	3,4%
7	15,84	1,69	0,63	1,8%	50,3%	10,9%	42	1,77	0,45	1,51	10,4%	0,0%	12,9%
8	14,18	0,67	0,61	1,7%	51,6%	8,7%	43	9,54	1,51	1,10	9,8%	6,3%	12,4%
9	15,67	1,93	0,58	2,0%	53,2%	8,5%	44	14,78	1,36	0,86	9,1%	6,1%	8,7%
10	16,79	1,88	0,56	1,9%	73,2%	7,0%	45	54,59	2,32	1,08	9,3%	78,2%	8,9%
11	22,10	2,11	0,51	2,5%	53,7%	6,7%	46	17,98	2,39	1,13	9,7%	12,3%	7,3%
12	11,18	0,83	2,76	0,5%	119,3%	1,9%	47	6,40	5,84	1,27	10,0%	0,0%	8,4%
13	2,28	1,05	2,55	0,4%	3,9%	5,7%	48	2,83	2,14	0,71	7,9%	0,0%	16,7%
14	1,07	0,81	2,21	0,3%	31,3%	7,3%	49	5,88	1,13	0,33	9,2%	27,0%	12,8%
15	1,96	3,08	0,43	0,4%	75,5%	6,7%	50	7,16	1,13	0,15	11,3%	102,3%	9,3%
16	12,03	2,03	0,37	8,4%	8,3%	12,4%	51	7,20	0,98	0,15	10,0%	41,4%	8,0%
17	10,39	0,69	0,35	6,9%	8,7%	12,6%	52	10,95	2,16	0,13	11,2%	0,0%	3,6%
18	12,35	0,31	0,46	4,7%	9,3%	11,8%	53	6,85	0,15	0,44	8,8%	0,0%	9,1%
19	9,63	1,91	0,43	8,1%	25,8%	5,1%	54	9,67	2,29	0,56	3,7%	3,5%	8,5%
20	13,34	2,04	0,51	6,3%	22,0%	2,2%	55	21,39	0,37	1,32	4,2%	4,3%	6,0%
21	11,50	1,36	0,54	8,0%	23,0%	3,3%	56	0,50	2,51	0,98	4,3%	0,0%	4,2%
22	13,15	0,06	0,39	7,7%	20,2%	9,2%	57	0,29	1,90	1,31	5,4%	0,0%	6,6%
23	8,73	2,82	3,39	4,3%	0,0%	4,1%	58	0,11	0,22	1,12	9,5%	0,0%	9,6%
24	10,88	2,31	0,93	4,5%	4,4%	7,9%	59	6,66	3,37	1,98	6,7%	0,0%	9,6%
25	18,28	0,23	1,51	3,8%	20,3%	6,0%	60	20,60	0,56	1,49	4,7%	0,0%	5,4%
26	25,45	0,51	1,88	4,1%	15,1%	4,3%	61	9,71	0,51	0,71	7,7%	0,0%	6,7%
27	1,53	0,33	0,20	10,1%	31,4%	5,2%	62	1,69	0,60	0,26	9,7%	0,0%	16,1%
28	1,08	1,07	0,15	9,3%	15,3%	10,8%	63	1,38	0,39	0,35	31,2%	31,5%	22,9%
29	0,91	1,22	0,13	6,9%	43,6%	11,3%	64	2,30	2,28	0,33	5,6%	65,0%	20,2%
30	1,11	0,68	0,07	6,4%	30,0%	9,0%	65	2,54	2,18	0,54	8,5%	27,2%	21,4%
31	9,04	2,17	0,08	8,1%	43,0%	10,3%	66	2,87	0,22	0,39	10,3%	24,0%	24,7%
32	12,49	1,76	0,19	6,3%	44,7%	7,5%	67	3,70	0,62	0,44	8,1%	32,3%	25,2%
33	12,99	0,75	0,30	6,0%	27,5%	5,4%	68	4,29	1,41	0,23	11,0%	20,3%	32,4%
34	18,56	0,74	0,03	26,8%	55,4%	4,9%	69	3,60	0,05	0,22	8,1%	16,8%	27,2%
35	23,22	1,56	0,15	6,6%	47,3%	2,5%	70	11,25	0,71	0,10	9,8%	12,7%	29,6%

Source : Calculated by researcher based on financial statement and published share price

Table 6. Return rate to calculate beta

No	Tingkat Pengembalian berdasarkan IHSG dan harga saham 10 perusahaan										
	IHSG	ASII	TURI	IMAS	AUTO	GJTL	GDYR	SMSM	MASA	NIPS	INDS
1	-0.00	-0.06	-0.06	0.32	0.04	-	-0.01	0.27	-	-	-
2	0.08	0.17	-	-0.40	0.02	0.03	0.02	-0.13	-	-	-0.43
3	0.11	0.04	0.16	0.25	0.03	0.08	-0.02	0.15	0.09	0.25	0.40
4	-0.09	-0.18	-0.05	-0.12	-0.03	-0.23	-	-0.03	-0.11	-0.07	0.12
5	-0.01	-0.01	-0.01	-	-0.03	-0.04	-0.16	-	0.06	-	0.13
6	0.03	0.58	0.02	-	0.19	0.04	0.67	0.02	-0.01	-	-
7	0.06	0.16	-	0.06	-0.03	-0.01	-	-	-	-0.14	-
8	0.07	0.12	0.03	-	0.04	0.13	0.01	0.29	-	0.24	-
9	0.03	0.08	0.02	-	-0.03	-	-0.02	0.08	0.14	-	-
10	0.09	0.34	0.11	-	-0.03	-0.07	-0.21	0.04	0.10	-0.23	-0.02
11	0.05	-0.02	-0.03	-	0.16	0.04	0.02	-0.01	-0.02	0.09	-
12	-0.03	-0.05	-0.03	0.09	-0.03	-0.02	-0.03	-0.11	0.02	0.07	-
13	-0.01	-0.05	-0.07	-	-0.04	-0.05	0.13	-	0.02	0.85	0.20
14	0.05	-0.06	0.05	-	-0.04	-0.06	0.19	-	0.07	-0.08	-
15	0.09	0.09	0.15	-	0.07	0.06	0.14	-0.03	-0.06	-0.13	-0.22
16	0.04	0.14	0.18	-0.20	0.07	0.06	-0.03	0.02	0.09	-0.20	0.81
17	0.03	0.03	-0.04	-	-0.02	0.05	0.03	0.02	-0.04	0.09	-
18	0.10	0.35	0.03	-	0.24	-0.02	0.05	-	0.00	0.09	0.07
19	-0.07	-0.05	0.02	0.16	-0.08	-0.11	-0.05	0.18	-0.15	-0.16	-0.27
20	0.08	0.08	0.14	0.27	0.06	0.02	-0.07	0.28	0.12	-0.06	1.56
21	0.12	0.33	0.09	0.67	0.05	0.04	0.09	0.12	0.02	0.17	-0.17
22	0.02	0.04	0.14	-0.22	0.03	-0.10	0.03	-0.03	-0.15	-0.14	0.04
23	0.02	0.09	-0.03	0.20	0.02	-0.01	0.32	0.05	0.10	0.23	0.17
24	-0.04	-0.00	-0.15	-0.16	-0.04	-0.14	0.12	0.15	0.09	-0.35	-0.12
25	0.04	0.02	-0.01	-0.02	0.05	-	0.38	-	0.11	0.17	0.13
26	-0.10	-0.13	-0.02	-	0.01	-0.11	-0.06	0.02	-0.06	-	0.12
27	-0.06	-0.18	-0.08	-	0.07	-0.16	-0.15	0.01	-0.02	-	-0.11
28	0.06	0.05	0.16	-	0.05	0.54	-0.09	0.16	-0.02	-0.22	-0.23
29	-0.04	-0.08	-0.08	0.02	-0.02	-0.13	-0.12	0.11	-0.04	0.98	-0.16
30	-0.02	0.55	0.27	-	0.64	0.02	0.14	0.71	0.09	0.22	0.43
31	-0.06	-0.08	-0.01	-	0.02	-0.08	-0.00	0.07	-0.10	-0.14	0.09
32	-0.15	-0.18	-	-0.06	-0.12	-0.23	-0.05	0.02	-0.11	-0.24	-0.32
33	-0.31	-0.45	-0.30	0.06	-0.36	-0.32	-0.20	-0.20	-0.28	-0.23	0.52
34	-0.01	0.85	0.03	-	0.69	-0.12	-	0.23	-0.04	0.10	-0.19
35	0.09	0.03	0.04	0.02	-0.03	0.23	-0.55	-0.24	0.04	-	0.33
36	-0.02	0.23	-0.29	0.01	-0.09	-0.11	-0.11	-0.46	0.04	-	-0.17
37	-0.04	-0.13	0.15	-	-0.09	-0.03	0.24	-	-0.06	0.01	-
38	0.12	0.26	0.62	-0.25	-0.01	0.14	-0.09	-0.14	0.17	-	-
39	0.20	0.26	0.06	-0.32	0.09	0.02	-0.05	-0.17	-0.06	-0.04	0.42
40	0.11	0.16	0.30	0.20	0.10	0.27	0.03	1.72	0.05	-0.31	-0.21
41	0.06	0.14	-0.02	0.25	-0.09	0.04	0.53	-0.28	0.04	0.75	-
42	0.15	0.63	1.55	-0.05	0.52	0.05	0.20	1.12	0.04	-	0.30
43	0.01	0.03	-0.10	-	0.41	0.05	0.02	0.11	0.11	0.03	-0.07
44	0.05	0.11	-0.03	-	-0.01	0.31	0.02	0.17	0.43	-	0.17
45	-0.04	-0.06	-0.01	-	-0.01	-0.02	-0.02	0.13	-0.06	-0.06	-
46	0.02	0.14	0.03	-	0.20	0.06	0.12	-	-0.13	-	0.07
47	0.05	0.07	0.36	-	-	-0.02	0.01	0.09	-	-0.15	-0.13
48	0.03	0.04	0.09	-	0.13	0.08	-	0.13	-0.04	0.17	-0.15
49	-0.02	0.01	-	-	-0.02	0.24	-	0.28	0.01	-0.15	-0.23
50	0.09	0.16	0.14	-	0.11	0.40	0.33	0.18	0.34	0.17	2.29
51	0.07	0.13	0.30	-0.12	1.04	0.30	0.09	0.03	0.11	0.17	0.07
52	-0.06	-0.08	-0.20	0.03	-0.16	-0.17	-0.06	-0.29	-0.14	-	-0.07
53	0.04	0.12	0.01	0.28	0.07	0.13	-0.04	0.06	-	-0.12	-0.04
54	0.05	0.28	0.16	0.10	0.49	0.29	0.04	-0.01	0.04	-0.09	0.20
55	0.00	-0.06	0.05	2.48	0.06	0.40	-0.01	-0.14	-0.01	0.22	0.46
56	0.14	0.19	0.40	1.46	0.05	0.15	0.01	0.69	0.40	0.71	2.06
57	0.04	0.01	-0.17	-0.26	-0.04	0.17	-0.04	-0.05	-0.11	0.23	-0.04
58	-0.03	-0.01	-0.18	0.01	-0.02	-0.01	-0.12	0.01	-0.02	-0.06	1.24
59	0.05	0.05	-0.09	0.09	-0.14	-	0.15	0.02	0.03	0.03	-0.31
60	-0.08	-0.10	0.03	-0.12	-0.10	-0.01	-0.22	0.08	-0.15	-0.07	-0.07
61	0.02	0.06	-0.03	-	0.08	-0.10	0.04	0.03	-0.02	0.05	-0.08
62	0.06	0.10	-	0.12	0.01	0.09	0.01	0.06	0.22	0.07	0.03
63	0.04	-0.01	-0.02	0.17	0.21	0.04	0.15	0.02	0.06	-0.08	0.18
64	0.00	0.05	-0.02	-0.02	-0.04	0.28	0.03	-	0.37	0.05	0.11
65	0.01	0.34	0.10	-0.05	0.17	0.05	-0.13	0.03	0.15	-0.12	0.43
66	0.06	0.11	0.20	0.53	0.21	0.05	-0.02	0.09	-0.05	0.25	0.15
67	-0.07	-0.06	-0.11	-0.10	-0.05	-0.11	-0.08	0.03	0.04	0.02	-0.25
68	-0.08	-0.04	0.02	-0.04	-0.17	-0.15	-0.02	0.06	-0.05	-0.20	-0.21
69	0.07	0.08	-0.06	0.15	0.08	0.11	-	0.02	-	0.35	0.09
70	-0.02	0.13	-0.02	0.06	-0.03	0.01	-0.02	0.07	-0.05	-0.17	0.05
71	0.03	0.04	-0.02	-0.02	0.06	0.08	0.06	0.14	0.02	0.14	-0.10
72	0.03	0.07	0.18	0.17	0.05	-0.03	0.29	0.24	-	-0.14	0.03
73	0.01	-0.10	-	-0.04	-0.06	-0.05	-	0.02	0.18	-0.01	-0.03
74	0.03	0.04	0.04	0.05	-0.01	-0.03	-0.02	0.03	0.05	0.13	0.18
75	0.01	-0.04	0.05	0.18	0.08	-0.04	-0.08	0.16	-0.08	-0.09	0.39
76	-0.08	-0.09	0.04	-0.10	-0.06	-0.05	0.07	-0.04	-0.12	0.10	0.01
77	0.03	0.33	-0.05	-0.11	0.05	-0.07	-0.07	0.03	0.04	0.06	-0.02
78	0.05	0.02	0.06	-0.13	0.06	0.03	-	-0.01	-0.08	-0.02	0.20
79	-0.02	-0.04	-0.03	-0.07	0.03	0.04	0.20	0.15	-0.15	-0.08	-0.09
80	0.05	0.10	0.08	-	0.04	-0.06	0.06	0.20	-0.02	0.05	-0.01
81	0.02	0.09	0.07	-0.11	-0.01	-0.04	-0.11	0.08	-0.06	0.35	0.07
82	-0.02	-0.09	-0.06	0.03	-0.01	0.01	-0.05	0.05	-0.11	-0.06	-0.07
83	0.01	0.04	0.07	-	-0.07	-	0.03	-0.06	0.28	-0.15	0.04
84	0.03	-0.03	-	-0.02	0.05	0.02	-0.02	0.04	-0.14	-0.01	0.01
85	0.08	0.08	0.01	0.05	0.06	-0.02	0.14	0.05	0.03	0.57	0.12
86	0.03	-0.01	0.02	0.02	0.03	0.14	-	0.01	-	-0.09	-0.05
87	0.02	-0.07	0.09	-0.04	-0.02	0.16	0.23	0.07	0.11	0.35	0.04
88	0.01	-0.04	-0.05	-0.01	0.13	0.11	0.42	-0.06	-0.11	0.11	-0.10
89	-0.05	0.01	-0.07	0.01	-0.03	-0.01	-0.06	0.04	0.07	-0.04	0.19
90	-0.04	-0.07	-0.15	0.01	-0.02	-0.18	0.05	-0.08	-	0.02	-0.13
91	-0.09	-0.07	-0.32	-0.09	-0.04	-0.28	-0.08	0.05	0.04	-0.01	-0.16
92	0.03	0.07	0.08	0.16	0.14	0.24	-0.10	0.17	-0.14	0.28	0.15
93	0.05	0.03	0.04	-0.09	-0.01	-0.01	-0.04	-0.07	0.04	0.51	0.11
94	-0.06	-0.05	-0.02	-0.03	-0.12	-0.22	-	0.42	-0.05	-0.22	-0.07
95	0.00	0.09	-0.04	-0.01	-0.05	-0.07	-	-0.04	0.11	-0.11	0.05
96	0.03	-0.06	0.14	-0.00	-0.08	0.12	-	-0.10	-0.13	-0.08	-0.07
97	0.05	0.08	0.07	0.07	0.07	0.16	-0.03	0.16	-0.04	0.04	0.08
98	0.03	0.06	0.04	-0.00	0.11	-					

Valuation of multivariate regression models

Model estimation results (Table 7) show that 16.03% (coefficient of determination R-square = 0.16028) PE value is affected by proxy risk (BETA), debt to equity ratio, cost of debt, dividend pay-out ratio and operation-return on assets. Those five variables that have a significant effect on

price to earnings ratio are return on assets (P = 0.0081 < 0.05) while the other independent variables have less significant effect (P > 0.05). Regression done with EViews® 10+ with the estimation equation as follows:

$$PE = 13.03 - 1.19 (BETA) - 0.58 (DER) + 1.00 (L_R) + 6.53 (POR) - 45.55 ROA$$

Table 7. Equation estimateion based on multivariate regression of price to earnings ratio (PE)

View	Proc	Object	Print	Name	Freeze	Estimate	Forecast	Stats	Resids
Dependent Variable: PE									
Method: Least Squares									
Date: 06/05/18 Time: 12:52									
Sample: 1 70									
Included observations: 70									
Variable	Coefficient	Std. Error	t-Statistic	Prob.					
C	13.02778	3.974722	3.277657	0.0017					
BETA	-1.186908	2.118936	-0.560143	0.5773					
DER	-0.578620	1.655983	-0.349412	0.7279					
L_R	1.003394	1.031135	0.973097	0.3342					
POR	6.527026	4.347696	1.501261	0.1382					
ROA	-45.54631	16.65038	-2.735452	0.0081					
R-squared	0.160128	Mean dependent var			9.513661				
Adjusted R-squared	0.094513	S.D. dependent var			9.290629				
S.E. of regression	8.840693	Akaike info criterion			7.278424				
Sum squared resid	5002.103	Schwarz criterion			7.471152				
Log likelihood	-248.7448	Hannan-Quinn criter.			7.354978				
F-statistic	2.440413	Durbin-Watson stat			1.425248				
Prob(F-statistic)	0.043592								

IV. DISCUSSION

The results of this study are in line with previous studies which stated that most of the companies on the Indonesia Stock Exchange (around 72%) offered their shares in an undervalued or lower than their intrinsic value (Paramitha et al. 2014). According to the efficient market hypothesis that a valuation can effectively explain the stock price on the exchange if the stock is included in an efficient market. This was explained by Fama (1970) that an efficient exchange is if the value of an asset or stock has reflected all available information, including information that is private.

Valuation of multivariate regression models

The valuation model with multivariate regression is estimated using data from 10 automotive sector public companies on the Indonesia Stock Exchange (Table 1) and the resulting equation must be tested for classical assumptions before being declared feasible to be used as a model for the stock price valuation of automotive companies on the Indonesia Stock Exchange. The results of classical assumptions (linearity, multicollinearity, autocorrelation, normalization, heteroscedasticity) are all fulfilled.

Table 8 shows the results of the linearity-Ramsay Reset Test test showing that the Prob F value (0.1389) is greater than the 0.05 alpha level (5%) so the regression model meets linearity assumptions.

Table 12. Heteroscedasticity Test

View	Proc	Object	Print	Name	Freeze	Estimate	Forecast	Stats	Resids
Heteroskedasticity Test: Breusch-Pagan-Godfrey									
Null hypothesis: Homoskedasticity									
				F-statistic	1.458029	Prob. F(5,64)		0.2160	
				Obs*R-squared	7.158216	Prob. Chi-Square(5)		0.2091	
				Scaled explained SS	22.42609	Prob. Chi-Square(5)		0.0004	
Test Equation:									
Dependent Variable: RESID^2									
Method: Least Squares									
Date: 06/05/18 Time: 13:11									
Sample: 1 70									
Included observations: 70									
Variable		Coefficient		Std. Error		t-Statistic		Prob.	
C		-6.675951		87.15988		-0.076594		0.9392	
BETA		-19.25126		46.46518		-0.414316		0.6800	
DER		22.30419		36.31331		0.614215		0.5413	
I_R		35.12732		22.61128		1.553531		0.1252	
POR		215.3796		95.33866		2.259100		0.0273	
ROA		-103.5506		365.1187		-0.283608		0.7776	
R-squared		0.102260		Mean dependent var				71.45861	
Adjusted R-squared		0.032124		S.D. dependent var				197.0545	
S.E. of regression		193.8636		Akaike info criterion				13.45400	
Sum squared resid		2405318.		Schwarz criterion				13.64673	
Log likelihood		-464.8901		Hannan-Quinn criter.				13.53056	
F-statistic		1.458029		Durbin-Watson stat				1.954329	
Prob(F-statistic)		0.216003							

After the five classical assumptions of this equation are fulfilled, the next test is the model feasibility test, in this case there are three tests to be carried out. First, the F test or model feasibility test (Table 7) shows the prob value. (F-statistic) 0.043592 is smaller than the error rate / error (alpha) 0.05 it can be said that the estimated regression model is feasible. Second, the t test in multiple linear regression is intended to test whether the parameters (regression coefficients and constants) that are supposed to estimate the equation / multiple linear regression model have been the right parameters or not. Right here is the parameter capable of explaining the behavior of independent variables in influencing the dependent variable. The results of the t test are seen in the prob value. t count for ROA 0.0081 < 0.05 means that ROA has a significant effect on the PE value of the automotive industry at 95% confidence level while for other variables prob. t counts greater than 0.05 means that the effect is less significant. Finally, the coefficient of determination explains the variation in the effect of independent variables on the dependent variable. Or it can also be said as a proportion of the influence of all independent variables on the dependent variable. In this study because it uses R-

Squared and Adjusted R-Squared to determine the coefficient of determination, it can be seen that the values of R-Square = 0.16028 and Adjusted R-Squared = 0.094513 means the independent variable [risk (BETA) free variable, Debt to Equity Ratio (DER), Interest Rate (I_R), Dividend Payout Ratio (POR) and Operation-Return on Assets (ROA)] affect the price to earnings ratio of 16.03% and the remaining 84.97% is influenced by other variables not in the regression variable.

Based on the classical assumption testing and also the reliability test of the multivariate regression valuation model, PE estimation equations obtained can be applied to the valuation of automotive companies in the Indonesia Stock Exchange. For this reason, researchers applied the model obtained to assess the initial stock price of two automotive companies that were IPOs in 2015 and 2017. The selected companies represented automotive companies from the manufacturing and trading sectors, namely PT. Garuda Metalindo, Tbk for the manufacturing sector which conducted IPOs on July 7, 2015 and PT. Bintraco Dharma, Tbk for the trade sector which conducted an IPO on April 10, 2017.

Table 13. Calculation of Beta in PT. Garuda Metalindo and PT. Bintraco Dharma

	ASII	TURI	IMAS	AUTO	GJTL	GDYR	SMSM	MASA	NIPS	INDS	Total
Beta	1,51	1,54	0,59	1,12	1,38	0,41	0,92	0,64	0,83	1,53	
Equity (Industri)	139.906	2.823	6.710	10.537	5.848	760	1.581	4.576	843	2.068	175.651
Beta x Equity	211.071	4.345	3.964	11.762	8.057	312	1.454	2.926	702	3.170	247.762
Leverage Beta	1,41										
Debt (Industri)	70.910	1.097	16.538	1.005	7.444	75	157	2.724	595	274	100.819
D/E	0,51	0,39	2,46	0,10	1,27	0,10	0,10	0,60	0,71	0,13	
Unleverage Beta	0,99	D/E (BOLT)		0,08	==>	Leverage Beta (BOLT) =				1,04	
D/E Industri	0,57										
Tax Rate	25,0%	D/E (CARS)		0,51	==>	Leverage Beta (CARS) =				1,36	

Source : Calculated by researcher based on financial statement

PE value for PT. Garuda Metalindo, Tbk obtained by the valuation model obtained in the study 8.5 times the earnings value of 192.3 billion rupiahs and the number of shares of 1.87 billion shares obtained the value of the stock price of Rp 870, -, while the initial stock price

of Rp 750, - For PT. Bintraco Dharma, Tbk PE value obtained from the above model is 10.9 times (Table 5) with an earning value of 245.2 billion rupiah and the number of shares of 1.35 billion shares, the share value of Rp. 1,980, -, while the initial share price of Rp. 1,750, -.

Table 14. Price to Earning Ratio (PE) Variable Calculation

SAHAM	BETA	DER	I_R	POR	ROA	PE
BOLT	1,36	0,51	10,8%	30,0%	5,1%	10,9
CARS	1,04	0,08	13,2%	67,6%	17,1%	8,5

Source : Calculated by researcher based on financial statement

The implementation of the model in the valuation of stock prices in two automotive companies both in the manufacturing and trading sectors showed that both were undervalued, in line with previous studies (Paramitha et al., 2014). Empirical data also shows that stock prices have an

increasing trend compared to the value of their initial share price when hold in the long term (Figure 1 and Figure 2) in accordance with efficient market theory where share prices will follow the information available on the market.

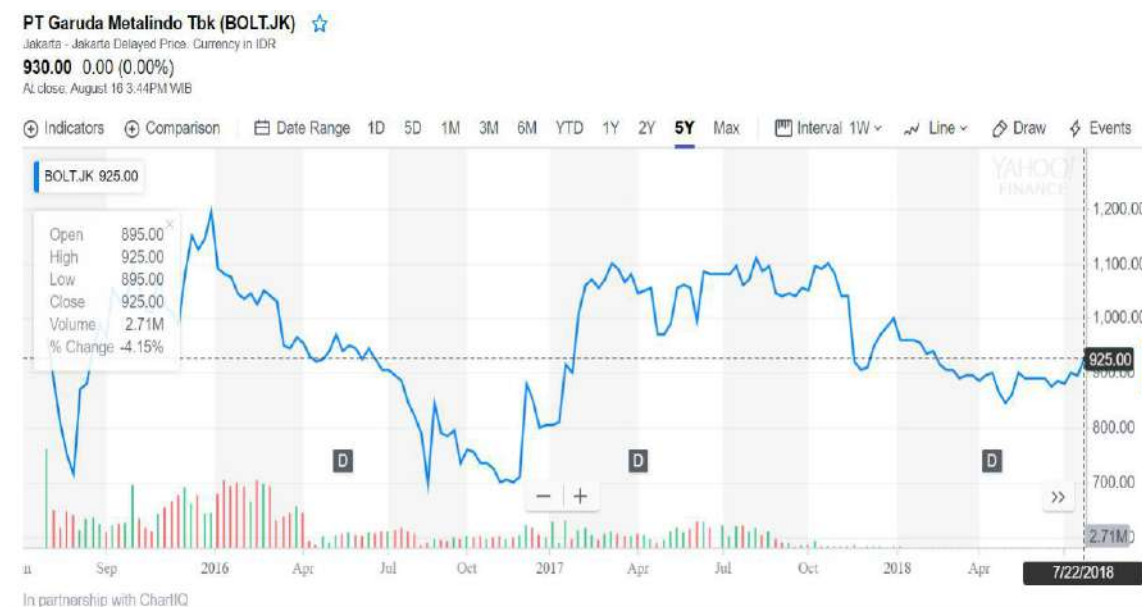


Fig.1: Share Price of PT. Garuda Metalindo, Tbk since IPO

(<https://finance.yahoo.com>)

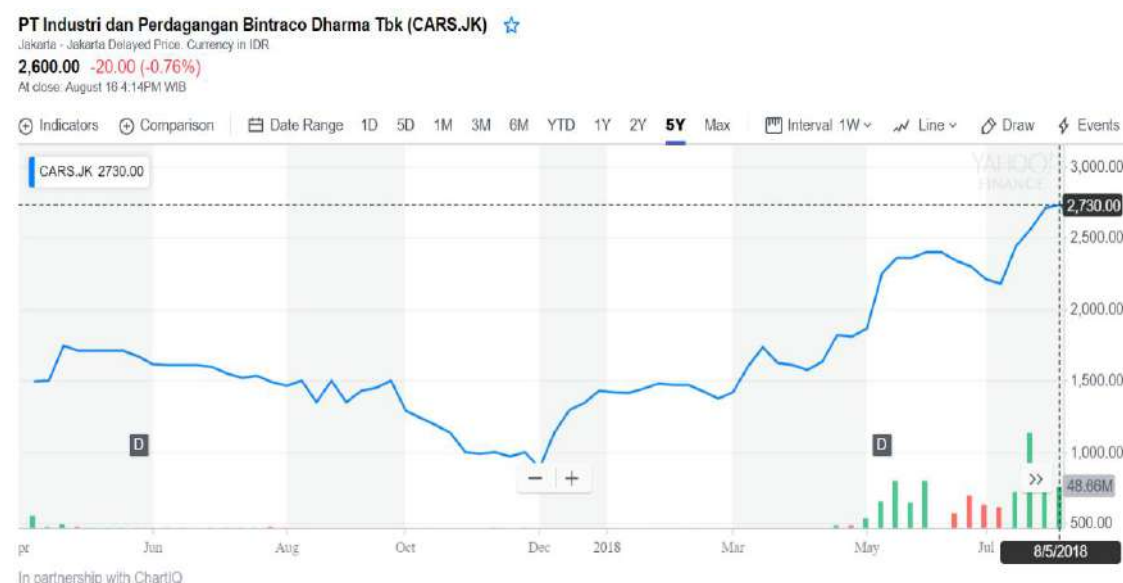


Fig.2: Share Price of PT. Bintraco Dharma, Tbk Since IPO

(<https://finance.yahoo.com>)

V. CONCLUSIONS AND RECOMMENDATIONS

Researchers concluded that the model obtained in this study could be applied in the valuation of automotive companies in the Indonesia Stock Exchange, both automotive company in the manufacturing sector and also the trade sector, because they had met the classical assumption test and the determination test. Based on the independent variables that the researcher uses in this research shows that the level of influence on the estimated value is still relatively low, because the variables used in this study focus on financial statement variables that are influenced by various past factors, so that further researchers can develop using different variables not only variables obtained from financial statements but also external factors that can affect stock prices.

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Indigenous Intercultural Physics Teaching Based on David Ausubel's meaningful Learning theory

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Abstract— This work presents a proposal for implementation of Physics teaching that interacts with culture and the natural phenomena studied by it, based on David Ausubel's Cognitive Theory to aggregate substantial factors to pedagogical facilitation. Therefore, through an educational practice using contextualized material and teaching, whose subjects interact with environment and apply knowledge from daily life, it is possible to understand and interpret from interdisciplinarity and actions not fragmented or mechanic. In other words, developing an accessible and intercultural learning it becomes effective (meaningful).

Keywords— Cognitive theory, Contextualized learning, David Ausubel, Interculturality, Physics teaching.

I. INTRODUCTION

In the state of Bahia, both Physics teaching and indigenous school education are object of research, however the methodology applied at classroom and beyond it lack further deepening. The educational practices developed in indigenous schools of Bahia continue fostering the mechanical learning. This is portrayed by the classical model whose teacher presents the content on the chalk board and the student, in its turn, just copy, in the common attempt to merely memorize to answer a test, memorizing content without any meaning and applying it mechanically to familiar situations and repeated several times, without questions to its relation with the community day-to-day or even on the labour market (practical use).

In indigenous school education of Bahia the most part of Physics Teaching is configured by fragmented actions and out of the daily context and indigenous culture. Unfortunately, it turns to the reproduction of knowledge and expertise imposed by contemporary society through textbooks rooted in cultural or ideological values that do not represent them,

In other words, reproductions that reflect the dominant culture desire of spread knowledge conveniently to a certain reality. They are books that do not show to indigenous students that the Physics studied

by them is derived from an historical building emerged of various cultures. They do not show that, many times, it occurs paradigm break on the science and that evolution of knowledge do not require a culture more important than the other, but that complete each other, because the cultural and social contextualization is relevant to the knowledge development. [1]

It is worth mentioning that it is unquestionable the importance of the textbook on the historical process of school education. However, according to our perspective, its value in the development of indigenous school education request some modification, including with regards to the textbook of Physics, and it is worrisome the lack of contextualization in the indigenous culture in the themes covered. In other words, they do not bring an intercultural perspective of teaching.

[...] Physics teaching in indigenous schools is still characterized by excess of attention given to repeated exercises, problems solved mechanically by a series of formulas, often decorated literally and arbitrary to the detriment of a deeper analysis aiming the comprehension of the involved physical phenomena. [1]

Other major factor observed in the classroom is the lack of context and meaning of Physics Teaching in the student daily, because Physics is being presented just as a mathematical formalism or, many times, through examples that occur only on the big cities. In addition, the language not accessible to the student is a concerning and essential factor, bearing in mind that language has a facilitating role on a meaningful learning.

It is fact that the indigenous teachers claim the elaboration of new curricular proposals applicable to their schools to replace the general model of current educational system. The reason, according to register from RCNEI/MEC (1998), is that “such models never corresponded to their politics interests and pedagogies of their cultures” (p. 11). [2]

Other concerning in Physics Teaching in indigenous schools of Bahia is the lack of proper training of the teacher. It is very common to find teachers teaching Physics in indigenous schools but with degree in Biology, Mathematics, Pedagogy or only Magisterium. [1]

In this context, we bring as issue the possibility of a meaningful learning in Physics by the indigenous student from Bahia. From that issue it is derived specific goals that unfold in analysis of the high school Physics textbook prevailing approach, with regard to the guidelines recommended by RCNEI and its interdisciplinary or intercultural perspective about Physics teaching.

II. CONCEPTIONS ABOUT MEANINGFUL LEARNING

The meaningful learning was influenced by Jean Piaget's Genetic Epistemology Theory which is based on the idea that the knowledge occurs based on an interactive process between the subject and the medium. Piaget searched to understand the capability of knowing and learning of the child, treating the subject as a systematic being always on the search for knowledge, studying the child's thinking and how it is developed still achieve the mature reasoning. [1]

Nonetheless, although Piaget's Theory dwell on the child development and have information about the adult functional learning, when we deal with the learning without any age restriction of the student, we glimpse the theory of Meaningful Learning by David Ausubel as the most suitable to this work.

According to Moreira (2001) [3], Ausubel concentrated himself on a question that any researcher had worried about until that moment: the learning that occurred in the

classroom, valuing the learning by discovery, which incited the lecture as the big focus of his research.

In our conception, Ausubel achieves a fundamental point on the teaching-learning process, on which the individual is the subject of its learning, that depends of its previous knowledge and interactivity with the medium, what cause new meaningful knowledge.

The distinction between Rote Learning and Meaningful Learning is one legacy from the Cognitive Theory of David Ausubel whose application in teaching practice aggregate considerations about the traditional and the focus class, through the search for effective learning. The meaningful learning depends of three essential elements: the new logical structured knowledge and the previous knowledge that can be associated and the comprehension design of the intended knowledge. [3]

The individual's cognitive structure, to Ausubel, is the organized content of ideas that in terms of learning of particular themes and issues, refers to the content organization of that area the individual wants to learn. In other words, the emphasis is given to the ideas acquisition, storage and coordination in the individual's brain. Based on this, we think that the cognitive structure is the set of cultural references that the subject has, since the culture guides the individual's perception and cognition codes, favoring acquisition, organization and anchoring of new knowledge. [1]

In this perception, the individual's cognitive structure to Ausubel (2003) is structured and organized, and the new ideas are articulated according to the relations established between them. Furthermore, it is in the individual's cognitive structure that new ideas and concepts are being fixed and organized gradually, in other words, learned. [4]

According to his theory, the continuous incorporating of new ideas in the individual's cognitive structure provides the learning due to modifications that occurs in that. The apprenticeship can be mechanical or meaningful, in which the meaning factor is the relation that the individual will make with the new proposed idea and the previous knowledge existing in its cognitive structure. In other words, if the new idea is meaningful to the individual, it will occur the meaningful learning, otherwise, it will be a mechanical learning. [3]

However, it is not possible to discuss about meaningful learning without expatiate on comments about rote learning – opposite sides and, unfortunately, it is the most common learning in the indigenous schools, in other words, that one practically without meaning, merely memorial, that serves to a particular purpose, normally a test, that after some time will be deleted, forgotten from the student's cognitive

structure. In this case, the new ideas are not logically and clearly related to the previous knowledge on the student cognitive structure, but they are merely memorized and reproduced, what do not ensure flexibility even longevity on its use. It impairs the learning of Physics by the indigenous student, because on our conception it is so much used by the students because it is still encouraged by the school.

The negative consequence of the rote learning in Physics teaching in indigenous schools of Bahia is that there is not substantivity, so the student is not able to express the new content with a different language from that with which the material was first presented. Therefore, the indigenous student will not be able to connect his culture and community reality with the content presented in the classroom and beyond it. It is worth mentioning that the rote and the meaningful learning are not separated, because they are along a fine. [5]

According to Moreira (2001) [3], the transition from the rote learning to the meaningful learning is not natural or automatic. It is an illusion to think that the student can learn initially on a rote way because at the end of the process the learning will be meaningful. It can occur but it depends of proper subsunctors, student predisposition to learn, potentially meaningful material and teacher's mediation.

III. INTERCULTURAL FACTORS TO PEDAGOGICAL FACILITATION

The substantive factors of pedagogical facilitation, as the name says, are that that promote the action of learning and they are related to selection of the most relevant themes that will be worked with the students. Hence, it is important to select basic ideas not to overburden the students with unnecessary information, hampering the acquisition of a proper cognitive structure. [3]

With regards to intercultural factors associated to Physics Teaching and the Meaningful Learning Theory as a process to pedagogical facilitation, the teacher must associate daily cultural processes of the community as a trigger to the indigenous student. In other words, through their previous knowledge (rituals, cosmology, religious ideas, art and other aspects of life) they will be able to formulate ideas and conceptions to new knowledge through these subsunctors, predisposing them to a meaningful learning. [1]

We believe that human thinking is developed through the lived cultural background. In other words, culture is what characterizes man, and not the man that characterizes

the culture. This conception inserted in school context, production of didactic material and in the community is fundamental to develop the indigenous student thinking and to a meaningful learning.

To David Ausubel (2003) [4], the concepts should be preferably presented to students in a wide format, in other words, from more general ideas to specific ones, because learning by subordination is easier to the individual than by superordination. Therefore, when the concepts are being worked, they will be able to be connected on a subordinated way – when apprenticeship occurs by subordination, the key concepts that are necessary to allow a meaningful learning are denominated subsunctors.

In this respect, when the teacher select general ideas/concepts about certain content linked to the students' cultural context, they will serve as an anchor to future apprenticeships. Otherwise, if the teacher's choice is for unique ideas/concepts, in other words, concepts not associated to their culture, probably it will not be meaningful to them, because it would be missing previous concepts on the cognitive structure of the student. [1]

It is possible to remark that the big and common difficulty presented on the Physics apprenticeship by High School indigenous students is that the teachers link the content taught to examples only from the textbook, that do not bring the indigenous context, in other words, do not portray their culture. Other factor is that there is a lack of proper information of the indigenous and not indigenous teacher at school, as we previously quoted.

IV. MATERIAL AND METHODS

This work was a theoretical-exploratory research that aimed to construct strategies to implementation of an intercultural Physics teaching at Indigenous School of Coroa Vermelha (Escola Indígena de Coroa Vermelha), as well to create proposals of alternative intercultural didactic material buoyed on David Ausubel's Meaningful Learning Theory.

Bibliographic studies were made to characterize the fundamental concepts of Meaningful Learning in diverse contexts of an intercultural epistemological approach, as well as a detailed study of their main characteristics in the indigenous reality.

Next, the studies were centered around a conceptual exploration and use of interculturality to organize the concepts studied in Physics within an alternative model of intercultural education.

V. CONCLUSION

The study brings as a great didactic-conceptual advantage the use of cultural knowledge of indigenous students, in other words, their previous knowledge as subunits to represent and model the main Physics concepts. This is mostly due to the existent capacity for dialogue between indigenous culture and the natural phenomena studied in Physics. The relation of cultural valorization in indigenous context is fundamental to pedagogical practices of the teacher in the classroom as well to the possibility of an alternative intercultural didactic material of Physics.

We believe that the local conceptions, pedagogical practices of the teachers and the process comprehension are crucial to obtain a significant answer from the indigenous students in the classroom and beyond it. Therefore, it is crucial to a meaningful learning of physical processes to High School students the compatibility between didactic material and local context, having as proposal the cultural enhancement of indigenous people in Physics study. At the same time, the relationship between teacher, student and community presented itself as a differential of an intercultural education in the indigenous education process.

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A Review on Stability Improvement with Wall Belt Supported Dual Structural System Using Different Grades of Concrete

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Abstract— In today's modern world tall structures like high-rise buildings, skyscrapers, towers are needed to be safe and stable. To provide stability to tall structures when shear wall is not enough to provide lateral support, therefore wall belt supported system is the one of the best technique to increase the stability of the same. Wall belt supported system is provided at the periphery of the tall structures throughout its height to increase the stability. The current work shows the literature survey of various researchers who have been contributing in this field. Conclusions with the outline of the proposed work are provided at the end of the work.

Keywords— Concrete Grades, Dual System, Stability Improvement, Tall Structures, Wall Belt.

I. INTRODUCTION

The new and the recent techniques with inventions of construction methods are currently in trend and Wall belt supported system is one of them. To increase the stability against lateral loads like wind and seismic loads wall belt supported system is used now a days. It is necessary to used modern construction techniques to improve construction quality and stability of the structure. In modern high rise building construction wall belt supported system is used to improve building stability against lateral loads. There are some examples of lateral loads they are:-

1. Seismic load
2. Wind load

Gravity loads on building:-

1. Snow load
2. Dead load
3. Imposed load

Special loads:-

1. Thermal load
2. Blast load
3. Impact load
4. Settlement load

II. BELT SUPPORTED SYSTEM

The lateral load resisting system is known as the belt supported system in which shear wall belt or truss belt is used. It resists the lateral loads on structure since in this system, the external columns are tied to the shear wall belt at one or more levels. It is the new lateral load resisting method of building construction.

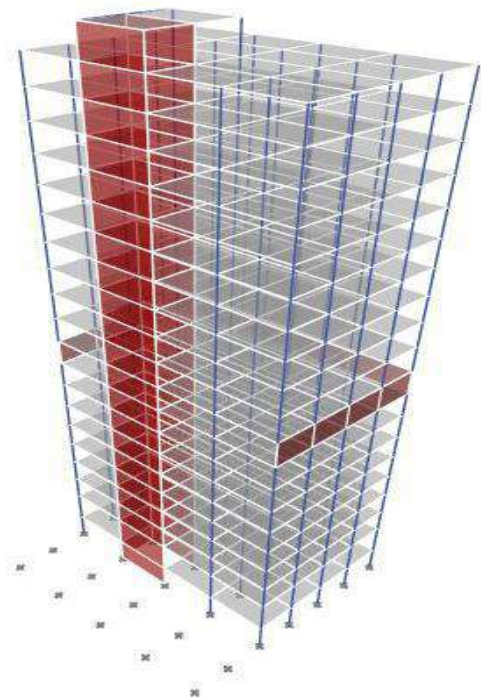


Fig. 1: 3D Sectional View of Belt Supported System

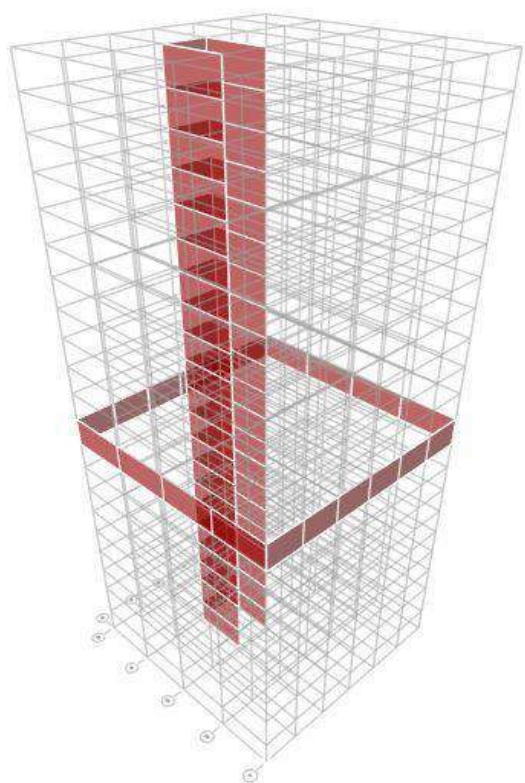


Fig.2: Dual System with Shear Belt

Advantages of belt supported system-

1. It provides more strength to the structure.
2. It provides stability to structure against lateral loads.

III. LITERATURE REVIEW

Due to the increase in the demand of high rise and fascinating structure with vertical & horizontal irregularity, different themes, and increasing height day by day leads to new challenges and requirement of new safety measures. To resist from earthquake and expressly wind effect due to increasing stature as the stiffness of the building is increases with increasing height we need to adopt some preventing structural system. Some of them are bracings, shear wall, outrigger system etc. In this study outrigger system is taken for analysis due the fact that is found the most optimal system for high rise buildings and skyscrapers. In this system the external columns are connected to main inner or outer core by means of outrigger beams at different floors to resist against story drift and rotating action of core due seismic and wind forces. In this study various papers allied to this topic are reviewed in which an enormous work is done in this field earlier. With the help of review of research paper we came to know about the conclusive outcome which forms the

research objectives of our further study (Neeraj Patel et. al.).

The infrastructure building is increasing day by day all over the world and the main material is used in building construction is concrete therefore to reduce the amount of cement in concrete supplementary material are used. These supplementary materials are cheaper than cement. Silica fume is most popular material used in the concrete to improve its compressive, strength. For this purpose silica fume is replaced by 0%, 5%, 7.5%, 12.5%, 15%, 20% & 25% by the weight of cement. Water binder ratio is taken 0.42 for M-25 grade of concrete. Various tests were conducted in the research which showed the results of the same percentage at the different of 0% 5%, 7.5%, 12.5%, 15%, 20% & 25% for the time period of 7, 14, and 28 days curing as a substitution of cement by micro silica on compressive behavior. (Prabhulal Chouhan et. al.)

The use of fly ash in concrete is increasing day by day as a partial replacement of cement. There are mainly three grades of (OPC) cement used in concrete namely 33, 43 and 53.it is commonly used grades of cement in construction industry. It is the comparative study of effects on concrete properties when cement is replaced by fly ash and concrete strength against compressibility, shrinkage and durability were also studied. The results of the test shows that fly ash improve the properties of concrete in all grade of ordinary Portland cement (C. Marthong et. al.).

To reduce the bad effect of lateral loads shear wall is used as structural member and also it provides stability to the structure. This system is made up of R.C.C, timber, masonry, reinforced masonry. This paper shows the study and analysis on shear wall system behavior against lateral loads. Shear wall resist the lateral load on high rise buildings therefore it supports and provide stability to high rise structures (Ms. Priyanka Soni et. al.).

In this present era of high rise buildings and skyscrapers it is obligatory to work on overall shape, plan and structure of building. The building performance under seismic loading is a constraint of various factors comprises of geometry, location and the way of earthquake forces transferred to the ground. The affected zones of higher chances of occurrence of seismic effects with respect to other part of the country may leads to collapse of building under seismic load if they are not provided with and structural strengthening arrangement. However, safety has to be the main criteria when seismic hazard has taken into account in multistoried buildings. In the current study the solution for aforementioned problem is suggested by providing shear wall in a specified ratio with respect to wall area in plan irregularity which helps in resisting lateral

load generated by seismic forces. This paper provides the review of research work previously presented by various researchers which shows the further research option (Prafoolla Thakre et. al.).

The waste materials which can be used as additional cementitious material like fly ash, steel slag, blast furnace, silica fume etc. Silica fume improves the strength of concrete. Now days the good strength and good performance concrete is extensively used in much civil engineering structure. To reduce the amount of cement in concrete supplementary material are used. Silica fume is most popular material used in the concrete to improve its flexural, split tensile strength. For this purpose silica fume is replaced by 0%, 5%, 7.5%, 12.5%, 15%, 20% & 25% by the weight of cement. Water binder ratio is taken 0.42 for M-25 grade of concrete. Various tests were conducted in the research which showed the results of the same percentage at the different of 0% 5%, 7.5%, 12.5%, 15%, 20% & 25% for the time period of 7, 14, and 28 days curing as a substitution of cement by micro silica on Split Tensile Strength and Flexural Strength (Prabhulal Chouhan et. al.).

The concrete is the most used material in infrastructure development around the world. There are many varieties and grades of concrete is researched and developed in laboratories according to the need of specific fields. In this paper an experimental investigation has been done in the area of strength and durability of concrete by replacing fine aggregates by fire bricks and glass powder. And it recommends that fire brick and glass powder can be used in the place of fine aggregate (Tiware Darshita et. al.).

It is observed that stability of the structure depends upon its structural members because they transfer and carry loads and they also connected to each other. In the case of high rise buildings structure height is more therefore they are less stable against lateral loads. Therefore belt supported system and shear core outrigger system is used in G+10 buildings located under seismic zone IV. The Taranath method is used in this paper and total seven numbers of cases has used and compared with each other (Archit Dangi et. al.).

To reduce the overall cost of the project, it is highly recommend reducing the cost in different manner. To make economic structure, the cost cutting should be done in every construction stages. The dual systems in building structure consist of structural walls and moment resisting frames. The walls are made up of RCC, which is a costly material used. The purpose of current study is to explore the reduction in shear wall area in multistorey building to reduce cost. Total 5 buildings framed in Staad pro software

abbreviated as SA, SB, SC, SD, SE supposed to be situated at Seismic Zone III. Post parametric analysis results shows that, the reduction in shear wall area should be adapted to a certain limit up to 20 % for cost cutting (Prafoolla Thakre et. al.).

IV. CONCLUSIONS AND OUTLINE OF THE PROPOSED WORK

To conclude the above literature review, it is found out that it is necessary to introduce stiffness increasing members in tall structures to increase the lateral load handling capacity. Various researches already done till now in terms of stability improvement. Since one side of the current theme is to increase overall stiffness to resist lateral load but the other side is; that it increases overall construction cost. To maintain these two things, wall belt supported system plays a major role. Hence wall belt supported system should be implemented in tall structures.

The upcoming proposed work shows various wall belt stability cases with different grades of concrete with different thickness. The optimum case of stability by comparing all the decided cases of different thickness will be implemented and shown in upcoming papers.

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First Report of *Eriosoma lanigerum* (Hausmann, 1802) (Hemiptera: Aphididae) on the Apple tree Crop in Espirito Santo State, Brazil

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Abstract— The apple tree is affected by a large variety of phytophagous plants. Woolly apple aphid in apple trees, *Eriosoma lanigerum* (Hausmann) (Hemiptera: Aphididae) are from North America. The main host of this insect is the plant *Ulmus americana* L. and the secondary host is the apple tree, where it develops throughout the year. Collects were carried out in pioneer municipalities in the planting of apple trees in the state of Espírito Santo, being cultivated Eva, Gala and Fuji varieties. The collections took place in the municipality of Santa Teresa, Santa Maria de Jetiba and Mantenópolis. Samples were taken at the stages of vegetative development and apple production. In this study, the occurrence of this insect was recorded in apple orchards in the state of Espírito Santo, where the presence of *E. lanigerum* was observed in all the samples, attacking the trunk, new shoots, roots, shoots and fruits between the planting lines.

Keywords— Insect-pest; Introduced species; Aphid; *Ulmus americana* L.

I. INTRODUCTION

The apple (*Malus domestica* Borkh) is the second most produced fruit in the world (Pasa et al., 2012; Ganopoulos et al., 2018). In Brazil, thanks to the favorable climate found in the main fruit producing regions, the crop 2016/17 produced excellent quality fruits, with a production of 1.2 million tons (Kist, 2016).

The apple trees are attacked by various types of arthropod pests (Shoonhoven et al., 2005). The aphids are considered key pests in apple orchards around the world (Beers et al., 2003). Among these pests, stands out the *Eriosoma lanigerum* (Hausmann) (Hemiptera: Aphididae), native to north america and one of the major pests of culture worldwide (Khan et al., 2015; Singh, et al., 2018). The outbreaks of this insect are related to the drop in biological control use to the detriment indiscriminate use of insecticides (Gontijo et al., 2012).

The *E. lanigerum* infestations in apple plants may occur in the root system or in trunks and branches through

lesions, what damages the sprouts and reduces tree growth (Brown et al., 1995; Pringle; Heunis, 2001; Beers et al., 2010). It is an indirect pest when it only weakens the host by feeding on bark and roots, which reduces tree health and prevents the wounds from healing. It is also a direct pest when it infests the central fruit part of some cultivars and can also be a pest during harvest, when the waxy cover of the insect focuses on the clothes of the pickers (Khan et al., 2015).

The studies published so far do not mention the presence of *E. lanigerum* in apple orchards in the Espírito Santo state. Thus, the objective of this paper was to report the occurrence of *E. lanigerum* in apple orchards in the Espírito Santo state.

II. MATERIAL AND METHODS

The survey of the occurrence of outbreaks of populations of *Eriosoma lanigerum* in apple tree culture was carried out from December 2018 to September 2019.

The collections were carried out in pioneer municipalities in the apple tree plantation in the Espírito Santo state, where the varieties Eva, Gala and Fuji were grown. The collections took place in the following localities: municipality of Santa Teresa, (Alto Caldeirão, 19°56'48.50"S, 40°46'18.18" W); municipality of Santa Maria de Jetibá (19°59'25.33" S, 40°42'16.73" W); and municipality of Mantenedópolis (18°51'10.85"S, 41° 3'50.42" W) (Figure 1). Monthly Samples, in the stages of vegetative development and apple production, were realized.

Random collections were performed between the orchard planting lines. The presence of insects was notified by the striking characteristic of the colonies, which are coated with a downy wrap and white. The knots and swellings caused by insects feeding was also a feature used in notification. The collections were performed in all parts of the attacked plants as: trunk, new branches, roots, sprouts and fruits. All infested materials were placed in thermal boxes (44 cm x 25 cm x 37 cm) and sent to the Entomology department of the Núcleo de Desenvolvimento Científico e Tecnológico em Manejo de Pragas e Doenças (NUDEMAFI) of the Universidade Federal do Espírito Santo (UFES). In the laboratory, the materials were carefully placed in 70% alcohol for later identification.

III. RESULTS AND DISCUSSION

After analyzing the materials collected in the three municipalities, it was checked that all samples presented occurrence of *Eriosoma lanigerum*, which confirmed its presence in the Espírito Santo state (Figure 2).

The *E. lanigerum* is a hemimetable insect. Thus, it has the same eating habit for most of his life cycle. The feeding process of this insect induces gall formation along the root length. In the stem, the presence of galls and sap dripping creates attack opportunities of opportunistic fungi (Molinari, 1986; Brown et al., 1991; Heunis; Pringle, 2006). The *E. lanigerum*, for being a hemipter, has the potential to be a vector of some culture-damaging virus. However, it is noteworthy that so far none viruses that harm the apple tree are linked to *E. lanigerum* (Blackman; Eastop, 1994).

The *E. lanigerum* attacks various tree species in the Rosaceae family. It is observed that in the places where it was introduced this species plague, it has a preference for apple trees (Asante, 1994). However, attacks on some other plants in the family can be found.

One of the ways of management of *E. lanigerum*, is the biological control with *Aphelinus mali* (Hald.) (Hymenoptera: Encyrtidae), that parasitizes all development stages of the pest, with preference for third instar nymphs (Muller et al., 1992). The parasitism rate of *A. mali* in the host under study show results above 80%, even at low population density, which demonstrates the harm reduction caused by the plague with the use of the parasitoid (Thakur; Dorga, 1980; Tejada; Rumayor, 1986; Shaw et al., 1996).

In the Espírito Santo state, the introduction of exotic species as: *Duponchelia fovealis* Zeller, 1847 (Lepidoptera: Crambidae); *Helicoverpa armigera* Hübner (Lepidoptera: Noctuidae) and *Daktulosphaira vitifoliae* (Fitch, 1856) (Hemiptera: Phylloxeridae) - was reported by other works, who claimed that these pests have caused great damage to state of the Espírito Santo agriculture (Fornazier et al., 2011; Pratissoli et al., 2015; Madalon et al., 2018). Faced with such fact, the report of the finding of the *E. lanigerum* in capixaba territory is of paramount importance, since the farmers are aware of the negative impacts of the infestation on apple tree productivity by this species, just as farmers adopt management practices to minimize future losses.

IV. FIGURES AND TABLES

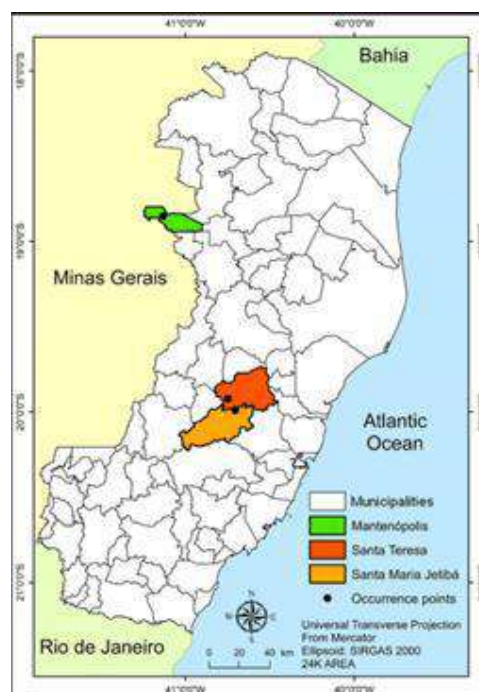


Fig. 1: Municipalities from the Espírito Santo state in which the survey of the occurrence of *Eriosoma lanigerum* was performed.

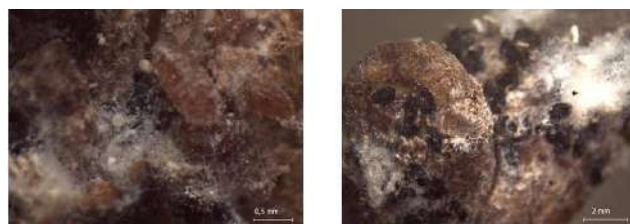


Fig.2. *Eriosoma lanigerum* in apple (left). Swelling caused by *Eriosoma lanigerum* (right).

V. CONCLUSION

All samples showed the occurrence of *Eriosoma lanigerum*, which confirmed its presence in Espírito Santo.

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Need or Altruism: A Study about Ticketing and Staying in the volunteering of the Child Cancer Institute

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Abstract— Volunteer work, in recent years, has been synonymous with citizenship and solidarity, receiving increasing prominence in organized society. Thus, in this article, motivational theories are raised to understand volunteering. This study focuses on volunteers who work at the Instituto do Câncer Infantil (ICI), a non-profit organization that serves children from all over the country. The study aims to identify the reasons for engagement, based on the following hypothesis: in critical situations, do people get involved in voluntary work out of necessity or altruism? The research is exploratory in nature, using the questionnaire technique and, through quantitative analysis, seeks to answer the hypothesis, identifying the reasons for volunteering at ICI. Among the most relevant results of the survey, it was shown that 75.00% of volunteers understand that voluntary work is not something that can be done for their own benefit. It can be seen that 95.00% of these feel the importance of their own volunteer work. It is also noted that 60.00% of the volunteers said that there are personal reasons for exercising voluntary work. And when asked, it is gratifying to see people's satisfaction with their voluntary work, 90.00% said yes.

Keywords— Volunteer work. Motivation. Childhood cancer.

I. INTRODUCTION

The study on voluntary work has been developing widely in recent decades. Living and coexisting with the world has always been challenging in any of the centuries, which is no different in the current context. Complexity and the age of uncertainty are indelible marks. On the one hand, it is possible to perceive daily changes that are imposed by the rapid and uncontrollable advances of scientific circles. On the other hand, due to the so-called spotlight society, organizations are more demanding in matters of ethics and transparency. Thus, child or semi-slave labor is openly discussed, the fight against drug trafficking, the increase in urban violence and many other ailments that, strictly speaking, reflect social inequalities. In this scenario, a new social actor seems to emerge with force: the volunteer.

According to Cimino *et al* (2018), volunteering apparently moves by several factors and has played an important role in building a society that aims at the well-being of all its members, especially those who are in a situation of social vulnerability. To the extent that social

responsibility is an imposition of the new times, it is worth questioning what motivations lead people to engage in voluntary work (CAVALCANTE, 2012).

Currently, volunteering is a necessity for socially responsible organizations and is part of the concept of corporate sustainability. Among the various voluntary institutions that operate in Brazil, one that benefits from this is the Instituto do Câncer Infantil (ICI), the object of the present study.

ICI is one of the largest Latin American institutions in the fight against childhood cancer. It is characterized as a non-profit organization that, since 1990, offers free treatment to hundreds of patients and acts as a research center for the cure of childhood cancer, surpassing the average of 70% of cases. The treatments are carried out at the Hospital de Clínicas de Porto Alegre (HCPA) and, since its foundation, have already exceeded the number of 20,000 services, including, in 2018, the institute provided 3,438 services (INSTITUTO DO CÂNCER INFANTIL, 2019).

This article, by its nature, according to Cervo, Bervian and Da Silva (2007), has in exploratory research, in general, the first step towards the development of the process of raising significant hypotheses. Therefore, this study seeks to answer what motivations are underlying in voluntary activity, based on the hypothesis that there are either particular needs or altruism of people.

Volunteering, in this article, deals with work in extreme situations, since it refers to the treatment of children with cancer - often in a terminal state - that is, situations that tend to cause great emotional weight. In order to achieve the objectives, this article was organized as follows: initially it will deal with the theoretical framework, addressing the origin of voluntary work and motivational theories. Soon after, the methodology will be presented, followed by data analysis and considerations taken from that study.

II. THEORETICAL FRAMEWORK

In this chapter the basic concepts of volunteering and the correlation with the theories that support this article will be presented, one of which is the psychoanalytic motivational theory and the other of the behavioral line.

It appears that, for various reasons, people are engaging with greater intensity in voluntary work. According to Cimino *et al* (2018) and Machado Filho (2011), the practice of volunteering is one of the alternatives for personal and professional development and training, in addition to making people citizens of solidarity and responsible for the common good. Particularly, it is noticed that young people tend to show greater enthusiasm and engagement in voluntary actions.

2.1 VOLUNTEER WORK

Volunteer is any individual who, in a free, disinterested and responsible manner, commits himself, according to his aptitudes and in his free time, to develop voluntary actions on behalf of individuals, families and the community, in need of help in various areas. areas of their lives (FLORES; DIAS, 2009). The volunteer is an idealist, someone who wants nothing concrete or material for himself. According to Cimino *et al* (2018), the aspirations of a volunteer are generally in relation to the next: the satisfaction of contributing to the reduction of suffering or injustice; the realization of bringing joy or contributing to the self-sufficiency of others; feel like an agent that builds your community and work to build a future that coincides with your personal vision and your individual values (CAVALCANTE, 2012).

To act as a volunteer is to have an ideal in doing good, which in a relationship of solidarity is translated into gratuity in the exercise of the activity, providing unpaid services for the benefit of the community. Voluntary action, as stated by Camargo (2002) can only be an informal help to the neighbor, a colleague, an effort to consolidate the community spirit, formal help (through organized social services) and or an opportunity for changes social. And, Flores and Dias (2009) state that the volunteer is an agent of transformation and does not conform to social exclusion, which encompasses many constraints, humiliations, deprivations, unemployment, hunger and homelessness.

However, Perez (2002, p. 47) states that "saying the relationship between volunteering and social changes supposes highlighting the place of civil society actions in a process of change that seeks to bring about social justice and citizenship for all". In Cavalcante's (2012) view, the role of volunteers in institutions needs to be analyzed the scenario, that is, it must be carefully prepared: it is necessary to realize that institutions have history, culture, dynamics and teams that already develop their work.

According to Cimino *et al* (2018), a volunteer is the person who donates his work, his potential and talents in a role that gratifies him in favor of carrying out an action of a social nature. For this reason, being a volunteer "is not just a hobby", or even the action of those who have no other occupation. But yes, "being a volunteer is an ideal of life and involves all dimensions of the human being" (MEISTER, 2003, p. 119).

These people who dedicate themselves to acting voluntarily are ordinary people who need to incorporate a profile focused on the social cause. According to Camargo (2002), "[...], they can work directly with the beneficiaries or work in the administrative areas of the entities, without relating to the target audience".

Availability, empathy, flexibility and responsibility are just a few issues that organizations look for in the volunteer. It is observed, then, that this also constitutes the expected profile of a volunteer candidate when defining competencies, skills and attitudes necessary to work in the Voluntary Service. Therefore, with a view to the future, volunteering must endeavor to keep its own specificity alive within the third sector, preserving ethics and essential goals (humanization, generosity, empathy, personalization, values, etc.) (FLORES; DIAS, 2009).

Many nonprofit organizations still say, "We don't pay volunteers, so we can't demand anything from them ..." Today, a change in attitude is necessary: "Volunteers need to obtain much more satisfaction from their achievements,

precisely because they receive no remuneration". The constant transformation of the volunteer - from well-intentioned amateur to unpaid team member, professional and trained - is the most significant progress in the non-profit sector (CAMARGO, 2002, p.121).

Many volunteers discover other potentials and develop new skills when working outside the company. From this perspective, the decision to work on a voluntary basis has had a decisive impact on the lives of many people, both as volunteers and those who live, especially in poor communities. Managing these people implies having the dimension that the management of human resources has the mission of selecting, training and retaining human talents necessary for the survival, growth and prosperity of organizations. Through these satisfied people who meet the requirements of competences, skills and attitudes necessary for each business, it is possible to guarantee competitiveness and continuity of activities with excellence.

2.1.1 VOLUNTEERING AND THE THIRD SECTOR

According to Binotto *et al* (2016) voluntary work has grown in Brazil and in other developing countries based on its solidarity, in the sense that this process goes through a personal initiative in favor of a community. The basis of the Third Sector's action is volunteering. The expression "volunteering" is often associated with the idea of altruism, solidarity, fraternity and selflessness.

Its execution is carried out not only by people who have better conditions and donate their time and resources to those who are not so favored, but also among equals. Thus, groups such as alcoholics anonymous, neighborhood communities, joint efforts, among others. In addition, together with the concept of volunteering, numerous initiatives originating from both organized civil society and the business field were built (TEODÓSIO; BRUM, 2006; BONFIM, 2010).

According to Dohme (2001) and Binotto *et al* (2016), the volunteer is well informed, participative, questioner, wants to perform his activities in the best possible way. As for the observance of the motivations of volunteering, the issue of donation needs a particular focus, in order to understand the process of exchanging this activity.

According to Bonfim (2010), volunteers are linked to the differential that the Third Sector offers in order to make possible the union of the need to work with the realization of a "citizen life project". The Third Sector also sought to improve itself, aiming at its insertion in this modernized market, becoming a reference with regard to issues related to social responsibility, through the

implementation of new forms of management (DIAS, 2012). The third sector has not become a fad, but has established itself as a new concept of relationship between organizations and society, which highlights the relevance of this sector within communities.

From the understanding of the concept of the third sector, it is possible to verify the importance of its segments and their development in the social context. The definition of the third sector emerged in the first half of the 20th century, in the United States. According to Bonfim (2010), the third sector "would be a mixture of the two classic economic sectors of society: the public, represented by the State, and the private, represented by the entrepreneur in general".

According to Dias (2012), the third sector is characterized by being a set of organizations and private initiatives that aim at the production of public non-profit goods and services. This statement does not mean that this sector does not work with funds and profits. However, their profits are not for the benefit of the founders and creators, but for the main objective of the organization to exist, which would, in the view of Meister (2003), patients, families and children.

Regarding their form of action, the authors Binotto *et al* (2016), say that the third sector integrates the continuity of the actions previously carried out by religious institutions and even today it is prolonged by the action of the different segments of the third sector: NGOs, foundations and non-profit associations (MEISTER, 2003).

2.2 MOTIVATIONAL THEORIES

For the purposes of this article, human motivation will be explained, first, through psychoanalysis, which had Freud as its precursor. When referring to Freud, Da Costa (2011) says that he was "the first to affirm that human nature is driven by a set of internal forces and that his actions are motivated by factors that are not always rational or accessible to consciousness". Therefore, he would have been the first to consider that human motivations are not necessarily conscious (DA COSTA, 2011, p. 22). Ferrari (2010), referring to these motivations, points out that one must think about the actions that lead people to work voluntarily for other human beings. He asks, in such actions, what unconscious motivations are at stake and whether they will be useful and appropriate to those who receive it.

Cavalcante (2012) also points out that voluntary work can occur through the search for something lost, defined in different ways by individuals and groups. It could be time wasted on organizations that have not given them space for something more rewarding; it could be the

desire to live and contribute to the community; or even, the return to forgotten values - hypotheses that require more in-depth analysis to prove them.

Ferrari (2010) says that Birman:

[...] when analyzing the malaise nowadays, he relates the helplessness produced by modernity as a consequence of the rupture with the references of traditional society, with the masochistic and perverse constructions, complementary subjective positions easily evident in our society. (FERRARI, 2010, p. 102).

In masochism, the subject blindly offers himself to the other because he cannot bear to live the anguish of helplessness. The other, although cruel, provides protection against pain and loneliness. Therefore, it can be understood that voluntary movements circulate in a society that has lost its references and has not yet found a substitute to deal with its helplessness. In this way, masochism and perversion can be found in a care relationship (FERRARI, 2010).

Anyway, the great challenge for the volunteer, in his caregiving role, is to break both omnipotence and narcissistic bonds. In addition, he needs to endure the helplessness that will confront him in that relationship, which will refer to his primordial helplessness, painful to be reissued. Such an experience, which is not easy to do, occurs because, in general, volunteers are people who do not have a personal analytical experience (FERRARI, 2010; CAVALCANTE, 2012).

From the perspective of humanism, emphasis will be placed on David McClelland's theory of needs. This, according to Costa (2011), identified that there are three needs that can be acquired socially: power, affiliation and fulfillment. It is through these that, in some way, the individual's behavior at work manifests itself, either negatively or positively, according to the requirements of the position, culture and organizational climate.

The need for power is one in which the individual seeks in some way to exert influence over other people. Affiliation is the imperative to belong and be accepted by the group and to establish social relationships. In people with this need, the perception of feelings, problems and motivations will be more acute. Therefore, they may find it easier to perform functions in which social contact occurs more frequently (CAVALCANTE, 2012).

Already need for achievement deals with the individual's precision in reaching certain goals. According to McClelland, analyzed by Costa (2011), this has its

origins in Protestant ethics, which emphasizes the performance of people in their work. The individual is accomplished in what he does and not for the possible rewards. The need for achievement starts from the hypothesis that people establish a standard of excellence for themselves and, in this sense, are voracious in their performance (COSTA, 2011).

Many volunteers discover other potentials and develop new skills when working outside the company. From this perspective, the decision to work on a voluntary basis has had a decisive impact on the lives of many people - whether volunteers or those who, in one way or another, use their services. In the case of the Instituto do Câncer Infantil, volunteering often occurs for two reasons: personal need (caring for and being close to a loved one) or altruism (love of neighbor).

III. METHODOLOGY

3.1 INTRODUCING THE OBJECT OF STUDY

The sample, in this work, was of non-probabilistic approach for convenience (MALHOTRA, 2012), being applied a questionnaire with dichotomous questions - also called answer between two options: yes and no. The data were quantified in order to obtain frequencies and percentages. The type of research is descriptive, as its purpose is to observe, record, analyze and correlate facts or phenomena. (CERVO, BERVIAN, DA SILVA, 2007). In this phase of the research, questionnaires were applied, which had a structured script, being applied in the months of August and September 2018. The questionnaires were sent by email to the interviewees. Of the 90 (ninety) questionnaires sent, there was a return of 40 (forty) questionnaires. These were applied only to the volunteer public who work at the Instituto do Câncer infantil. This group of chosen volunteers is directly involved with ICI's relatives and patients in various sectors, such as the family assistance center, visitations and festive and recreational activities.

IV. DATA ANALYSIS

In the analysis of the data, the statistical treatment of the data was performed with a computational resource of the *Statistical Package for the Social Sciences* (SPSS). Because the research has a quantitative approach, it facilitated and enabled the use of descriptive and inferential statistical techniques. According to Cooper and Schindler (2011), the quantitative approach allows the precise measurement of something, considered the most important in this regard. The quantitative analysis of the results made it possible to carry out some analyzes and

extract lessons. The results were presented in tables, which allowed an accurate descriptive statistical analysis of the results that were obtained.

4.1 SAMPLE PROFILE

Based on the responses to the questionnaires applied, the following characteristics were identified regarding the profile of the volunteers, as shown in tables one to five.

Table 1: Regarding the gender, gender.

Responses	Researched	Relative Frequency
Female	35	87.50%
Male	5	12.50%
Total	40	100.00%

Source: Prepared by the authors.

With regard to gender, it is observed that the respondents who responded to the survey are represented by 87.50% females and 12.5% males, as illustrated by (Table 1). According to the authors Cimino *et al* (2018), volunteer work begins to have more visibility in Brazil, after the 20th century, from the need for support to the most needy people, especially in relation to the epidemics of various diseases that affected the most vulnerable population. needy. And, at the beginning, this volunteer work was carried out by the female gender, who were mostly ladies of society, who had their participation linked to Catholic clubs and churches.

Table 2: Regarding marital status

Answers	Researched	Relative Frequency
Married	15	37.50%
Divorced	1	2.50%
Others	3	7.50%
Separated	3	7.50%
Single	18	45.00%
Total	40	100.00%

Source: Developed by the authors .

Table 2 shows that, regarding marital status, 45% are single, 37.5% are married, 7.5% are separated and 2.5% are divorced.

Table 3: Regarding the age group

Answers	Researched	Relative Frequency
From 18 to 25 years old	9	22.50%
From 26 to 35 years old	9	22.50%
From 36 to 50 years old	9	22.50%

Over 51 years old	13	32.50%
Total	40	100.00%

Source: Prepared by the authors.

With reference to the age group, it can be seen, in Table 3, that 32.50% of the volunteers are in the age group above 51 years. Followed by 22.50% representing the other age groups (Table 3). Stresses Nogueira-Martins *et al* (2010), through a study carried out in public hospitals, this factor of ages above 50 years is due to the maturity and experiences they have accumulated throughout their lives, a fact that would trigger greater importance voluntary service.

Table 4: Level of education

Answers	Researched	Relative Frequency
Fundamental	2	5.00%
Medium	15	37.50%
Higher	13	32.50%
Postgraduate	10	25.00%
Master's	0	0.00%
Doctoral	0	0.00%
Total	40	100, 00%

Source: Prepared by the authors.

As for the level of education, it is observed that 37.5% have completed high school, followed by higher education, with 32.50%, post-graduation, with 25% and elementary education, with 5% (Table 4).

Table 5: Volunteer time

Answers	Researched	Relative Frequency
Up to 1 year	16	40.00%
Between 2 to 3 years	9	22.50%
Between 4 to 6 years	5	12.50%
Over 7 years	10	25.00%
Total	40	100 , 00%

Source: Prepared by the authors.

With regard to volunteering time, it was found that 40% have up to one year, followed by 25% who have worked for more than seven years, 12.5% who work between four and six years and 22% who work between two to three years, according to (Table 5).

Ferrari (2010) in his studies points out that there is a tendency to abandon voluntary action after a period of involvement. In other words, this data is one of the most

relevant data for the research, because it speaks of the wear and tear, of the discredit of people with the ability to change things. What comes up against the speech of Cimino *et al* (2018), when he says that it is understandable, in voluntary work, especially in these areas of health, which interfere a lot with the emotional, tends to become heavy.

4.2 REASONS FOR ENGAGING IN VOLUNTEER WORK

Based on the responses to the questionnaires, the reasons for involvement / engagement in volunteer work were identified.

Table 6: Do I clearly feel the importance of my work as a volunteer?

Responses	Researched	Relative Frequency
Yes	38	95.00%
No	2	5.00%
Total	40	100.00%

Source: Prepared by the authors.

It is noticed that 95% of the interviewees feel the importance of their voluntary work (Table 6). According to Ferrari (2010), psychoanalysis helps us to think that these people expect to be involved emotionally by their object of care, to be loved and recognized for their dedication. If this does not occur or takes time to be demonstrated, the tendency is to emerge hostile feelings towards the latter, in a defensive psychic movement, which can lead to the abandonment of the volunteer.

Table 7: I am practically not evaluated for what I do in my volunteer work?

Responses	Researched	Relative Frequency
Yes	31	77.50%
No	7	17.50%
Total	40	100.00%

Source: Prepared by the authors.

Table 7 shows that voluntary work for 77.5% of respondents does not receive formal or even informal assessment.

Table 8: Is the integration among the volunteers satisfactory?

Responses	Researched	Relative Frequency
Yes	36	90.00%
No	4	10.00%
Total	40	100.00%

Source: Prepared by the authors.

In the integration factor, it appears that for 90% it occurs among volunteers, as shown in (Table 8). Language, communication and meanings are central to understanding the symbolic universe in which human beings are inserted and with which they have the potential to identify and engage (DA COSTA, 2011).

For Costa (2011), affiliation is a motivational factor that impacts individuals, which may explain the permanence in the work of many volunteers.

Table 9: Do I realize that many volunteers are not committed to the cause?

Responses	Researched	Relative Frequency
Yes	18	45.00%
No	22	55.00%
Total	40	100.00%

Source: Prepared by the authors.

As for commitment, table 9 reports that 55% of the interviewed volunteers perceive that the other volunteers are not committed to the cause and 45% say that there is commitment. Although there is a very small division of opinion, according to Ferrari (2010), the key to deciphering this perception may lie in the unconscious functioning of conflicts and ambiguities.

Table 10: Is the number of new friends that I can win important in volunteering?

Responses	Researched	Relative Frequency
Yes	4	10.00%
No	36	90.00%
Total	40	100.00%

Source: Prepared by the authors.

In the friendship factor, table 10 shows that 90% understand that voluntary work has another meaning in their lives.

Table 11: When volunteering, can I exercise leadership and command over people and work?

Responses	Researched	Relative Frequency
Yes	16	40.00%
No	24	60.00%
Total	40	100.00%

Source: Prepared by the authors.

Table 11 identifies that 60% of respondents say they do not exercise leadership and command.

Table 12: Do you feel the satisfaction of people and family members with your work?

Responses	Researched	Relative Frequency
Yes	36	90.00%
No	4	10.00%
Total	40	100.00%

Source: Prepared by the authors.

As for the satisfaction aspect, table 12 shows that 90% of the interviewees denote receiving recognition and satisfaction from family members. The desire to be recognized is inherent to human beings, since compliments tend to profoundly affect our unconscious (DA COSTA, 2011).

Table 13: Would you like to be more required in voluntary work?

Responses	Researched	Relative Frequency
Yes	23	57.50%
No	17	42.50%
Total	40	100.00%

Source: Prepared by the authors.

In terms of demand, 57.50% revealed that they would like to be able to better exploit their potential and 42.50% stated that they would not like to be demanded (Table 13). It can thus be inferred that there are volunteers who carry out the work within their time and / or skills limitations and others who seek greater responsibilities (CIMINO *et al*, 2018).

Table 14: Is it common to see volunteers who do the work routinely and mechanically?

Responses	Researched	Relative Frequency
Yes	19	47.50%
No	21	52.50%
Total	40	100.00%

Source: Prepared by the authors.

It can be seen in Table 14 that 47.50% of the interviewees said that it is common to see volunteers who do the work in a routine and mechanical way. While, 52.50% understand that they do not.

V. FINAL CONSIDERATIONS

This study aimed to identify the reasons why people get involved or engage in volunteering. According to motivational theories, it was realized that the nature of human motivation is complex and that narcissism is important in self-care. However, the exclusiveness of the

narcissistic axis tends to compromise civilized life. The motivations present in volunteering actions can be altruistic or selfish. Psychoanalysis could not go unnoticed in the face of a movement that grows every day, as is the voluntary movement (FERRARI, 2010).

In this research it was observed that there is no formula for motivation and commitment. Human motivation is a subject widely studied in several areas of knowledge, especially when related to monetary factors and the professional environment. Even so, little can be found about the motivation for voluntary work. The theoretical review allows us to suppose that several factors can be considered motivators of voluntary work, including recognition and love for others.

According to the research result, it was shown that the sample profile was 87.50% females and 12.50% males. Also, the marital status of these interviewees is as follows: 45.00% single, and, because they have no family, it is possible that they have more time to exercise volunteering. It is also observed that 37.50% of these interviewees are married. The predominant age was 32.50%, who said they were over 51 years old. Regarding the level of education, 37.50% of them have high school, 32.50% have higher education and 25.00% have a graduate degree.

Regarding the time of volunteering, 40% of the volunteers who responded to this survey are linked to the ICI for one year, over 7 years; a percentage of 25.00% is added and, between 2 to 3 years, totaled a percentage of 22.50%.

The reasons for engaging in voluntary work that appeared in the survey were as follows: it is clear that volunteers feel important and integrated in ICI and that the preference for the majority is to have the freedom to choose what to do. 95.00% of respondents feel the importance of their own volunteer work. Regarding the integration factor, it was found in the survey that for the vast majority, that is, 90,00% of the interviewees said that the integration is satisfactory. Repeating the same percentage, 90,00% of the interviewees show recognition and satisfaction on the part of family members.

It is also noted that in terms of requirements, the interviewees said, in a percentage of 57,50%, that they would like to be able to better exploit their potential and 42,50%, said that they would not like to be required in the voluntary actions they develop. And finally, the theme of this article was chosen because of its relevance in the current context, since like any organization, ICI needs to have talented, motivated and productive people and, above all, with a voluntary spirit. It is hoped that this study can be

complemented with new research and that it will contribute to ICI in attracting and retaining its volunteers.

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Geotechnical properties of soil reinforced with Shredded Plastic Bottle

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Abstract— The rate at which plastic waste is generated yearly is alarming and proper disposal poses a serious problem. Particularly, recycling ratio of the plastic wastes in life and industry is low and many of them have been reclaimed for the reason of unsuitable ones for incineration. It is necessary to utilize the wastes effectively with technical development in each field.

This study presents a simple way of recycling plastic waste in the field of civil engineering as reinforcing material. Reinforcing of soil in construction is an efficient and reliable technique for improving the strength and stability of soils. The technique is used in a variety of applications, ranging from retaining structures and embankments to subgrade stabilization beneath footings and pavements.

This research experimentally studied the influence of shredded plastic waste on two types of soil (clayey soil and sandy soil) at different mixing ratios (0, 5, 10 & 15)% by weight respectively. For the two types of soils, a series of compaction tests were performed on soil samples mixed with different percentages of waste pieces to determine the maximum dry density (MDD) and optimum moisture content (OMC). In addition, the reinforced samples were investigated by the CBR test to determine its strength, the CBR values at (0, 5, 10 and 15)% were (2.07, 3.08, 3.90 and 5.13)% for clay soil and (32.7, 41.4, 53.94 and 59.88)% for sandy soil respectively.

It was found that, there is significant improvement in the strength of soils due to increase in the percentage of the plastic waste. The percentage of increase in the strength for sandy soil is slightly more than that in clayey soil. Also, it was concluded that the plastic pieces decrease the maximum dry density of the soil due to their low specific gravity and decrease the optimum moisture content.

It can therefore be concluded that plastic waste is a promising soil reinforcement.

Keywords— soil reinforcement, plastic waste, compaction, CBR.

I. INTRODUCTION

The Properties of a soil are very uncertain when it is subjected to variable moisture. It shows huge volumetric change when exposed to dry and wet conditions. These changes create challenges for civil and geotechnical engineers doing work on site specially while constructing foundations either for structural or pavement designs. There are many available methods used to improve the volumetric changes, bearing capacity and reduce the settlement of such soils. One of these methods is using reinforcement. Reinforced soil is a construction material that consists of soil fill strengthened by a variety of tensile inclusions ranging from low-modulus, polymeric materials to relatively stiff, high-strength metallic inclusions. These tensile inclusions come in many forms ranging from strips and grids to discrete fibers and woven

and non-woven fabrics. The soil and reinforcing element will interact by means of frictional resistance. Appropriate selection of the type and location of the reinforcement material is necessary in order to achieve optimum improvement. (Maha Hatem Nsaif, 2013)

Synthetic fibres are made from synthesized polymers of small molecules. The compounds that are used to make these fibers come from raw materials such as petroleum based chemicals or petrochemicals. These materials are polymerized into a long, linear chemical that bond two adjacent carbon atoms. Differing chemical compounds will be used to produce different types of synthetic fibers.

Plastic waste classification

Plastics waste is of two types:

- Pre-use plastic (production scrap)

- Post-use plastic

pre-use plastic

That plastic which does not fulfil the desired requirement during casting and assembly i.e. material that has the mismatching colour, undesirable hardness, or wrong processing characteristics are called Pre-use plastic waste. This material is easy to use for other applications and has the property to get recycled. Pre-use plastic waste is the ultimate source of plastics which are suitable for reprocessing from manufacturers of plastic products. Processing of Pre-used plastic is less as compared to post-use hence Pre-use is more valuable than Post-use plastic.

post-use plastic

Post-use plastic waste suitable for recycling generally falls into one of five main categories:

- Plastic bottles, pots, tubs and trays
- Plastic film
- Rigid plastics, such as crates, pipes and moldings
- Plastic foams, such as expanded polystyrene (EPS)

Flexible plastics, such as strapping and cable sheathing

II. LITERATURE REVIEW

Dr. A.I. Dhatrik et al in 2015 after reviewing performance of plastic waste mixed soil as a geotechnical material observed that for construction of flexible pavement to improve the sub grade soil of pavement using waste plastic bottles chips is an alternative method. In his paper a series of experiments are done on soil mixed with different percentage of plastic (0.5%, 1%, 1.5%, 2 % & 2.5%) to calculate CBR. on the basis of experiments that he concluded using plastic waste strips will improve the soil strength and can be used as sub grade . It is economical and eco-friendly method to dispose waste plastic because there is scarcity of good quality soil for embankments and fills.

Akshat Malhotra and Hadi Ghasemian et al in 2014 studied the effect of HDPE plastic waste on the UCS of soil. In a proportion of 1.5%, 3%, 4.5% and 6% of the weight of dry soil, HDPE plastic (40 micron) waste was added. They concluded that the UCS of black cotton soil increased on addition of plastic waste. When 4.5 % plastic waste mixed with soil strength obtained was 287.32kN/m² which is maximum because for natural soil it was 71.35kN/m².

III. MATERIALS AND METHODS

3.1 Soil sample

1. **Expansive (clay) soil (sample A):** 35kg of representative soil sample was collected from a borrow pit at Fasola – Apapa Road, Moniya, Oyo State, Nigeria; with sample depth of above 1m; Sample was collected and carefully labeled for easy identification. The soil sample employed in this work was a disturbed sample due to mechanical actions.
2. **Loose (sandy) soil (sample B):** 35kg of soil was collected from at The Polytechnic Ibadan (South Campus), Oyo State, Nigeria; with sample depth of above 0.2m; Sample was collected and carefully labeled for easy identification. The soil sample employed in this work was a disturbed sample due to mechanical actions

3.2 Plastic waste material

3. Plastic waste bottles were collected within The Polytechnic, Ibadan vicinity and were shredded to smaller sizes for the purpose of this project.

3.3 Laboratory Tests

Preliminary/ Classification Test

The tests carried out includes:

Natural water content determination: Naturally occurring soils usually contain water as part of their structure. The water content in such soil is referred to as moisture content, moisture content of a soil is assumed to be the amount/quantity of water within the pore space between the soil grains that is removable by oven drying at 105°– 110°C, expressed as a percentage of the mass of dry soil. Measurement of moisture content, both in natural state and under certain defined test conditions, can provide an extremely useful method of classifying cohesive soils and of assessing their engineering properties. The results are referred to as the index properties, or consistency limits.

Grain Size Analysis: This was done to analyse the soil particles according to their aggregate. Soil sample was poured into the Riffle box with the intention of getting an appreciable sample that would contain all particles present in the soil (a small sample that would contain different sizes of particles present in the soil. A handful of sample was collected into the crucible and kept in the oven at a temperature of 105°C for 24 hours so as to remove moisture content in the soil sample. The sample was weighed with the aid of weighing balance (weight of sample before sieving). Consequently, wet sieving was carried out on the sample. The sample was poured/soaked in a tray filled with water and was stirred, washed, sieved with sieve No.200 (75µm) under tap until water became

clean. This was done to remove clay/silt particles finer than sieve No.200. The particles retained in the sieve were collected into the crucible and oven dried for 24 hours to expel moisture present in the sample in preparatory for dry sieving. Dry sieving was accomplished by passing/pouring the particles through assemblage of sieves of various sizes. These sieves were shaken for some time so that each sieve could retain particles not finer than the sieve and the weight of particles retained in each sieve is determined, from where percentage retained and percentage passing were deduced.

Atterberg's limit: This was done to determine the liquid limit, plastic limit, Plastic Index and Shrinkage limit of soil. An appreciable sample of clay soil was poured in a mortar and was grinded with a rubber-headed pestle and also sieved using sieve No.36 (425µm) to separate the pebbles from the fines (pulverization process). Water was added to the fines on a wide glass, mixed thoroughly with the aid of spatula to obtain a paste that was subsequently wrapped with/in polythene nylon, and kept in a crucible for 24 hours so as to allow the paste to swell to its maximum capacity. Consequent upon this, water was added to the paste and mixed thoroughly with spatula. The paste was now placed in a brass cup on the Liquid limit device and levelled to a maximum depth. A long narrow cut (groove) was made along symmetrical axis on the cup. The cup was made to fall on a hard rubber base by turning the handle on the device. The number of blows that closed the groove was first noted between the ranges of 40 – 50 blows. At this point, a small sample or paste was collected along the symmetrical axis on the cup and kept in a can from where weights of wet sample and dry sample were known to determine the moisture content. More water was added and the number of blows that closed the groove was noted at ranges of 30 – 40 blows, 25 – 30 blows, 15 – 25 blows and 10 – 15 blows respectively, and samples were collected to determine their moisture contents. The more the volume of water added, the lesser the number of blows that would close the groove. The sample for shrinkage limit was collected when 18 – 22 blows closed the groove. The sample was used to fill shrinkage limit mould of 12.7cm long and kept in the oven for 24 hours so as to determine linear shrinkage in percentage.

$$\text{Linear shrinkage} = \frac{(P - P')}{P'} \times 100$$

Where P = Original length of mould

P' = New length of sample after oven drying.

The remaining 1/4 of the original soil sample mixed was used for the plastic limit test. The soil sample was further mixed with distilled water until a consistency was reached whereby the soil can be rolled without sticking to the hands. The soil was formed into an ellipsoidal mass, and then rolled between the palm/fingers and the glass plate.

Sufficient pressure was applied to the soil sample to roll the mass into a thread of uniform diameter by using about 90 strokes per minute. (A stroke is one complete motion of the hand forward and back to the starting position.) The thread formed by rolling the soil sample becomes deformed so that its diameter reaches 3.2 mm (1/8 in.). The portions of the crumbled thread were then gathered together and placed into moisture cans, then weighed before they were placed in the oven and allowed to dry for at least twenty (24) hours. The water content from each of the plastic limit moisture cans was calculated. The average of the water contents was used to determine the plastic limit, PL.

Engineering Test

Engineering tests carried out on the samples includes;

Compaction Test: The compaction test used for this research was carried out in accordance with the Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort. This was carried out to determine the Optimum Moisture Content (OMC) and Maximum Dry Density (MDD). Weights of cylindrical moulds were determined using weighing balance. The soil samples was divided into four different portions of about 6kg each. 100ml of water was added to the first portion and mixed thoroughly. Some parts of it were kept in two separate cans to determine weight of wet sample and weight of dry sample after spending 24 hours in the oven in order to know its moisture content. The first layer of a 3- layer cylindrical mould was filled with the sample and rammed 27 times with the aid of 4.5kg rammer. The same was done on the rest layers and rammed 27 times each. The weight of compacted wet sample was determined using weighing balance and wet density calculated thereof as shown in below. The same procedures were followed for remaining four portions but with increment of 100ml of water on each portion from the first 100ml. That is, 200ml, 300ml, 400ml and 500ml of water respectively.

$$\% \text{ MOISTURE} = \frac{\text{WEIGHT OF MOISTURE}}{\text{WEIGHT OF DRY SAMPLE}} \times 100$$

$$\text{DRY DENSITY} = \frac{\text{WET DENSITY} * 100}{\% \text{ MOISTURE CONTENT} + 100}$$

California bearing ratio (CBR): This was carried out to estimate the bearing capacity of the soil using the California Bearing Ratio (CBR) Machine. The dry soil mixed with the shredded plastic waste, water was added based on the OMC and then placed into the mould and compacted in 3- layers with the 4.5kg rammer of 27 blows. The compacted sample was placed on the California Bearing Ratio (CBR) machine. The proofing ring gauge and plunger

penetration gauge were set at zero. Immediately the plunger penetration made a contact with the soil, the gauges started working simultaneously and, the readings were taken on the proofing ring gauge at every 25 division on the plunger penetration gauge. The first 10 readings were referred to as first pointer and the 10th reading being the correct reading was adopted and multiplied with a multiplication factor of 0.18 while the last 10 readings were referred to as second pointer, and so also, the 20th reading was adopted and multiplied with a multiplication factor of 0.12. The test was done on both

top and bottom of the compacted wet soil. The higher of the two values was chosen as actual CBR. The average of the top and bottom was however the actual final CBR value.

IV. RESULTS AND DISCUSSION

4.1 Natural Moisture Content

Sample A retains more water than sample B given by the values 26% and 6% respectively. This shows that sample A contains more silty clay than sample B.

4.2 Particle Size Analysis

The particle size distribution analysis shows not only the range of particle sizes present in a soil but also the type of distribution of various size particles.

According to clause 6201 of Federal Ministry of Works and Housing (F.M.W & H) Specification Requirement, for a sample to be used as both subgrade/fill and base, the percentage by weight passing the No.200 sieve (75µm) shall be less than but not greater than 35%.

Sequel to the above, the sample A is not a good sample because percentages by weight passing sieve No. 200 exceed 35% requirement, while sample B is good sample because it does not exceed 35% requirement.

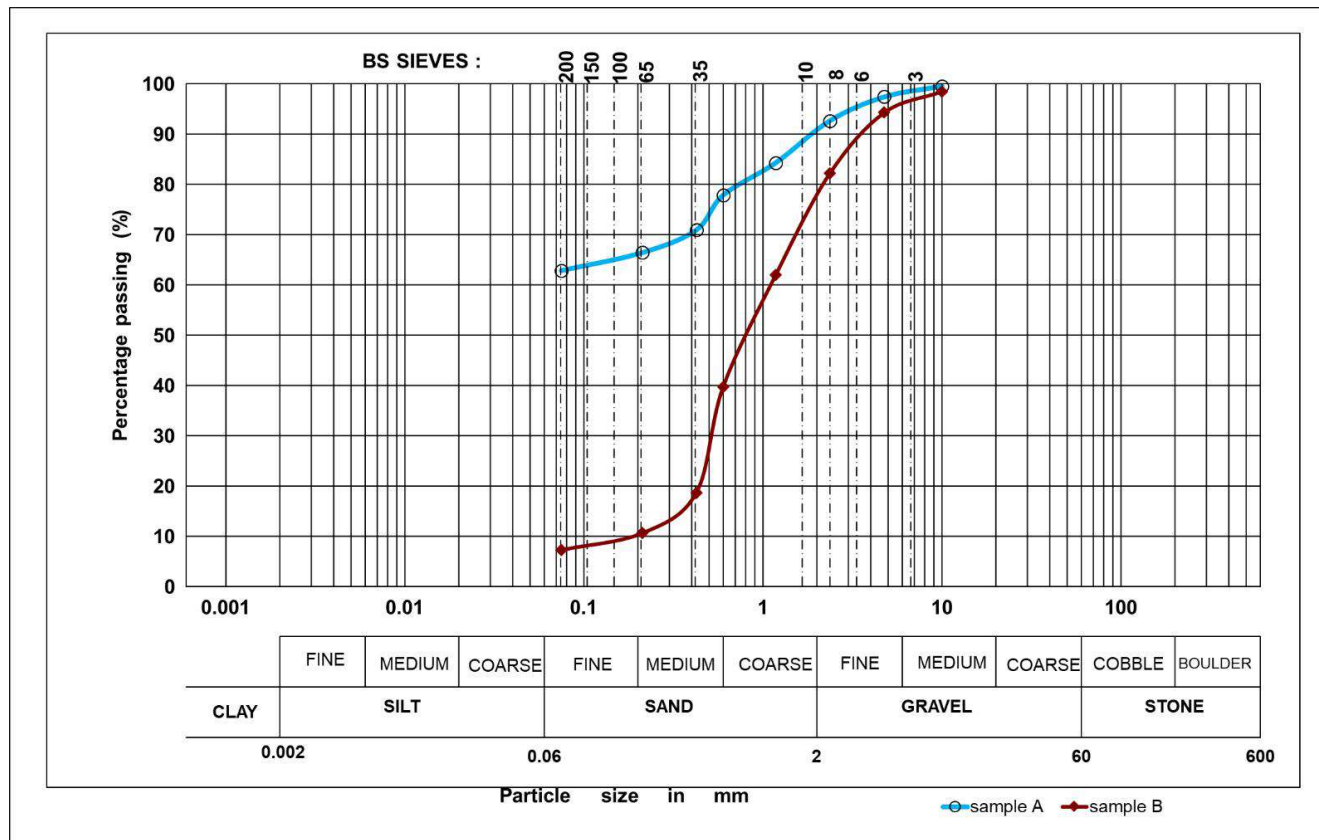


Fig 1: Particle size curve for sample A and B

4.3 Atterberg's limit

It is obvious from the results that sample A absorbs more water and swells on drying which is evident in the result of Linear Shrinkage and Plastic index. It can be said to be more clayey/plastic than subgrade samples.

According to Federal Ministry of Works and Housing (F.M.W & H) Specification Requirement in clauses 6201 and 6252, material passing the 425 μ m sieve shall have a liquid limit of not more than 35% and a Plastic Index (P.I) of not more than 12% as determined by American Society for Testing Materials Method.

In view of the above, subgrade samples are fit to be used in road construction since both their Liquid limits and

Plastic Index values do not exceed the stipulated values of 35% and 12% respectively. The base sample is not suitable for the purpose for which it was used, since it shows Liquid Limit and Plastic Index of 48% and 25% which do not fall within the stipulated values of 35% and 12% for Liquid Limit and Plastic Index respectively.

4.4 Compaction Test

The table and the figure below shows the result of the compaction test carried out in this project. The compact test helps in determining the Optimum Moisture Content (OMC) and the Maximum Dry Density (MDD).

Table 1: Compaction result for both soil samples

	1	2	3	4	5	6
CLAY SAMPLE						
Average moisture content %	9.81	14.33	15.83	19.28	23.18	25.43
Dry density (Mg/m ³)	1.34	1.36	1.46	1.58	1.58	1.50
SANDY SAMPLE						
Average moisture content %	6.57	10.40	13.22	16.36	19.84	22.36
Dry density (Mg/m ³)	1.75	1.79	1.83	1.85	1.83	1.76

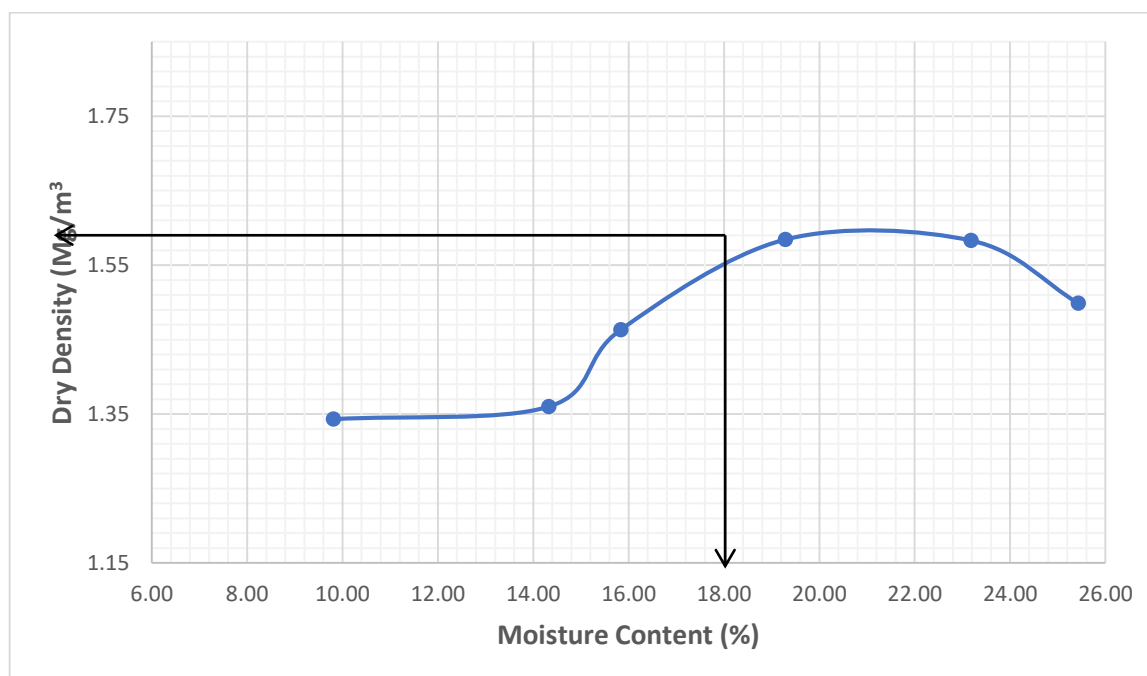


Fig.2: Graph of Dry density against Moisture Content for clayey Sample

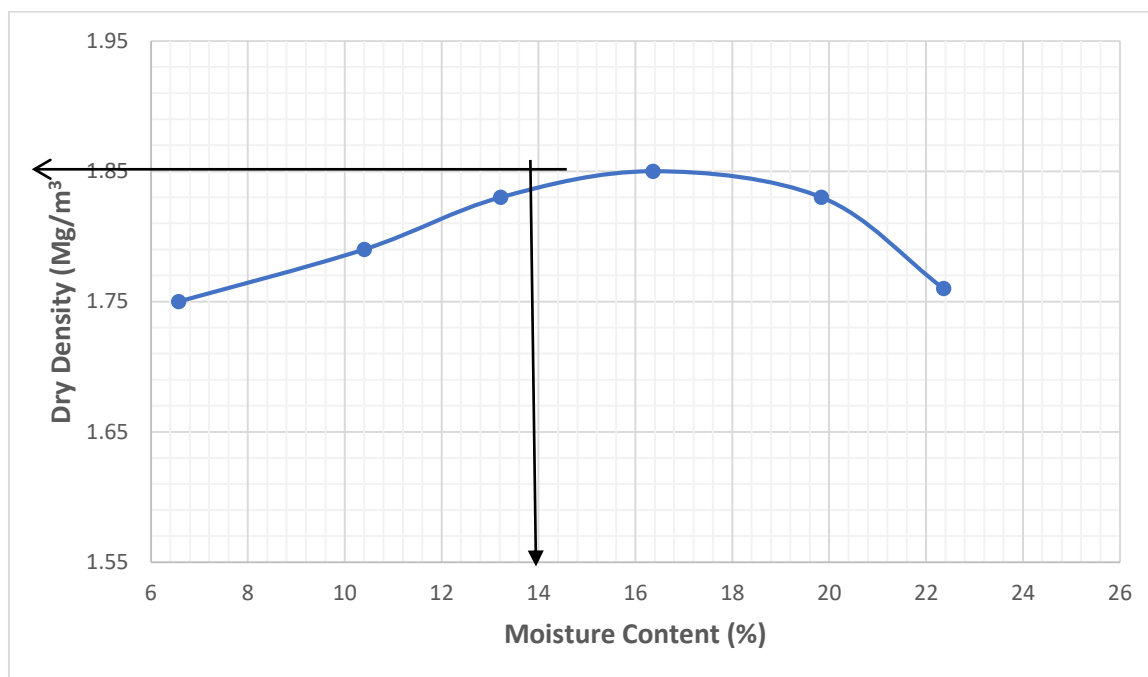


Fig.3: Graph of Dry density against Moisture Content for Sandy Sample

3.5 California bearing ratio (CBR)

According to clause 6201 of Federal Ministry of Works and Housing (F.M.W & H) Specification Requirement, the minimum strength of subgrade and sub-base material shall not be less than 20% and 50% un-soaked C.B.R respectively.

In light of the above, clay sample is a very poor subgrade material because it exhibits un-soaked CBR of 2.07% as control and (3.03, 3.90 and 5.13)% with the inclusion of

shredded plastic waste at (5, 10 and 15)% which is less than the stipulated 20%. The sandy sample is a very good subgrade and sub-base material because it exhibit un-soaked CBR value of 32.7% as control and (41.4%, 53.94 %,and 59.88%) with the inclusion of shredded plastic waste at (5, 10 and 15)% which is close to what is stipulated in the specification. Based on this, sandy sample is better than the clay sample as a subgrade and sub-base material for the construction of the road which is evident in their CBR values.

Table 2: CBR Value for both samples

Dosage of shredded plastic bottle (%)	clayey sample (%)	sandy sample (%)
0	2.07	32.7
5	3.03	41.4
10	3.90	53.94
15	5.13	59.88

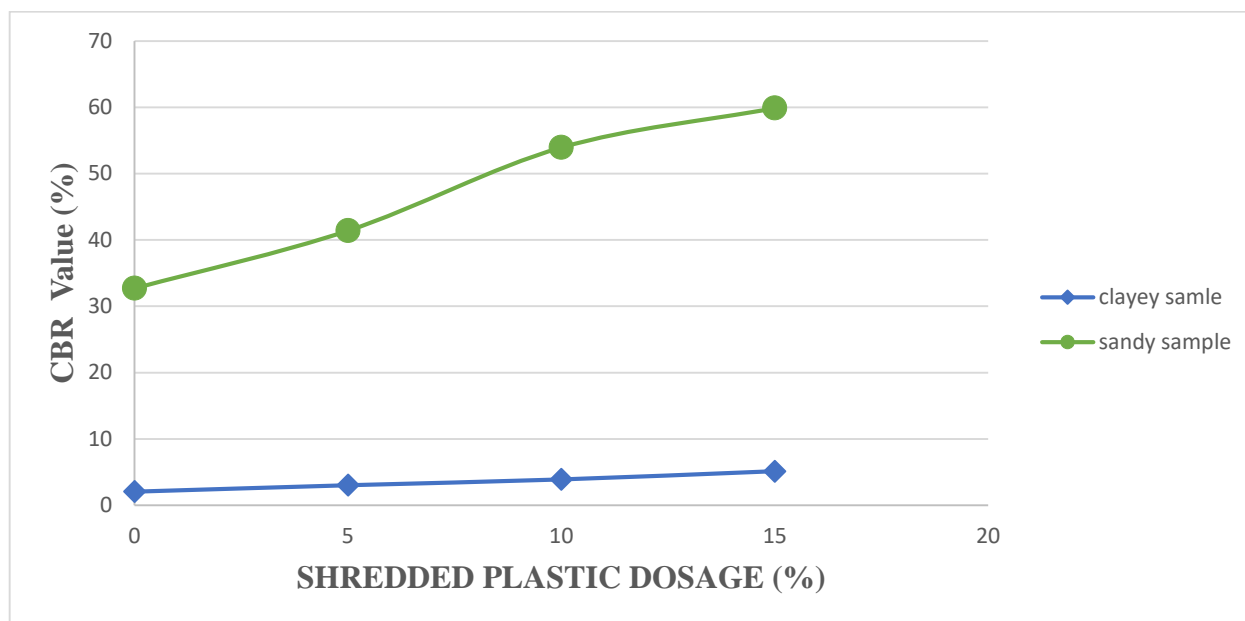


Fig.3: CBR Value against Shredded plastic Dosage for both sample

V. CONCLUSION

This research work examined the geotechnical properties of clayey and sandy soil reinforced with synthetic fibre {shredded plastic bottle}. The following were observed during the course of the practical aspect of the project:

1. The effect of plastic waste pieces on soil is influenced by various factors such as soil type and plastic waste content.
2. The addition of plastic pieces to the two types of soil increased the CBR values of both soil. However, significant increase was observed in CBR values of sandy soil.
3. The increment for clayey soil does not make it relevant in Engineering and Geotechnical world i.e for construction purpose based on the research result.
4. The plastic pieces decrease the maximum dry unit weight of the soil and optimum moisture content. The variation of optimum water content and maximum dry unit weight with plastic pieces content is linear.

VI. RECOMMENDATION

Based on the investigations of the study, the following recommendations are proffered;

1. It is recommended that shredded plastic material is a potential soil reinforcing material.
2. There is need to investigate more on the effect of higher percentage of plastic material on the

soil sample to determine optimum yield/performance.

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Application of Artificial Intelligence: A Review

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Abstract— Industry 4.0 is the modern demand and revolution to get more accuracy, desired shape, and quality with a less manpower in the industry by following advance technology like Artificial Intelligence (AI), Internet of Things (IoT). This rebellion was started from Germany and still continuing to get the modernized application of industry. Artificial Intelligence (Robot) is one of the advance applications in the modern industry. Nowadays, AI is a very popular field of science. Humans are using Artificial Intelligence in places where it is difficult and dangerous for a human to work. On the other hand, some people are trying to make Artificially Intelligent robots, which would be able to think like a human. Trying to replace the need for men, which is very dangerous because this act can result in the extinction of human civilization because Artificial Intelligence already has greater computational ability. This trying to make like a human or trying to imitate human's decision is also not accurate because human do not know how human thoughts work completely. Artificial Intelligence as technology has achieved many unthinkable developments, which is helping the human race to become more prosperous. However, it is affecting the morals and norms of humans also. People are becoming more dependent on AI. This paper aims to study various developments and achievements of Artificial Intelligence and discussed in the view of their positive and negative impacts on our life.

Keywords— Artificial Intelligence; Artificial neural network; Personal Computer; Artificial general knowledge.

I. INTRODUCTION

Artificial Intelligence is an intelligent machine or program, which can take decisions on its own by analyzing the circumstances, without human involvement. Major AI researchers and textbooks define this field as "the study and design of intelligent agents", in which an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success. John McCarthy, who coined the term in 1955, defines it as "the science and engineering of making intelligent machines" [1].

Artificial Intelligence has been a great tool for solving critical problems and for working in conditions and situations where the work is too dangerous for humans. For example, Repetitive works in many industries are injurious for humans to do with high speed. However, it is needed to be done and done faster to help the company's work. In this kind of conflicting situations, Artificial Intelligence is used [1,2]. Artificially Intelligent Robots can do the same repetitive work at very high speed without any accumulated stress. Similarly, if a human does the same work, then because of the repetitive movements human might become injured for a lifetime. His hands or legs might become paralyzed or his hearing ability might

decrease depending on the nature of work he does [3]. In some cases, the computational capability of Artificial Intelligence is used to aid humanity in various programs and services. Like various programs which run sequences and thus complete a process [4].

There are some effects of using this Artificial Intelligence. Since Artificial Intelligence is making things easier and doing some of our hard works, humans are relying more on Artificial Intelligence. Moreover, because of using Artificial Intelligence more there is less work opportunity for human. Since Artificial Intelligent Robots can do repetitive work with great speed and no fatigue which man cannot do in most cases, so Artificial Intelligence is preferred. Rather, this dependency on Artificial Intelligence is creating some unemployment [5,6].

1.1 Definition

Artificial Intelligent (AI) is a zone of software engineering that manages to enable machines to appear as like as human insight. It can be defined as the intensity of a machine to duplicate the intelligence of human conduct [7].

The expression AI (Artificial intelligence) was started at the 1956 Dartmouth meeting. The most part

acknowledged definition is the Turing test, first proposed in 1950, as the capacity of a machine conveying regular language over a teletype to an individual person to build a trust that it was a human. "AGI" or "Artificial General knowledge" stretches out this plan to expect machines to do everything that humans can do, for example, get pictures, explore a robot, perceive and react properly to outward appearances, recognize music kinds, etc [8].

Artificial Intelligence (AI) is the field inside software engineering that looks to disclose and to copy, through mechanical or computational procedures, a few or all parts of human intelligence. Included among these parts of intelligence is the capacity to connect with nature through tangible methods and the capacity to settle on choices in unanticipated conditions without human intercession [9]. Average regions of research in AI incorporate game playing, characteristic language realization and synthesis, PC vision, critical thinking, learning, and robotics [8, 9].

The above is a general depiction of the field; there is no endless supply of man-made consciousness, basically in light of the fact that there is little understanding regarding what comprises intelligence. Interpretation of being shrewd to differ, yet most can be ordered in one of three different ways. Intelligence can be thought of as a quality, a separately held property that is divisible from every single other property of the human individual [10]. Knowledge is additionally found in the capacities one performs, in activities or the capacity to do certain assignments. At long last, a few scientists consider intelligence to be a quality that must be obtained and showed through association with other intelligent beings. Every one of these understandings of knowledge has been utilized as the premise of a way to deal with creating PC programs with keen attributes.

II. BACKGROUND & IMPORTANCE AI

Artificial Intelligence has been used as a very useful tool in many cases. Starting from heavy industries, computational works, hospitals up to games and toys in every sector Artificial Intelligence has become a part and parcel. Some of the fields which use AI (Artificial Intelligence) are discussed below. Figure 1 shows the various application of AI.

2.1 Industries

In industries, AI agents are used very frequently nowadays. Most of the car manufacturing companies use robots extensively. Robots are used successfully in many situations where it is considered dangerous and degrading for human. Robots are also very expert at repetitive works

in which sudden lapse of concentration can cause damage and/or accidents [11].

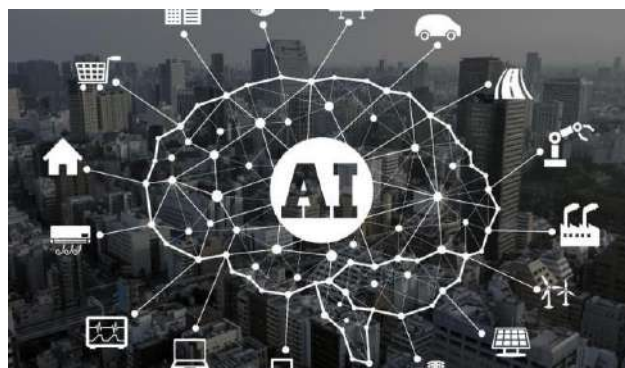


Fig. 1: Different applications of artificial intelligence [11]

2.2 Transportation

Fuzzy Logic controllers have been produced for programmed gearboxes in cars. For instance, the 2006 Audi TT, VW Toureg, and VW Caravell include the DSP transmission which uses Fuzzy Logic. Various Škoda variations (Škoda Fabia) additionally right now incorporate a Fuzzy Logic-based controller. Additionally, Google Car that is driven consequently with no driver is a miracle of AI use as of late [12, 13].

2.3 Finance

The use of AI in banking can be followed back to 1987 when the Security Pacific National Bank in USA set-up a Fraud Prevention Task power to counter the unapproved utilization of debit cards. Applications like Kasisito and Money stream are utilizing AI in budgetary administrations Banks utilize artificial intelligence frameworks to sort out tasks, put resources into stocks, and oversea properties. In August 2001, robots beat people in simulated money related exchanging competition [14].

Budgetary establishments have since quite a while ago utilized counterfeit neural system frameworks to identify charges or claims outside of the standard, hailing these for human inspection.

2.4 Hospital and Medicine

An MC can use the AI system to sort out bed plans, make a staff turn, and give therapeutic data and other significant undertakings. Artificial neural systems are utilized as clinical choice emotionally supportive networks for therapeutic analysis, for example, in Concept Processing technology in EMR programming software [15].

- Different shops in medication that can possibly be performed by AI include:

- Computer-helped elucidation of restorative pictures. Such frameworks help check computerized pictures, for example from processed tomography, for regular appearances and to feature prominent segments, for example, potential infections. A normal application is the identification of a tumor.
- Heart sound test
- Watson's task in where the utilization of AI in this field is Q/A program that proposes for specialists of cancer patients.

2.5 Online and Telephone Customer Service:

Artificial Network is actuated in computerized online associates that can be viewed as symbols on web pages. It can profit for endeavors to diminish their activity and preparing cost. A significant fundamental innovation in such frameworks is natural language preparation [16].

Comparable procedures might be utilized in answering mail of call focuses. For example, speech acknowledgment programming to enable PCs to deal with the first degree of client assistance, content mining and characteristic language preparing to permit better client taking care of, specialist preparing via programmed mining of best practices from past connections, bolster computerization and numerous different advancements to improve operator profitability and consumer loyalty.

Numerous media communications organizations utilize experimental inquiry in the administration of their workforces, for example, BT Group has sent heuristic pursuit in a booking application that gives the work routines of 20,000 engineers [17].

2.6 Music

The development of music has consistently been influenced by technology. With AI, researchers are attempting to cause the PC to copy the exercises of the adroit musician. Structure, execution, music theory, sound handling are a portion of the significant territories on which research in Music and Artificial Intelligence are centering. Among these endeavors, Melomics seems to go ahead by powering PC authors that figure out how to make the manner in which people do [18].

2.7 Aeronautics

The Air Operations Division (AOD) utilizes AI for the standard-based master frameworks. The AOD has a use for artificial intelligence for surrogate administrators for battle and preparing the system test, mission guides, emotionally supportive networks for strategic basic leadership, and post

handling of the test system information into symbolic gist's [19].

III. MERITS OF USING AI

Using Artificial Intelligence certainly has many merits. They are not corrupted like humans. They are not biased in their decisions. They are good at repetitive work. They are not lazy and certainly do not look for time to rest. They can be controlled better than humans in most cases. This acclaim for AI continues endlessly. An idealistic perspective on utilizing robotized vehicles can be considered. The positive effect of having intelligent vehicles would be massive. Consider the potential biological investment funds of utilizing interstates a great deal more productively as opposed to clearing over farmland. There is the wellbeing part of lessening the yearly road accident on the streets: it is assessed that 1.2 million individuals are killed, and in excess of 50 million are injured due to road accidents every year around the world [20]. Other than the subsequent decrease in accidents, there could be up to multiple times the traffic throughput. Old and disabled people would have the option to get around without anyone else. Individuals could dispatch their vehicles to the parking center self-sufficiently and afterward review them later.

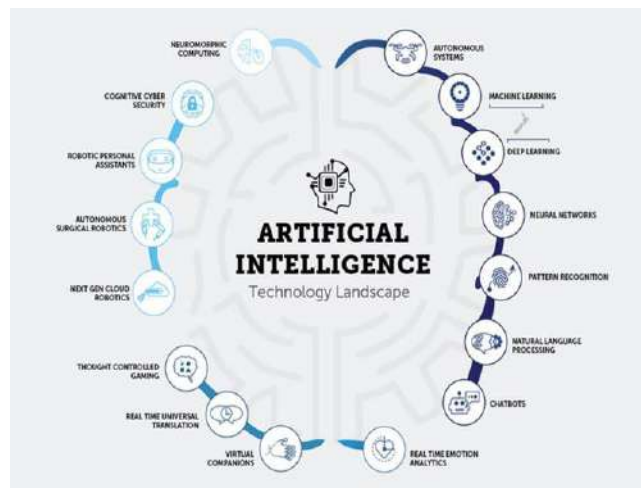


Fig. 2: Wide coverage of AI [21]

There would, in fact, be automated stockrooms for self-ruling cars as in lieu of utilizing surface land for stopping. Genuinely, the positive allegations of achievement around there are generally promising/ encouraging. That there are two fundamentally unique, yet not conflicting, situations for the results of the improvement of self-ruling vehicles recommend the requirement for insightful moral thought of their utilization [21]. The stuff of science fiction is quickly getting to be science actuality. Figure 2 shows the wide coverage of Artificial Intelligence. Computer-based

intelligence is currently developed, both as a science and, in its innovations and applications, as a building discipline.

Numerous open doors exist for AI to affect positively our planet's condition. Artificial intelligence scientists and improvement architects have an exceptional point of view and the abilities required to contribute essentially tending to worries of an Earth-wide temperature boost, neediness, nourishment creation, arms control, wellbeing, instruction, the maturing population, and statistic issues [22]. We could, as a straightforward model, improve access to devices for finding out about AI so individuals could be engaged to give AI methods a shot their very own issues, instead of depending on specialists to assemble hazy frameworks for them. Games and challenges dependent on AI frameworks can be exceptionally convincing receiving the hang of, educating, and explore situations, as appeared by the accomplishment of the Robo Cup for robot soccer [23]. We have just viewed as a portion of the ecological effect of intelligent cars and smart traffic control. Work on combinatorial closeouts effectively applied to range distribution and coordinations, and could further be applied to providing carbon offsets and to enhancing energy market interest. There could be more work on smart energy controllers utilizing conveyed sensors and actuators that would improve energy use in structures [24]. We could utilize qualitative demonstrating procedures for atmosphere situation displaying. The thoughts behind imperative based frameworks can be applied to break down reasonable frameworks. A framework is sustainable on the balance of chance that it is in a stable with its condition: fulfilling present moment and long haul requirements on the assets it devours and the output it produces. Figure 3 shows the advantages and disadvantages of AI.

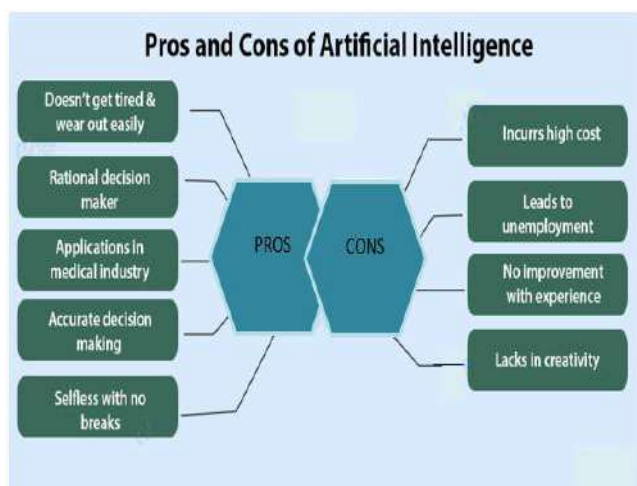


Fig. 3: Pros and Cons of AI [20]

IV. DEMERITS OF AI ON SOCIETY AND MANKIND

Artificial Intelligence has some demerits as well. They are replacing humans in many cases. Moreover, AI robots will not feel the empathy humans are able to feel. This emotion of humans can make them a great creature. In addition, in most cases, artificial intelligence can be hacked if there is a dedicated expert. This is a major warning because if the AI robot is hacked and turned against its purpose it would be a nightmare. Joseph Weizenbaum proposed that AI applications cannot understand, by definition, effectively reproduce certified human compassion and that the utilization of AI innovation in fields [25]. Weizenbaum was also reported that AI specialists (and a few rationalists) were eager to see the human personality as just a PC program (a position presently known as computationalism). He also proposes that AI research depreciates human life [25]. Martin Ford reported that Automation, Accelerating Technology and the Economy of the Future, and others contend that particular artificial intelligence applications, robotics and different types of automation will eventually bring significant changes in job life that means huge unemployment as machines coordinate and surpass the ability of laborers to perform daily schedule and boring employments [26]. Portage predicts that numerous information-based occupations and specifically entry-level employments—will be progressively vulnerable to robotization by means of expert system, AI and other AI-improved applications. Artificial intelligence-based applications may be utilized to enhance the capacities of low-wage seaward laborers, making it progressively practical to redistribute information work [26].

It was observed that a look at the eventual fate of AI in Google's self-driving vehicles. Presently imagine that some evil wrongdoing syndicate was to take such a vehicle, tie a weapon to the top, and reprogram it to shoot people. That is an AI weapon [27].

The capability of these weapons has not escaped from the minds of governments. This year, the US Navy's declaration of designs to create self-governing automaton weapons, just as the declaration of both the South Korean Super aegis II programmed turret and the Russian Platform-M programmed battle machine [28].

The governments are not the main players making AI weapons. Think about a GoPro-bearing quadcopter drone, the sort of thing anybody can purchase. Presently envision a straightforward bit of programming that enables it to fly consequently. The equivalent terrible wrongdoing syndicate that can weaponize a driverless vehicle is simply

inches from connecting a firearm and programming it to murder individuals in a packed open spot [29].

This is the impending threat with AI weapons: They are effectively changed over into aimless passing machines, unmistakably more hazardous than similar weapons with a human in charge.

In any case, Sharkey [30] mentioned some of the threats of depending on robotic assistance as allies for the Elder and the young. Same as with autonomous vehicles also conveying the threat and dangerous action.

We cannot yet depend on robots (AI) to make the best choice. They are not completely dependable and reliable, given the manner in which they are manufactured at this point. Anyway, would they be able to make the best decision? Will they make the best choice? What is the proper thing? In our aggregate thinking, the fear exists that in the end robots may turn out to be totally self-ruling, with choice, knowledge, and awareness; they may rebel us as Frankenstein-like beasts [31].

Vernor Vinge has reported that a time may come when a few PCs are more intelligent than men [25]. He calls this "the Singularity." He recommends that it might be to some degree or potentially exceptionally risky for people. This is talked about by a way of thinking called Singularitarianism. The Machine Intelligence Research Institute has recommended a need to assemble "Friendly AI", implying that the advances, which areas of now happening with AI. It can incorporate a push to make AI naturally well-disposed and humane [32].

"My take is that A.I. is dominating," said Sebastian Thrun, a notable roboticist who drove the advancement of Google's self-driving vehicle. "A couple of people may, in any case, be 'in control,' however less and less so." [32]

"Loss of control of A.I. frameworks has turned into a major concern," he said. "It panics individuals." Rather than reject these tragic cases, he stated, researchers rather should screen and constantly assess the innovations.

V. CONCLUSION

Artificial Intelligence is the latest wonder in science. Like most other wonders of science, it also has many merits and demerits. However, we cannot throw it away just because it seems dangerous. We have to understand it more. We have to become better at overcoming the demerits. We should use AI in order to solve our problems. Since it is a very sensitive area, we cannot afford to just play with it. We should not just try to make a Robot, which will behave like humans just out of curiosity. Because it would not be, as human. It would be super intelligent

because of the superior computational ability compared to a human. This is why playing around just because of self-interest should not be the way of using Artificial Intelligence. Artificial Intelligence nowadays is used in many research because of interest. Not because they are needed but because they are wanted. How can a human create something like a human when they just do not really fully understand how everything inside a human body and mind works! This intention of becoming Gods actually poses a real threat to Humanity. The intention of using Artificial intelligence should be the greater good of humanity.

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An Overview of Hydrological Studies by C. P. Kumar

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Abstract— This article presents an overview of hydrological studies undertaken and published by a Senior Scientist working at National Institute of Hydrology (A Government of India Society under Ministry of Jal Shakti), Roorkee - 247667 (Uttarakhand), India. It covers a wide variety of research outcomes related to groundwater assessment; seawater intrusion in coastal aquifers; numerical modelling of unsaturated flow, groundwater flow and contaminant transport; management of aquifer recharge; and impact of climate change on groundwater etc.

Keywords— Groundwater, Groundwater Balance, Groundwater Modelling, Hydrology, Hydrologist, Seawater Intrusion.

I. INTRODUCTION

The National Institute of Hydrology (NIH) was established in December 1978 as an Autonomous Society (presently under Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, Government of India). Main objectives of the Institute are to undertake, support, promote and coordinate systematic and scientific research work in all aspects of Hydrology and Water Resources. The Institute has its headquarters at Roorkee (Uttarakhand, India), four Regional Centres at Belagavi, Jammu, Kakinada and Bhopal and two Centres for Flood Management Studies at Guwahati and Patna. The institute is well equipped to carry out computer, laboratory and field oriented studies. The institute acts as a center of excellence for transfer of technology, human resources development and institutional development in specialized areas of hydrology and conducts user defined, demand-driven research through collaboration with relevant national and international organizations.

At the headquarters (Roorkee), the R & D activities and consulting services are carried out through six divisions – Surface Water Hydrology, Ground Water Hydrology, Environmental Hydrology, Water Resources System, Hydrological Investigations, Research Management and Outreach. The comprehensive work program of the Institute covers: (i) In-house R & D studies on emerging areas, (ii) Sponsored R & D studies, (iii) Demand driven and referred problems, (iv) Consultancy and Technical

services, and (v) Capacity building activities through regular training courses and technology transfer.

Ground Water Hydrology division, a key division of the Institute, has collaborated in many national and international projects. The division undertakes in-house R & D studies, sponsored studies and consultancy projects from the Central and State Government departments and other stakeholders of water. As part of the technology transfer program of the Institute, the division organizes various training courses/ workshops/ seminars/ symposia/ conferences from time to time. The division presently has a number of highly acclaimed scientists along with trained scientific and project staff. Two state-of-the-art units, viz., Centre of Excellence for Advanced Groundwater Research and Soil Water Laboratory, possessing advanced computational and analytical facilities are associated with the division. Providing efficient and effective methodologies and technologies for sustainable groundwater resources development and management are the vision of Ground Water Hydrology division of National Institute of Hydrology, Roorkee, Uttarakhand, India.

Presently, Mr. C. P. Kumar is the Head of Ground Water Hydrology division at NIH, Roorkee. He post-graduated in Hydraulic Engineering from University of Roorkee in 1985. From 1985, he has been working for National Institute of Hydrology (NIH), Roorkee - 247667 (Uttarakhand). His major research areas of interest include assessment of groundwater potential; seawater intrusion in coastal aquifers; numerical modelling of unsaturated flow, groundwater flow and contaminant transport; management

of aquifer recharge; and impact of climate change on papers and reports.
groundwater. He has authored more than 100 technical

II. WORK AREAS OF C. P. KUMAR

The specific areas of work by Mr. C. P. Kumar in the field of hydrology and water resources are presented in the following table.

Subject/ Work Area	Specific Studies
Groundwater Assessment	<ul style="list-style-type: none"> Groundwater Balance of Upper Ganga Canal Command Area Groundwater Balance of Jamnagar District (Gujarat) Estimation of Irrigation Return Flow Impact of Rainwater Harvesting on Groundwater in Savna Watershed
Laboratory and Field Determination of Soil Moisture Characteristics	<ul style="list-style-type: none"> RD 838 of Indira Gandhi Nahar Pariyojana, Stage-II Upper Part of Hindon River Catchment Malaprabha and Ghataprabha Basins Savna Watershed
Modelling of Soil Moisture Movement	<ul style="list-style-type: none"> Development of a Numerical Simulation Model for One-Dimensional Infiltration Prediction of Evaporation Losses from Shallow Water Table Evaporation from Layered Soils in the Presence of a Water Table Estimation of Ground Water Recharge due to Rainfall Effect of Water Table Depth on Recharge due to Rainfall
Modelling of Sea Water Intrusion	<ul style="list-style-type: none"> Nauru Island (Central Pacific Ocean) Ernakulam Coast Goa Coast Porbandar Coast (Minsar River Basin)
Modelling of Groundwater Flow and Solute Transport	<ul style="list-style-type: none"> Common Ground Water Modelling Errors Modeling of Solute Transport in Agricultural Fields Simulation of Solute Transport in Saline Areas of Ghataprabha Command
Application of Hydrological Models	<ul style="list-style-type: none"> Application of SHE Model to Narmada (upto Manot) Basin Application of SHE Model to Hemavati (upto Sakleshpur) Basin Simulation of Soil Moisture Movement in Barchi Watershed using SWIM Model
Impact of Climate Change	<ul style="list-style-type: none"> Impact of Climate Change on Groundwater Impact on Dynamic Groundwater System in Sonar Sub-basin
Books Published	<ul style="list-style-type: none"> Groundwater Assessment and Modelling Modelling of Sea Water Intrusion using SUTRA Assessment of Groundwater Potential (eBook) Groundwater Data Requirement and Analysis (eBook) Impact of Climate Change on Groundwater Resources (eBook)

Editorial Board Member	<ul style="list-style-type: none"> • American Journal of Water Resources • Advances in Engineering & Scientific Research • International Journal of Current Trends in Engineering & Research • Earth Science India • Current World Environment • Environmental Science: An Indian Journal • Madridge Journal of Agriculture and Environmental Sciences • International Journal of BioSciences and Technology
Internet Hydrology	<p>Creation and monitoring of the following websites and e-mail discussion groups:</p> <ul style="list-style-type: none"> • Kumar Links to Hydrology Resources http://www.angelfire.com/nh/cpkumar/hydrology.html • Hydrology Forum http://groups.yahoo.com/group/hydforum/ • Hydrological Modelling Discussion Group http://in.groups.yahoo.com/group/hydrologymodel/ • Ground Water Modelling Discussion Group http://groups.yahoo.com/group/gwmodel/

III. HYDROLOGICAL STUDIES BY C. P. KUMAR

Based-upon the hydrological studies undertaken, Mr. C. P. Kumar has published large number of technical reports, papers and articles. Many of his papers, technical notes and PowerPoint presentations are available at

<http://www.angelfire.com/nh/cpkumar/publication/>
Abstracts of his few publications are presented below.

Triangular Side Weirs (1987)

Discharge characteristics of sharp and broad-crested triangular side weirs have been experimentally investigated. Relations between discharge coefficient and main channel Froude number for different apex angles have been established.

Groundwater Balance in Upper Ganga Canal Command Area (1988)

The water balance study serves as a means of solution to important theoretical and practical hydrological problems. On the basis of the water balance approach, it is possible to make a quantitative evaluation of water resources and its dynamic behavior under the influence of man's activities. The water balance studies are undertaken in the Upper Ganga Canal command area to evaluate the various hydrological components constituting the recharge and discharge components for the groundwater reservoir and

understand their inter-relationship. This will facilitate for optimal planning and utilization of water resources.

The study deals with an area of around 12,500 sq. km. of Upper Ganga Canal command covering the district of Bulandshahr and parts of the districts of Ghaziabad, Meerut, Muzaffarnagar and Saharanpur. Considerable variations in rainfall, canal supplies, groundwater extraction and cropping pattern etc. exist within the study area.

The scope of the present study is the preparation of seasonal groundwater balance of 12 years (1972-73 to 1983-84) for monsoon (June to October) and non-monsoon (November to May) seasons. The various components which influence the groundwater balance in the study area are identified. These components are evaluated using the data made available by U.P. Irrigation Department and Ground Water Investigation Organization. The methodologies adopted for the estimation of water balance components have been discussed. Using the water balance approach, recharge from rainfall for the study area has been calculated. The values of various components of water balance are also verified with the results of various earlier investigators for their consistency.

Application of SHE Model to Narmada (upto Manot) Basin (1990)

The Systeme Hydrologique Europeen (SHE), a physically-based, distributed, catchment model has been implemented for Narmada (upto Manot) basin in Madhya Pradesh, India. The SHE is physically based in the sense that it is derived directly from equations of flow and mass conservation for the hydrologic processes it aims to represent, and it is distributed by describing the catchment on a rectangular grid system. The capacity of SHE to account for spatial variations in meteorologic and hydrologic inputs represents an important advantage over traditional lumped catchment models.

The computational grid network and channel system was set up for the basin, forming the basis for the spatial distribution of topographic elevation, soil type, land use and rainfall stations in the data files. The basic network was composed of grid squares of 1 km x 1 km, but in view of the heavy computing requirements associated with such densely defined system, this was converted to arrays with grid squares of 2 km x 2 km for the simulation work. Since direct measurements of soil and vegetation properties for the basin were not available, the model parameters were evaluated using information taken from the literature on neighbouring areas. Four land uses were identified (agricultural land, dense mixed forest, thin forest and waste land). Three categories of soil depth were defined for low land, semi-hilly and hilly areas, the distributions obtained from the topographic maps. However, the same soil retention curve, typical of black cotton clays, was used throughout.

The calibration and validation of the model was achieved on the basis of physical reasoning and through consideration of the variation of runoff response from the basin. The calibration was carried out for the period 1982-84 by varying only a few of the parameters and was then validated against 1985 and 1987 hydrographs, on the basis of changes in the initial level of the phreatic surface. Some deficiencies in the simulations were noted but, in general, there were good agreement between observed and simulated responses. Sensitivity analysis was also carried out for the basin to study the sensitivity of model grid spacing and flow resistance coefficients to the simulated hydrological regime.

Application of SHE Model to Hemavati (upto Sakleshpur) Basin (1991)

The Systeme Hydrologique Europeen (SHE) is a deterministic distributed and physically-based hydrological modelling system developed from the partial differential equations describing the processes of subsurface, overland and channel flow solved by finite difference methods. The model is completed by the

processes of interception, evapotranspiration and snowmelt. SHE has been developed in a joint effort by the Institute of Hydrology (UK), SOGREAH (France) and the Danish Hydraulic Institute (Denmark).

The description of the hydrological processes has been simplified by solving the unsaturated flow equation in independent one-dimensional vertical columns of variable depths. The columns link a two-dimensional surface flow component with a two-dimensional groundwater flow component. The catchment is represented in the horizontal plane by grid squares and the river system is superimposed on the boundaries of the grid squares. In the SHE programme, each process is solved in separate model components. The coordination and parallel running of the individual components is controlled by a Frame component. This means that the process components can be applied independently and/or in combination. The processes in the various components can be modelled at different levels of complexity and, in its simplest form, a component can be replaced by a dummy component in which default boundary conditions (flows or levels) are prescribed and transferred to the other components. This allows for great flexibility and the applications with SHE may range from single sub-surface column simulations to runs on large complex catchments. The capacity of the SHE to account for spatial variations in meteorologic and hydrologic inputs represents an important advantage over traditional lumped catchment models.

The computational grid network and channel system was set up for the basin, forming the basis for the spatial distribution of topographic elevation, soil type, land use and rainfall stations in the data files. The basic network was composed of grid squares of 1 km x 1 km, but in view of the heavy computing requirements associated with such densely defined system, this was converted to arrays with grid squares of 2 km x 2 km for the simulation work. Since direct measurements of soil and vegetation properties for the basin were not available, the model parameters were evaluated using information taken from the literature on neighbouring areas. Three land uses (forests, coffee plantations and unirrigated crop land) and two soil types (red loamy soils and red sandy soils) were identified. Three categories of soil depth were defined for low land, semi-hilly and hilly areas, the distributions obtained from the topographic maps. However, only one soil retention curve was used throughout.

The calibration and validation of the model was achieved on the basis of physical reasoning and through consideration of the variation of runoff response from the basin. The calibration was carried out for the period 1975-77 by varying only a few of the parameters and was then

validated against hydrographs for the period 1978-80, on the basis of changes in the initial level of the phreatic surface. In general, there were good agreements between observed and simulated responses. Sensitivity analysis was also carried out for the basin to study the sensitivity to the simulated hydrological regime of model structural parameters, flow resistance, unsaturated flow parameters, saturated flow parameter and spatial distribution of rainfall.

Ground Water Balance of Jamnagar District (1992)

With the ever increasing demand of water and inadequate surface water in drought prone areas, more attention is given on groundwater reserve. The present study forms a part of the development of a model to forecast the availability of drinking water in Jamnagar district. Drinking water availability has to be assessed both from surface water sources and from groundwater reserve. The groundwater balance study has been carried out for Jamnagar district for the period 1981-82 to 1985-86 and the percentage of rainfall that gets recharged to the groundwater storage, has been estimated from the water balance study.

Physically - Based Distributed Modelling of Narmada (upto Manot) Basin using the Systeme Hydrologique Europeen (1995)

The Systeme Hydrologique Europeen (SHE), a physically-based, distributed, catchment model has been implemented for Narmada (upto Manot) basin in Madhya Pradesh. The calibration and validation of the model was achieved on the basis of physical reasoning and through consideration of the variation of runoff response from the basin. The calibration was carried out for the period 1982-84 by varying only a few of the parameters and was then validated against 1985 and 1987 hydrographs, on the basis of changes in the initial level of the phreatic surface. Some deficiencies in the simulations were noted but, in general, there were good agreement between observed and simulated responses.

Developments in Ground Water Hydrology: An Overview (1996)

Groundwater development has shown phenomenal progress in our country during the past three decades. There has been a vast improvement in the perception, outlook and significance of groundwater resource. The objective of this paper is to present the status of developments in hydrological studies related to groundwater hydrology including review of the basic concepts and associated methodologies.

Prediction of Evaporation Losses from Shallow Water Table using a Numerical Model (1996)

A steady state flow problem of interest and importance is the upward movement of water from a water table and subsequent evaporation at the soil surface. This information is desirable when estimating water loss from soils by evaporation and estimating the amount of groundwater available to plants due to the upward movement of water from a water table. Soils may also become saline due to the upward movement of saline groundwater and its subsequent evaporation at the soil surface. To minimize the rate of salt accumulation and thus reduce the salinity hazard, attempts are usually made to lower the water table by pumping or by installation of drains. In order to determine at what depth the water table should be maintained, the relation between depth to water table, soil properties, and evaporation rate must be known.

The purpose of this study is to estimate the steady state evaporation rates from bare soils under conditions of high water table. A finite difference numerical scheme based upon the one-dimensional Richards equation has been employed to attain the steady state moisture profiles and estimate the evaporation rates under conditions of high water table. The procedure takes into account the relevant atmospheric factors and the soil's capability to conduct water. Field data required include soil water retention curves, water table depth, and a record of air temperature and air humidity. Results obtained with the method demonstrate how the soil water evaporation rates depend on water table depth.

Development of a Soil Moisture Prediction Model (1996)

Flow of water through unsaturated porous media is common in nature. The basic equation of flow in the unsaturated zone of a porous medium is Richards' equation. The exact solution to the Richards' equation is not yet known. Therefore finite difference methods are widely used for solving the partial differential equation describing one-dimensional water transfer in unsaturated soil. This paper deals with development of a numerical model for transient, one-dimensional water flow through the unsaturated porous medium. Seven models, employing different ways of discretization of the nonlinear infiltration equation, were compared with Philip's quasi-analytical solution. All models yielded good agreement with water content profiles at various times in a sand column.

Estimation of Natural Ground Water Recharge (1997)

Quantification of the rate of natural groundwater recharge is a pre-requisite for efficient groundwater resource management. It is particularly important in regions with large demands for groundwater supplies, where such resources are the key to economic development. However, the rate of aquifer recharge is one of the most difficult factors to measure in the evaluation of groundwater resources. Estimation of recharge, by whatever method, is normally subject to large uncertainties and errors. In this paper, various methods of estimating natural groundwater recharge are outlined and critically reviewed with regard to their limitations and associated uncertainties.

Effect of Water Table Depth on Recharge due to Rainfall (1997)

Reliable estimates of recharge rates to an aquifer are often a pre-requisite to the development of efficient plans for management of a groundwater resource. Groundwater recharge is a complex function of meteorological conditions, soil, vegetation, physiographic characteristics, antecedent soil moisture regime and properties of the geologic material within the paths of flow. Soil layering in the unsaturated zone plays an important role in facilitating or restricting downward water movement to the water table. Depth to water table is also important in groundwater recharge estimations.

The purpose of this study is to determine the effect of water table depth on recharge due to rainfall by studying one-dimensional vertical flow of water in the unsaturated zone. A model has been formulated for finite difference solution of the non-linear Richards equation applicable to transient, one-dimensional water flow through the unsaturated porous medium. The groundwater recharge has been estimated for various depths of the groundwater table using appropriate initial and boundary conditions to study the influence of water table depth.

A Numerical Simulation Model for One-Dimensional Infiltration (1998)

The theory for transient isothermal flow of water into non-swelling unsaturated soil has been developed to a large extent in terms of solutions of the non-linear Richards equation. In the field, the description of infiltration is highly complicated since the initial and boundary conditions are usually not constant while the soil characteristics may vary with time and space. In this study, a model has been formulated for finite difference solution of the nonlinear Richards equation applicable to transient, one-dimensional water flow through the unsaturated porous medium. The simulated soil moisture profiles for explicit, Crank-Nicolson and implicit schemes

have been compared with the quasi-analytical solution of Philip.

Estimation of Ground Water Recharge due to Rainfall by Modelling of Soil Moisture Movement (1998)

The purpose of this study is to estimate the groundwater recharge due to rainfall by studying one-dimensional vertical flow of water in the unsaturated zone. A model has been formulated for finite difference solution of the non-linear Richards equation applicable for transient one-dimensional water flow through the unsaturated porous medium. Implicit scheme with implicit linearization (prediction-correction) has been used for discretization. The groundwater recharge has been estimated using appropriate initial and boundary conditions for storm and inter-storm periods.

Estimation of Ground Water Recharge from Rainfall through Numerical Modelling (1998)

The amount of water that may be extracted from an aquifer without causing depletion is primarily dependent upon the groundwater recharge. Thus, a quantitative evaluation of spatial and temporal distribution of groundwater recharge is a pre-requisite for operating groundwater resources system in an optimal manner. This paper presents the methodology for estimation of groundwater recharge from rainfall by modelling of soil moisture movement.

Evaporation from Shallow Water Table through Layered Soil Profiles (1999)

Evaporation from shallow water table through a homogeneous soil profile has been studied theoretically and experimentally by many workers. However, uniform soil profiles rarely occur in nature. It is more common to find the soils having well-defined layers differing from each other either in texture or in structure. Therefore, it becomes necessary to determine the effect of layered soils on evaporation from a shallow water table.

The purpose of this study is to estimate the steady state evaporation rates from layered soils in the presence of high water table under isothermal conditions. A finite difference numerical scheme based upon the one-dimensional Richards equation has been employed to estimate the evaporation rates from a two-layered soil profile overlying shallow water for appropriate initial and boundary conditions. The method takes into account the relevant atmospheric factors and soil moisture characteristics of the two layers. The effects of sequence and thickness of the soil layers and water table depth on the evaporation rates have been examined.

Variation of Soil Moisture Characteristics in a Part of Hindon River Catchment (1999)

Mathematical models of hydrologic and agricultural systems require knowledge of the relationships between soil moisture content (θ), soil water pressure (h) and unsaturated hydraulic conductivity (K). Hence, a sustained research effort towards the parameterisation of $K(h)$ and $h(\theta)$ has resulted in the development of several laboratory, field and theoretical methods.

This study aims at field and laboratory determination of soil moisture characteristics in a part of Hindon river catchment and to study their variation along the Hindon river in its upstream reach. A total of 38 soil samples were collected from 14 sites in Aurangabad, Kamalpur, Budhakhera, Gagalheri and Dudhil Bukhara comprising around 24 km reach, upstream of Hindon river. Field determination of saturated hydraulic conductivity was made at 8 locations through Guelph Permeameter. Extensive laboratory measurements were made for each soil sample collected. Soil texture was determined through sieve analysis and laser diffraction technique. Porosity was obtained for each soil sample. Saturated hydraulic conductivity was measured through ICW Permeameter in the laboratory. Retention curve was obtained through pressure plate apparatus. Unsaturated hydraulic conductivity function was indirectly derived through van Genuchten retention parameters. The report presents a thorough soil investigation results for the uppermost part of Hindon river.

Soil Moisture Retention Characteristics in Upper Part of Hindon River Catchment (2000)

Mathematical models of hydrologic and agricultural systems require knowledge of the relationships between soil moisture content (θ), soil water pressure (h) and unsaturated hydraulic conductivity (K). Hence, a sustained research effort towards the parameterisation of $K(h)$ and $h(\theta)$ has resulted in the development of several laboratory, field and theoretical methods.

This paper presents the soil moisture retention characteristics and their variation along the Hindon river in its upstream reach. A total of 38 soil samples were collected from 14 sites in Aurangabad, Kamalpur, Budhakhera, Gagalheri and Dudhil Bukhara comprising around 24 km reach, upstream of Hindon river. Extensive laboratory measurements were made for each soil sample collected. Porosity was measured for each soil sample. Saturated hydraulic conductivity was measured through ICW Permeameter in the laboratory. Retention data was obtained through pressure plate apparatus. Parameters of water retention function of the van Genuchten model

were determined through non-linear regression analysis.

Simulation of Sea Water Intrusion and Tidal Influence (2001)

Coastal zones contain some of the most densely populated areas in the world as they generally present the best conditions for productivity. However, these regions face many hydrological problems like flooding due to cyclones and wave surge and drinking fresh water scarcity due to salt water intrusion. This paper presents the simulation of sea water intrusion in Nauru Island through Saturated-Unsaturated TRAnsport (SUTRA) model and examines the effect of tidal forcing on the fresh water resources.

Determination of Saturated Hydraulic Conductivity in Upper Part of Hindon River Catchment (2001)

A proper physical description of water flow in the soil requires that three parameters be specified: flux, hydraulic gradient and hydraulic conductivity. Knowledge of any two of these allows the calculation of the third, according to Darcy's law. Hydraulic conductivity plays an important role in Darcy's law which is applicable for saturated as well as unsaturated soils.

This paper presents the laboratory investigations of soil texture and saturated hydraulic conductivity in upper part of Hindon river catchment. A total of 38 soil samples were collected from 14 sites in Aurangabad, Kamalpur, Budhakhera, Gagalheri and Dudhil Bukhara comprising around 24 km reach, upstream of Hindon river. Extensive laboratory measurements were made for each soil sample collected. Soil texture was determined through sieve analysis and laser diffraction technique. Saturated hydraulic conductivity was measured through ICW Permeameter in the laboratory. An empirical relationship has been derived between soil texture and saturated hydraulic conductivity.

Soil Moisture Retention Characteristics at RD 838 of I.G.N.P. Stage-II (2001)

Mathematical models of hydrologic and agricultural systems require knowledge of the relationships between soil moisture content (θ), soil water pressure (h) and unsaturated hydraulic conductivity (K). Hence, a sustained research effort towards the parameterisation of $K(h)$ and $h(\theta)$ has resulted in the development of several laboratory, field and theoretical methods. This paper presents the soil moisture retention characteristics at RD 838 of Indira Gandhi Nahar Priyojana, Stage - II. A total of 15 soil samples were collected from 4 locations at different depths. Extensive laboratory measurements were made for each soil sample collected. Soil bulk density, particle density and porosity were measured for

each soil sample. Saturated hydraulic conductivity was measured through Permeameter. Retention data was obtained through pressure plate apparatus. Parameters of water retention function of the van Genuchten model were determined through non-linear regression analysis.

Soil Moisture Characteristics in Upper Part of Hindon River Catchment (2001)

Knowledge of the physics of soil water movement is crucial to the solution of problems in watershed hydrology, for example, the prediction of runoff and infiltration following precipitation, the subsequent distribution of infiltrated water by drainage and evaporation, and estimation of the contribution of various parts of a watershed to the groundwater storage. Convenient and reliable techniques for estimating the soil hydraulic properties are required for prediction of soil water flow.

This paper presents the field and laboratory determination of soil moisture characteristics and their variation along the Hindon river in its upstream reach. A total of 38 soil samples were collected from 14 sites in Aurangabad, Kamalpur, Budhakhera, Gagalheri and Dudhil Bukhara comprising around 24 km reach, upstream of Hindon river. Extensive laboratory measurements were made for each soil sample collected. Porosity was obtained for each soil sample. Saturated hydraulic conductivity was measured through ICW Permeameter in the laboratory. Retention curve data was obtained through pressure plate apparatus. Unsaturated hydraulic conductivity function was indirectly derived through van Genuchten retention parameters by non-linear regression analysis.

Simulation of Soil Moisture Movement in a Hard Rock Watershed using SWIM Model (2001)

A very large fraction of the water falling as rain on the land surfaces of the earth or applied irrigation water moves through unsaturated soil during the subsequent processes of infiltration, drainage, evaporation, and the absorption of soil-water by plant roots. The water movements in the unsaturated zone, together with the water holding capacity of this zone, are very important for the water demand of the vegetation, as well as for the recharge of the groundwater storage. A fair description of the flow in the unsaturated zone is also crucial for predictions of the movement of pollutants into groundwater aquifers.

A number of simulation models are available for investigating the soil water balance. SWIM (Soil Water Infiltration and Movement) is a physically based, isothermal, one dimensional model of water flow through the soil coupled with a simple crop water extraction

model in which the growth of the canopy and of the root system is a predetermined input. SWIM is driven by rainfall and potential evaporation, and so appears to be more appropriate than few other similar models if the available meteorological data are limited.

The present study aims at modelling of soil moisture movement in Barchi watershed (Karnataka) using SWIM. Field and laboratory investigations were carried out to determine the saturated hydraulic conductivity at eight locations using Guelph Permeameter and soil moisture retention characteristics using the Pressure Plate Apparatus. The van Genuchten parameters of soil moisture retention function and hydraulic conductivity function were obtained through non-linear regression analysis. Daily rainfall and evaporation data of Barchi for the period 1996-97 to 1999-2000 were used for the simulations. Water balance components like runoff, evapotranspiration and drainage (groundwater recharge from rainfall) were determined through SWIM.

Common Ground Water Modelling Errors and Remediation (2001)

Groundwater models are used to predict the future changes in hydraulic heads or the migration pathway and concentrations of contaminants in groundwater. The accuracy of model predictions depends upon the degree of successful calibration and verification of the model in determining transport flow directions, and the applicability of the groundwater flow and solute transport equations to the problem being simulated. Errors in the predictive model, even though small, can result in gross errors in solutions projected forward in time. This paper presents an overview of the common errors in any groundwater modelling study and ways to remove them.

Derivation of Soil Moisture Retention Characteristics from Saturated Hydraulic Conductivity (2001)

Knowledge of the physics of soil water movement is crucial to the solution of many problems in watershed hydrology, for example, the prediction of runoff and infiltration following precipitation, the subsequent distribution of infiltrated water by drainage and evaporation, and estimation of the contribution of various parts of a watershed to the groundwater storage. Mathematical models of hydrologic and agricultural systems require knowledge of the relationships between soil moisture content (θ), soil water pressure (h) and unsaturated hydraulic conductivity (K). Sustained research effort towards the parameterisation of $K(h)$ and $h(\theta)$ has resulted in the development of several laboratory, field and theoretical methods.

This study involved field and laboratory determination of soil moisture characteristics along the Hindon river in its upstream reach. The soils in this area are mainly sand, loamy sand, sandy loam and silt loam. A total of 37 soil samples were collected from 13 sites in 24 km upstream reach of the Hindon river. Extensive laboratory measurements were made for each soil sample. Saturated hydraulic conductivity was measured through ICW Permeameter in the laboratory. Retention curve data was obtained through pressure plate apparatus. These have been used to develop an empirical relationship to derive the approximate soil moisture retention curve at the places in upper part of Hindon river basin where only saturated hydraulic conductivity data are available.

Numerical Simulation Models for Seawater Intrusion (2002)

The development and management of coastal groundwater aquifers remain a very delicate issue. Under-utilization of the available resource means that valuable fresh water will discharge naturally to the sea and wasted; overdevelopment, on the other hand, will mine the resource and cause a gradual or sometimes sudden degradation of water quality due to the encroachment of seawater. As an aid to effective management, many models have been developed over the years to represent and study this problem. They range from relatively simple analytical solutions to complex state-of-art numerical models using large computing capacity. This paper presents the salient features of available numerical models to enable selection of appropriate code for the specific seawater intrusion problem.

Modelling of Solute Transport in Agricultural Fields using SWIM (2002)

Modern agricultural activities are based on the extensive use of fertilizers and pesticides to obtain high crop yield. Some of the chemicals applied to farm land, however, move down with the deep percolating water from the root zone and can contaminate underlying groundwater. The problem becomes more complicated when dealing with different kinds of soil with varying properties. In the present study, solute transport in three agricultural plots (Jowar, Gram and Safflower located at Belvatgi in Malaprabha subbasin in Dharwad district, Karnataka) has been modelled using a software package, SWIM (Soil Water Infiltration and Movement). Known quantities of fertilizer were applied and field/laboratory investigations were carried out for monitoring the chemical constituent (Nitrogen/Phosphorous/Potassium) at varying depths upto 120 cm. Field observed and simulated (through SWIM)

solute concentration (N, P and K) profiles after application of fertilizer were compared. The model can be used to predict the cumulative solute in the soil profile for different scenarios of fertilizer applications.

Assessment of Natural Ground Water Recharge in Upper Ganga Canal Command Area (2002)

Quantification of the rate of natural groundwater recharge is a pre-requisite for efficient groundwater resource management. It is particularly important in regions with large demands for groundwater supplies, where such resources are the key to economic development. However, the rate of aquifer recharge is one of the most difficult factors to measure in the evaluation of groundwater resources. Estimation of recharge, by whatever method, is normally subject to large uncertainties and errors. In this paper, an attempt has been made to derive an empirical relationship to determine groundwater recharge from rainfall in Upper Ganga Canal command area based upon seasonal groundwater balance study carried out for a number of years.

Conceptualisation in Groundwater Modelling (2003)

Mathematical models are tools, which are frequently used in studying groundwater systems. In general, mathematical models are used to simulate (or to predict) the groundwater flow. Predictive simulations must be viewed as estimates, dependent upon the quality and uncertainty of the input data. Model conceptualization is the process in which data describing field conditions are assembled in a systematic way to describe groundwater flow processes at a site. The model conceptualization aids in determining the modelling approach and which model software to use. This paper presents the conceptualisation process for any groundwater flow modelling study which will help to reduce the level of uncertainty.

Estimation of Ground Water Recharge Using Soil Moisture Balance Approach (2003)

The amount of water that may be extracted from an aquifer without causing depletion is primarily dependent upon the groundwater recharge. Thus, a quantitative evaluation of spatial and temporal distribution of groundwater recharge is a pre-requisite for operating groundwater resources system in an optimal manner. This paper presents a methodology with step-by-step procedure to determine the groundwater recharge by soil moisture balance in the unsaturated zone.

Pitfalls and Sensitivities in Groundwater Modelling (2003)

Groundwater models provide a scientific and predictive tool for determining appropriate solutions to water

allocation, surface water - groundwater interaction, landscape management or impact of new development scenarios. However, if the modelling studies are not well designed from the outset, or the model doesn't adequately represent the natural system being modelled, the modelling effort may be largely wasted, or decisions may be based on flawed model results, and long term adverse consequences may result. This paper presents the common pitfalls and sensitivities which are normally encountered during groundwater modelling studies. It will help in improving the model conceptualisation and understanding the uncertainty in model results.

Basic Guidelines for Groundwater Modelling Studies (2003)

Groundwater flow modelling studies are required to resolve groundwater and catchment issues. A model, no matter how sophisticated, will never describe the groundwater system under investigation without deviation of model simulations from the actual physical processes. As a consequence, in applying a numerical model to a field study, the model user should always understand the implications of simplifying assumptions. This paper addresses groundwater modelling concepts and outlines the approach for commissioning and understanding groundwater modelling studies. It will encourage best practice and help avoid potential problems.

Modelling of Soil Moisture Movement in a Watershed using SWIM (2003)

The present study aims at modelling of soil moisture movement in Barchi watershed (Karnataka) using SWIM (Soil Water Infiltration and Movement). Field and laboratory investigations were carried out to determine the saturated hydraulic conductivity at eight locations using Guelph Permeameter and soil moisture retention characteristics using the Pressure Plate Apparatus. The van Genuchten parameters of soil moisture retention function and hydraulic conductivity function were obtained through non-linear regression analysis. Daily rainfall and evaporation data of Barchi for the period 1996-97 to 1999-2000 were used for the simulations. Water balance components like runoff, evapotranspiration and drainage (groundwater recharge from rainfall) were determined through SWIM. The drainage was found to vary between 38% and 47% of rainfall (1241 mm to 1887 mm) while the runoff coefficient varied between 12% and 32% for the study period.

Constraints in the Numerical Modelling of Salt Water Intrusion (2004)

Mathematical models help us to understand the relevant processes that cause salt water intrusion in coastal

aquifers. In this paper, constraints of three-dimensional (3D) modelling of salt water intrusion in large-scale coastal (homogeneous) aquifers have been discussed. Computer codes, which solve the advection-dispersion equation based on standard finite element or finite difference techniques, can not yet be applied to model large-scale coastal aquifers. The reason is that these codes must satisfy a condition of spatial discretization, characterized by the so-called grid Peclet number. This number imposes that the dimension of the grid block should be not greater than a few times the magnitude of the longitudinal dispersivity, as otherwise numerical dispersion will occur. In addition, stand-alone personal computers are not yet fast enough to execute models with several hundreds of thousands of grid blocks. Finally, reliable and sufficient groundwater data, required for calibration and verification, are not available in most cases. However, effective 3D-modelling of salt water intrusion in large-scale coastal aquifers may be technically possible within next few years, though the availability of data will always restrict practical applications to a certain extent.

Groundwater Flow and Contaminant Transport Models: An Overview (2006)

In the management of a ground-water system in which decisions must be made with respect to both water quality and water quantity, a tool is needed to provide the decision maker with information about the future response of the system to the effects of management decisions. This tool is the model. A model may be defined as a simplified version of a real-world system (here, a ground-water system) that approximately simulates the relevant excitation-response relations of the real-world system. This paper presents an overview of the essential components of ground-water flow and contaminant transport modelling in saturated porous media.

Modelling of a Coastal Aquifer using FEFLOW (2007)

Coastal tracts of Goa are rapidly being transformed into settlement areas. The poor water supply facilities have encouraged people to have their own source of water by digging or boring a well. During the last decade, there have been large-scale withdrawals of groundwater by builders, hotels and other tourist establishments. Though the seawater intrusion has not yet assumed serious magnitude, but in the coming years it may turn to be a major problem if corrective measures are not initiated at this stage. It is necessary to understand how fresh and salt water move under various realistic pumping and recharge scenarios. Objectives of the present study include simulation of seawater intrusion in a part of the coastal

area in Bardez taluk of North Goa, evaluation of the impact on seawater intrusion due to various groundwater pumping scenarios and sensitivity analysis to find the most sensitive parameters affecting the simulation.

Soil Moisture Retention Characteristics and Hydraulic Conductivity for Different Areas in India in Selected States (2008)

Mathematical models of hydrologic and agricultural systems require knowledge of the relationships between soil moisture content (θ), soil water pressure (h) and unsaturated hydraulic conductivity (K). This study involved field and laboratory determination of soil moisture characteristics in different areas of India – Hindon, Kolar, Narsinghpur, Ghataprabha and Lokapavani. Saturated hydraulic conductivity was measured either through Guelph Permeameter in the field or through ICW Permeameter or Jodhpur Permeameter in the laboratory. Retention curve data was obtained through pressure plate apparatus. These have been used to develop empirical relationships to derive the approximate soil moisture retention curve at the places where only saturated hydraulic conductivity data is available.

Determination of Soil Hydraulic Properties in a Part of Hindon River Catchment using SOILPROP Software (2010)

Mathematical models of hydrologic and agricultural systems require knowledge of the relationships between soil moisture content (θ), soil water pressure (h) and unsaturated hydraulic conductivity (K). To model the retention and movement of water and chemicals in the unsaturated zone, it is necessary to know the relationships between soil water pressure, water content and hydraulic conductivity. It is often convenient to represent these functions by means of relatively simple parametric expressions. The problem of characterizing the soil hydraulic properties then reduces to estimating parameters of the appropriate constitutive model. A number of models for water retention function and unsaturated hydraulic conductivity are well reported in literature, the most popular being van Genuchten model and Brooks-Corey model. In general, the van Genuchten model matches experimental data more satisfactorily than Brooks-Corey model. However, the functional form of van Genuchten model is complicated and limits its usefulness for large number of analytical solutions available for infiltration and drainage problems. On the other hand, Brooks-Corey model yields conductivity and water retention functions that are easy to manipulate mathematically.

For this study, 27 soil samples were collected from various locations as well as depths in different villages, namely Aurangabad, Kamalpur, Budhakhera, Gagalheri, Dudhil Bukhara in the upstream part of Hindon river catchment and laboratory investigations were carried out to determine bulk density and grain size distribution. Using these data as input to the SOILPROP software, van Genuchten and Brooks-Corey parameters (α and n & h_d and λ) were determined to derive the retention characteristic and unsaturated hydraulic conductivity. The values of α and n (van Genuchten parameters) were found to vary from 0.00004 to 0.00078 and 1.19 to 1.65 respectively. The values of h_d and λ (Brooks-Corey parameters) were found to vary from 860 to 20200 cm and 0.189 to 0.538 respectively. These results (as necessary input for unsaturated zone modelling) will be helpful for prediction of soil moisture flow and groundwater recharge in the Hindon river catchment.

Assessment of Impact of Climate Change on Groundwater Resources (2012)

Climate change poses uncertainties to the supply and management of water resources. The Intergovernmental Panel on Climate Change (IPCC) estimates that the global mean surface temperature has increased 0.6 ± 0.2 °C since 1861, and predicts an increase of 2 to 4 °C over the next 100 years. Temperature increases also affect the hydrologic cycle by directly increasing evaporation of available surface water and vegetation transpiration. Consequently, these changes can influence precipitation amounts, timings and intensity rates, and indirectly impact the flux and storage of water in surface and subsurface reservoirs (i.e., lakes, soil moisture, groundwater). In addition, there may be other associated impacts, such as sea water intrusion, water quality deterioration, potable water shortage, etc.

While climate change affects surface water resources directly through changes in the major long-term climate variables such as air temperature, precipitation, and evapotranspiration, the relationship between the changing climate variables and groundwater is more complicated and poorly understood. The greater variability in rainfall could mean more frequent and prolonged periods of high or low groundwater levels, and saline intrusion in coastal aquifers due to sea level rise and resource reduction. Groundwater resources are related to climate change through the direct interaction with surface water resources, such as lakes and rivers, and indirectly through the recharge process. The direct effect of climate change on groundwater resources depends upon the change in the volume and distribution of groundwater recharge. Therefore, quantifying the impact of climate change on

groundwater resources requires not only reliable forecasting of changes in the major climatic variables, but also accurate estimation of groundwater recharge.

A number of Global Climate Models (GCM) are available for understanding climate and projecting climate change. There is a need to downscale GCM on a basin scale and couple them with relevant hydrological models considering all components of the hydrological cycle. Output of these coupled models such as quantification of the groundwater recharge will help in taking appropriate adaptation strategies due to the impact of climate change. This paper presents the likely impact of climate change on groundwater resources and methodology to assess the impact of climate change on groundwater resources.

Groundwater Modelling Software – Capabilities and Limitations (2012)

Groundwater modelling has become an important methodology in support of the planning and decision-making processes involved in ground-water management. Ground-water models provide an analytical framework for obtaining an understanding of the mechanisms and controls of ground-water systems and the processes that influence their quality, especially those caused by human intervention in such systems. Increasingly, models are an integral part of water resources assessment, protection and restoration studies; and provide essential and cost-effective support for planning and screening of alternative policies, regulations, and engineering designs affecting groundwater.

There are many different ground-water modelling codes available, each with their own capabilities, operational characteristics, and limitations. If modelling is considered for a project, it is important to determine if a particular code is appropriate for that project, or if a code exists that can perform the simulations required in the project.

In practice, it is often difficult to determine the capabilities, operational characteristics, and limitations of a particular ground-water modelling code from the documentation, or even impossible without actual running the code for situations relevant to the project for which a code is to be selected due to incompleteness, poor organization, or incorrectness of a code documentation. Systematic and comprehensive description of a code features based on an informative classification provides the necessary basis for efficient selection of a groundwater modelling code for a particular project or for the determination that no such code exists.

Assessment of Groundwater Potential (2012)

Water balance techniques have been extensively used to make quantitative estimates of water resources and the impact of man's activities on the hydrologic cycle. On the basis of the water balance approach, it is possible to make a quantitative evaluation of water resources and its dynamic behaviour under the influence of man's activities. In this paper, an attempt has been made to describe the methodologies to understand and evaluate various recharge and discharge components of groundwater balance equation and to establish the recharge coefficient with a view to work out the groundwater potential of an area.

Water Status and Problems in India (2013)

The surface water and groundwater resources of the country play a major role in agriculture, hydropower generation, livestock production, industrial activities, forestry, fisheries, navigation, recreational activities, etc. Traditionally, India has been an agriculture-based economy. Hence, development of irrigation to increase agricultural production for making the country self-sustained and for poverty alleviation has been of crucial importance for the planners. The rainfall in India shows great variations, unequal seasonal distribution, still more unequal geographical distribution and the frequent departures from the normal. In view of the existing status of water resources and increasing demands of water for meeting the requirements of the rapidly growing population of the country as well as the problems that are likely to arise in future, a holistic, well-planned long-term strategy needed for sustainable water resources management in India.

Numerical Modelling of Ground Water Flow using MODFLOW (2013)

Groundwater models provide a scientific and predictive tool for determining appropriate solutions to water allocation, surface water – groundwater interaction, landscape management or impact of new development scenarios. However, if the modelling studies are not well designed from the outset, or the model doesn't adequately represent the natural system being modelled, the modelling effort may be largely wasted, or decisions may be based on flawed model results, and long term adverse consequences may result. This paper presents an overview of the groundwater modelling technique and application of MODFLOW, a modular three-dimensional groundwater flow model.

Recent Studies on Impact of Climate Change on Groundwater Resources (2013)

We are in a period of climate change brought about by increasing atmospheric concentrations of greenhouse

gases. Atmospheric carbon dioxide levels have continually increased since the 1950s. The continuation of this phenomenon may significantly alter global and local climate characteristics, including temperature and precipitation. Changes in regional temperature and precipitation have important implications for all aspects of the hydrologic cycle. Variations in these parameters determine the amount of water that reaches the surface, evaporates or transpires back to the atmosphere, becomes stored as snow or ice, infiltrates into the groundwater system, runs off the land, and ultimately becomes base flow to streams and rivers.

While climate change affects surface water resources directly through changes in the major long-term climate variables such as air temperature, precipitation, and evapotranspiration, the relationship between the changing climate variables and groundwater is more complicated and poorly understood. The greater variability in rainfall could mean more frequent and prolonged periods of high or low groundwater levels, and saline intrusion in coastal aquifers due to sea level rise and resource reduction. This article presents the likely impact of climate change on groundwater resources and recent research studies carried out to assess the impact of climate change on groundwater resources.

Hydrological Studies Using Isotopes (2013)

Isotope hydrology is a field of hydrology that uses isotopic dating to estimate the age and origins of water and its movement within the hydrologic cycle. Water molecules carry unique fingerprints, based in part on differing proportions of the oxygen and hydrogen isotopes that constitute all water. Isotopes are forms of the same element that have variable numbers of neutrons in their nuclei. This article presents the details of hydrological studies using isotope techniques undertaken by National Institute of Hydrology, Roorkee (India) during last few years.

Impact of Climate Change on Agriculture (2014)

Climate change and agriculture are inter-related processes, both of which take place on a global scale. Global warming is projected to have significant impacts on conditions affecting agriculture, including temperature, carbon dioxide, glacial run-off, precipitation and interaction of these elements. The overall effect of climate change on agriculture will depend on the balance of these effects. Assessment of the effects of global climate changes on agriculture might help to properly anticipate and adapt farming to maximize agricultural production. This paper discusses probable impacts of climate change on agriculture.

Modelling of Groundwater Flow and Data Requirements (2015)

Groundwater is used for a variety of purposes, including irrigation, drinking and manufacturing. Groundwater is also the source of a large percentage of surface water. Accurate and reliable groundwater resource information (including quality) is critical to planners and decision-makers. Huge investment in the areas of groundwater exploration, development and management at state and national levels aims to meet the groundwater requirement for drinking and irrigation and generates enormous amount of data. We need to focus on improved data management, precise analysis and effective dissemination of data. Numerical models are capable of solving large and complex groundwater problems varying widely in size, nature and real life situations. With the advent of high speed computers, spatial heterogeneities, anisotropy and uncertainties can be tackled easily. However, the success of any modelling study, to a large measure depends upon the availability and accuracy of measured/recorded data required for that study. Therefore, identifying the data needs of a particular modelling study and collection/monitoring of required data form an integral part of any groundwater modelling exercise. This paper presents groundwater modelling process, basic data requirements for groundwater modelling and commonly used groundwater modelling software.

Concepts and Modelling of Groundwater System (2015)

Groundwater is of fundamental importance in water resources planning, development and management. Groundwater flow has many applications, among which are agricultural developments, domestic use such as supply of drinking water, irrigation, and a variety of water quality applications. As the usage of groundwater expands, our knowledge of groundwater systems must also expand. Numerical groundwater modelling is a tool that can aid in studying groundwater problems and can help increase our understanding of groundwater systems. The purpose of this article is to highlight major groundwater issues, concepts of groundwater modelling, and commonly used groundwater modelling software.

Climate Change Effects on Groundwater Resources (2015)

Climate change is normally defined as any change in climate over time, whether due to natural variability or from human activities. It poses uncertainties to the supply and management of water resources. Although climate change has been widely recognized, research on the effects of climate change on groundwater system is

relatively limited. Groundwater resources are related to climate change through the direct interaction with surface water resources, such as lakes and rivers, and indirectly through the recharge process. This article presents the likely effects of climate change on groundwater resources, and methodology to assess the impact of climate change on groundwater resources.

Contribution of Women in Hydrological Research (2016)

Women play a central part in the provision, management and safeguarding of water. This pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources. Acceptance and implementation of this principle requires positive policies to address women's specific needs and to equip and empower women to participate at all levels in water resources programmes, including decision-making and implementation. The objective of this paper is to highlight some of the recent contribution of women in the field of Hydrology.

Modelling Flow and Transport in Unsaturated Zone (2016)

Unsaturated zone transport models are indispensable tools for analyzing complex environmental pollution problems, and for developing practical management strategies. A quantitative study of water flow and contaminant transport in the unsaturated (vadose) zone is necessary for improvement and protection of the quality of groundwater supplies. This is the region bounded above by the land surface and below by the groundwater table. It is the region through which water derived from precipitation and irrigation infiltrates and transports contaminants to reach the groundwater. This article presents an overview of the modelling process for water flow and contaminant transport in the unsaturated zone, input data requirements and related software packages.

Sea Water Intrusion in Coastal Aquifers (2016)

The coastal regions, particularly deltaic regions, are the most developed and most densely populated regions all over the world. These regions are facing many hydrological problems both due to natural conditions and man's activities. The problems due to natural conditions range from flooding due to cyclones and wave surge to drinking fresh water scarcity due to problem of sea water intrusion. Man's activities compound these problems further. Sea water intrusion is one of the severe problems faced by coastal regions. Natural conditions and man's activities both contribute to this problem. There exists an urgent need to study systematically the causes and

remedial measures for sea water intrusion problem in coastal areas. This article presents the hydrological aspects, control measures and modelling of sea water intrusion in coastal aquifers.

Climate Change and Groundwater (2016)

The Intergovernmental Panel on Climate Change (IPCC) estimates that the global mean surface temperature has increased 0.6 ± 0.2 °C since 1861, and predicts an increase of 2 to 4 °C over the next 100 years. Temperature increases also affect the hydrologic cycle by directly increasing evaporation of available surface water and vegetation transpiration. Consequently, these changes can influence precipitation amounts, timings and intensity rates, and indirectly impact the flux and storage of water in surface and subsurface reservoirs (i.e., lakes, soil moisture, groundwater). In addition, there may be other associated impacts, such as sea water intrusion, water quality deterioration, potable water shortage, etc. While climate change affects surface water resources directly through changes in the major long-term climate variables such as air temperature, precipitation, and evapotranspiration, the relationship between the changing climate variables and groundwater is more complicated and poorly understood. This paper discusses the likely impacts of climate change on groundwater resources and the climate change scenario for groundwater in India.

Groundwater Studies at National Institute of Hydrology, Roorkee, India (2017)

National Institute of Hydrology is a Government of India society under Ministry of Water Resources, River Development & Ganga Rejuvenation. It has been functioning as a research Institute in the area of hydrology and water resources in the country since December 1978 with headquarters at Roorkee (Uttarakhand, India) and six regional centres located in different physiographic regions of the country. This article presents salient details of groundwater studies undertaken by Ground Water Hydrology division of the Institute during last few years.

Subsurface Water Modelling using SWIM and FEFLOW (2017)

Mathematical models provide a scientific and predictive tool for determining appropriate solutions to water allocation, surface water – groundwater interaction, landscape management or impact of new development scenarios. However, if the modelling studies are not well designed from the outset, or the model doesn't adequately represent the natural system being modelled, the modelling effort may be largely wasted, or decisions may be based on flawed model results, and long term adverse consequences may result. This article presents case

studies on modelling of soil moisture movement (unsaturated flow) using SWIM and modelling of seawater intrusion (density-dependent groundwater flow) using FEFLOW.

Hydrological Research at National Institute of Hydrology, India (2017)

The National Institute of Hydrology (NIH) is a premier research Institute in India in the area of hydrology and water resources. The Institute was established in 1978 with the main objective of undertaking, aiding, promoting and coordinating systematic and scientific work in all aspects of hydrology. The Institute has its headquarters at Roorkee (Uttarakhand), four regional centres at Belagavi, Jammu, Kakinada and Bhopal and two centres for flood management studies at Guwahati and Patna. The Institute is well equipped to carry out computer, laboratory and field oriented studies. This article presents an overview of research activities being undertaken by the Institute.

Water Security – Challenges and Needs (2018)

Our fate is intrinsically bound to the fate of our water resources. To build the future we want, we need to harness the contributions of science and innovation for water security. An interdisciplinary and integrated approach is needed for watershed and aquifer management, which incorporates the social dimension of water resources, and promotes and develops international research in hydrological and freshwater sciences. This article presents the challenges and needs pertaining to water security.

Water Resources Issues and Management in India (2018)

Water is one of the most essential natural resources for sustaining life. Its development and management play a vital role in agriculture production. Integrated water management is vital for poverty reduction, environmental sustenance, and sustainable economic development. In view of the rapid increase in population, urbanization, and industrialization, the demand for water for meeting various requirements is continuously increasing. Therefore, we are facing numerous challenges in the water sector, which include reducing per capita water availability, the decline in groundwater table in many areas, and saltwater intrusion in coastal aquifers. The quality of surface water and groundwater is also deteriorating because of increasing pollutant loads from various sources. Climate change may also adversely affect the availability and distribution of water resources. This article presents an overview of relevant issues pertaining to development and management of water resources in India.

Modelling Water Flow in Unsaturated Zone (2018)

The water movements in the unsaturated zone, together with the water holding capacity of this zone, are very important for the water demand of the vegetation, as well as for the recharge of the groundwater storage. A fair description of the flow in the unsaturated zone is crucial for predictions of the movement of pollutants into groundwater aquifers. This article presents an overview of the modelling process for water flow in the unsaturated zone, input data requirements, boundary conditions and related software packages.

Norms for Groundwater Resource Estimation in India (2019)

The occurrence and movement of groundwater are controlled by various hydrogeological, hydrological and climatological factors. Reasonably accurate assessment of groundwater recharge and discharge components is not easy because no direct measurement techniques are presently available. Therefore, indirect methods are generally employed for assessment of groundwater resources. Groundwater is a dynamic and replenishable resource which is normally estimated based upon the annual groundwater recharge. It is subjected to withdrawal for various uses such as irrigation, domestic, industrial etc. This article presents the norms for various groundwater recharge components for estimation of groundwater resources in India.

An Overview of Commonly Used Groundwater Modelling Software (2019)

A groundwater model is any computational method that represents an approximation of an underground water system. While groundwater models are, by definition, a simplification of a more complex reality, they have proven to be useful tools over several decades for addressing a range of groundwater problems and supporting the decision-making process. There are many different ground-water modelling codes available, each with their own capabilities, operational characteristics, and limitations. If modelling is considered for a project, it is important to determine if a particular code is appropriate for that project, or if a code exists that can perform the simulations required in the project. This article presents an overview of most commonly used groundwater modelling codes.

Purpose Driven Studies under National Hydrology Project, India (2019)

Considering the peculiarities and large variation in the nature of problems associated with water resources planning, development and management, the issues

involved in research related to particular region and specific project, there is a provision under National Hydrology Project (NHP) of India is to take up applied and action-oriented R&D studies by the implementing agencies. This article presents the details of purpose driven studies taken up by various implementing agencies under the National Hydrology Project of India.

IV. CONCLUDING REMARKS

This article has been written by Mr. C. P. Kumar to showcase his technical contribution as a Scientist at National Institute of Hydrology, Roorkee, India. He is due to retire from current government service at NIH in September 2020. He is likely to seek suitable post-retirement job opportunity to continue his services from October 2020. Any comments or suggestions are welcome at his e-mail address cpkumar@yahoo.com

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Environmental Education approach in the documents of Pedagogical Guidelines of the Municipal College Custódio Sento-Sé/Ba/Brasil

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Abstract— This article presents the analyzes made of a study on the approach of Environmental Education in the pedagogical activities of the Colégio Municipal Custódio Sento Sé/BA, with the aim of analyzing how the pedagogical guidance documents address Environmental Education. The research has a qualitative, documentary focus, of a descriptive type, which initially seeks to prepare a literature review on the subject, then analyzed the Pedagogical Political Project (PPP), in order to collect the information necessary to carry out the research. Therefore, the result made it possible to realize that the PPP recognizes the importance of the school's social role and the construction of social values for the promotion of citizenship, however, environmental issues were not explicitly addressed in the respective document.

Keyword— Environmental Education, Political Pedagogical Project, Awareness.

I. INTRODUCTION

This work aims to analyze how Environmental Education has been approached in the pedagogical guidance documents to promote awareness and training of critical, participatory and autonomous citizens, in an Elementary School II, at the seat of the municipality of Sento-Sé/BA.

Education has the capacity to transform the realities experienced by human beings, through sensitization and awareness, and Environmental Education is widely discussed today, with the purpose of demonstrating that social, economic and political factors are directly related to the changes that the environment has been suffering.

The development of Environmental Education in the educational scenario is of paramount importance to seek balance in the relationship between man and the natural environment, which is increasingly compromising the quality of life of society. In view of this, urgent measures are needed in order to raise people's awareness in the search for new concepts and ideas about the importance of preserving the environment, being a participatory and continuous process in the construction of values, knowledge and actions.

According to Dias (2004, p. 523) the process is permanent in which “individuals and the community become aware of their environment and acquire new knowledge, values, skills, experiences and determination that make them able to act and solve environmental problems, present and future”.

In this way, Environmental Education is a transversal theme that allows dialogue between different disciplines, enabling communication and joint action between education professionals and students, seeking to show that knowledge is composed by the union of the contents of the disciplines and that they communicate. It is a tool capable of bringing a contextualized and interdisciplinary view.

It is noticed that environmental issues have been discussed and researched today, and this study aims to answer the following question: ¿How is Environmental Education addressed in the pedagogical guidance documents of the School Unit?

In view of the problem of this research, it was determined to verify the following hypotheses: the documents of pedagogical guidelines address the theme of Environmental Education. Or, the pedagogical guidance documents do not address the issue of Environmental

Education. In this sense, the general objective of this study is to analyze how the pedagogical guidance documents address Environmental Education and, to consolidate this analysis, it was listed as specific objectives: a) To know the pedagogical guidance documents of the school; b) To analyze how the Environmental Education is addressed by the Political Pedagogical Project.

The results found point out that the Pedagogical Political Project (PPP) does not have an approach that actually contemplates Environmental Education, thus hindering the respective approach in the school environment based on the pedagogical perspective.

II. THEORETICAL REFERENCE

2.1 – The history of Environmental Education

The transformations in the production processes that occurred after the Industrial Revolution, aroused concerns on the part of social organizations about environmental issues worldwide, starting in the 1960s in the 20th century, because of the levels of pollution and rising temperatures in the Earth (SAMPAIO, 2011).

In 1972, the United Nations (UN) held the first meeting to address environmental issues. The United Nations Conference on the Environment, in Stockholm, which generated the document called “Declaration of the UN Conference on the Human Environment”, proclaiming criteria of relationship between man, production and the environment, that citizens and companies seek balance to find the path that leads to sustainable development (CABEDA, 2017).

Among several determined principles, awareness and awareness is sought to promote the preservation of natural resources such as air, water, land, flora, fauna and parts of natural ecosystems need to be conserved to guarantee the existence of present and future generations. Man has the responsibility to preserve and manage the heritage of flora and fauna and their habitat, which is in grave danger (COELHO; REZENDE, 2016).

After the Stockholm Conference, some actions were taken, such as: 1. The United Nations Educational, Scientific and Cultural Organization (UNESCO), took over the organization of regional and international discussions on Environmental Education (EA); 2. The International Seminar on EE was held in Belgrade, Yugoslavia, in 1975; 3. The United Nations Conference on Environment and Development was held in the city of Rio de Janeiro, known as Rio - 92, where Agenda 21 was created; and, 4. The Creation of the Environmental Education Treaty for Sustainable Society and Global Responsibility.

With all these actions, the world begins to worry about seeking knowledge to address environmental issues. It was noted the need that global societies need to build public policies aimed at the conservation and balance of the environment, establishing principles and rules for the use of non-renewable natural resources. It is the moment when the transversal theme - Environmental Education - starts to be developed within society.

International organizations started to address the issue of sustainable development after the Rio 92 conference. Agenda 21 was a historic milestone, containing the commitment of rich countries in relation to poor countries, each participating country has a duty to incorporate policies based on the proposal for sustainable development, with the aim of improving the quality of life of the population. This document recognizes that poverty and environmental degradation are intertwined. Proposing discussions on combating poverty, changing consumption patterns, combating deforestation. Where it seeks a balance between the relations of economic development, the environment and the human being (GOTTARDO, 2003).

2.2 The Need for Environmental Education

Developing actions in a sustainable manner in the social environment where we operate is a necessity in the contemporary society scenario. In view of the expansion of the capitalist economy, which leads to a consumerist society, causing environmental destruction, such as the climate changes that we already experience today.

Society must adopt economic attitudes that are less aggressive to the environment and these attitudes must come from all nations, from the least developed to the most developed, with the precept of ensuring quality of life for the planet and all forms of life that exist on it.

Humanity needs to balance itself in a sustainable way with the environment, use only what is necessary for its existence and, seek to reorganize nature preservation and active actions in an active and quick way, so that we can ensure the survival of the various forms of life that inhabits the planet. It is of utmost importance to effectively program a quality Environmental Education, which brings in its theme a perspective of raising awareness and sensitizing people in a more active coexistence in benefits of the preservation of natural resources, ensuring better quality of life for all forms of beings existing. It is necessary that the human species be reeducated in a perspective of coexistence and respect for the environment, so that it will generate a mutuality between man and nature (MORIN, 2016).

Environmental Education is an interdisciplinary, multidisciplinary theme that needs the support of

knowledge from various areas acting in partnership to achieve the holistic of the whole. According to Paviani (2014, p.16):

[...] it is not too much to reinforce the idea that interdisciplinarity takes place in each situation in a peculiar way and presupposes the integration of knowledge and people, of units and syntheses of knowledge or of "content", of use or application theories and methods and collaboration (principle of collaboration) between teachers or researchers.

Fazenda (2011, p. 75) points out that "the possibility of being in the world today, understanding and criticizing the innumerable information that attacks us daily, can only happen in overcoming the existing barriers between the disciplines".

Seeking a dialogue between economic development, the environment and human beings is one of the objectives of Environmental Education.

According to Medina and Santos (2008, p.24):

Environmental Education will allow, by its basic assumptions, a new creative interaction that redefines the type of people we want to train and the future scenarios that we want to build for humanity, in function of the development of a new environmental rationality. It is necessary to train individuals who can respond to the challenges posed by the dominant development style, based on the construction of a new harmonious style between society and nature and who, at the same time, are able to overcome merely instrumental rationality and economist, which gave rise to the environmental and social crisis that concern us today.

Such assumptions allow us to understand that it is necessary to integrate society in the search for knowledge, to understand the changes that the environment has been undergoing. Environmental Education leads us to the possibility of exploring, knowing, identifying, describing and interpreting social behaviors in the search to find new proposals for changing the relationship and culture of the human being with the environment through less aggressive actions, and sources of energy alternatives.

However, the new attitudes must be based on the lessons learned in the school environment through the contents studied in the classroom. According to Figaro:

The concrete experience of the students' lives is not outside the school. Connecting school content to the interest of young students presupposes understanding them as discourse producers, in which they select, categorize and organize, from their experiences, all statements addressed to them (FÍGARO, 2010, p.27).

Therefore, Environmental Education, when developed, allows to promote curricular integration in the educational environment, developing interdisciplinarity and contextualization of contents with the lived reality, in the perspective of integral human formation, seeking to form autonomous and critical citizens who can interact and intervene in the environment social environment.

2.3 Environmental Education in the Brazilian educational scenario

Environmental Education is a term that emerged only in the 1970s, as a result of concern with the environmental issue. From then on, the organization of several events that consolidated such issues began, such as the Stockholm Conference in 1972, the Rio-92 Conference in 1992, held in Rio de Janeiro, which established an important measure, Agenda 21, which it was an action plan for the 21st century aimed at the sustainability of life on earth (DIAS, 2004).

In Brazil, Environmental Education became law on April 27, 1999, by Law No. 9,795 - National Environmental Education Policy, where in its Art. 1:

Environmental education is understood as the processes by which the individual and the community build social values, knowledge, skills, attitudes and competences aimed at the conservation of the environment, a common use of the people, essential to a healthy quality of life and its sustainability (PNEA, 1999, p1).

In Art. 2nd states: "Environmental education is an essential and permanent component of national education, and must be present, in an articulated manner, at all levels and modalities of the educational process, in a formal and non-formal character" (PNEA, 1999, p. 1).

In this perspective, Environmental Education is not a new discipline, it has an interdisciplinary character,

where its approach must be integrated and continuous. Interdisciplinarity requires a broader and more meaningful view to understand, the concepts, phenomena and problems of everyday life, through knowledge of different areas of knowledge. We can observe in the National Curriculum Parameters (PCNs), “in the school perspective, interdisciplinarity does not intend to create new disciplines or knowledge, but to use the knowledge of several disciplines to solve a specific problem or understand a particular phenomenon under different points of view sight”(BRASIL, 1999, p.34-36).

Therefore, we realize that Environmental Education with Law, is a policy considered recent, widely discussed today. However, little developed and worked in the school context.

III. METHODOLOGY

The present research was carried out in the Municipality of Sento-Sé - BA/Brazil (figure 1), located in the territory of the Sertão do São Francisco (figure 2), on the edge of Lago de Sobradinho, in the North of the State of Bahia. The Municipality of Sento-Sé according to the Brazilian Institute of Geography and Statistics (IBGE) has an estimated population of 40,684 inhabitants and has a territorial extension of approximately 12,181,239 km² (IBGE, 2019).



Fig.1: Sento Sé/Bahia/Brazil

Source: IBGE (2020)

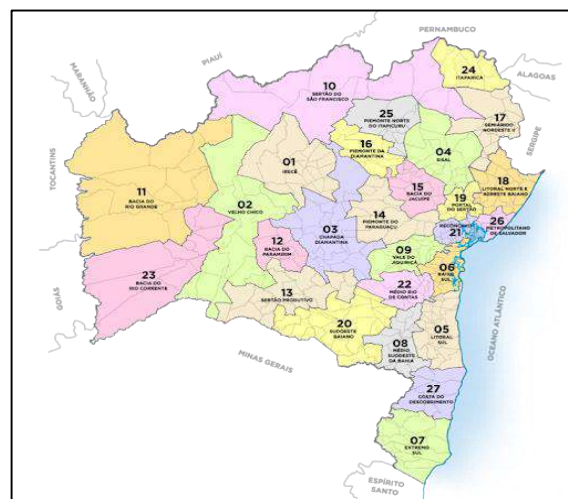


Fig.2: SSF/BA/BR Territory

Source: SECULT/BA (2020)

The School Unit where the research was conducted was Colégio Municipal Custódio Sento-Sé, located at Praça Dr. Juvêncio Alves no number, neighborhood Centro. The school serves classes from Elementary School II and Youth and Adult Education (EJA), in the morning, afternoon and evening shifts, with a population of 955 enrolled students and 57 teachers (CENSO, 2019).

In order to carry out a research, it is essential to define how it will be carried out through the design that, according to Sampieri, Collado and Lucio (2006, p. 154), the term model means the “plan or strategy designed to obtain the information that is want”. For Gonzáles, Fernández and Camargo (2014, p. 43) “a design of the research is determined by the type of investigation that is intended to be carried out, and by the hypothesis that one wishes to verify during the process”.

The methodological approach was qualitative because it is related to analyzing, understanding and interpreting the data of the analyzed documents, about how the pedagogical guidance documents address the theme of Environmental Education and reflecting its directions for activities in teaching practice.

The qualitative approach sought to reach as much information as possible, aiming to expand the knowledge under study. Still according to Sampieri et al. (2006, p.15) “the qualitative research gives depth to the data, the dispersion, the interpretative richness, the contextualization of the environment, the details and the unique experiences”. In this sense, it was sought through the observation moments with the professionals involved in the research process of that school, to reach deeper results,

imbued with veracity and feelings and, thus, reconstruct the reality from their observation, experience and experience.

According to Gil (2008, p. 8), "one can define method as a way to reach a certain end". The author also endorses that "for knowledge to be considered scientific, it is necessary to identify the mental and technical operations that make it possible to verify it". Or, in other words, to determine the method that made it possible to reach that knowledge.

The research also had a documentary character, developed from the survey of documentary analysis of institutional records. Lüdke and André (1986) mention that document analysis can be understood as several operations, which seeks to study and analyze one or several documents, aiming to identify information of facts in them, to find social, economic and ecological circumstances with which there is a possibility of relationships, focusing on issues of interest to the research.

IV. RESULTS AND DISCUSSIONS

The present study was developed through documentary analysis of the instruments of pedagogical guidance of the researched College, in order to understand how Environmental Education is approached in these instruments. The instrument used by the School Unit for its pedagogical organization is the Pedagogical Political Project (PPP).

Given the moments of analysis of the PPP, it can be noted that it was built collectively during the year 2011, and it is explicitly found throughout the text, the search for citizen training to work in the social environment at the same time. Which is inserted, as the school's mission. It was noticed the emphasis given on the social function of the school, to the formation of values focused on citizenship, guiding teachers to the construction of a reflective and contextualized teaching practice.

Starting from the principle that Environmental Education contemplates the environment as a whole, from the relationship between people and the use and care for natural resources, it was analyzed that, when the PPP mentions the formation of citizens and is concerned with the school's social function, it is understood that some principles of Environmental Education are being implicitly contemplated.

For the National Curricular Guidelines for Environmental Education, Art. 2:

Environmental Education is a dimension of education, it is an intentional activity of

social practice, which must give individual development a social character in its relationship with nature and with other human beings, aiming to enhance this human activity in order to make it full of social practice and environmental ethics"(BRASIL/DCNEA, 2012, p.2).

However, it was noticeable that Environmental Education is not explicitly and objectively included in the PPP of the school that is the focus of this research. However, the document is in the process of restructuring. However, its restructuring is being carried out in stages, according to the guidelines of the Municipal Department of Education, and three meetings have already been held.

These meetings were moments of studies for the appropriation of knowledge from the National Common Curricular Base (BNCC), so that the PPP's of the Municipal School Units are rebuilt taking into account the new trends of the national education scenario. Through the analysis of the reports built in the three meetings, it was possible to notice that the theme of Environmental Education until now has not been considered with the necessary and emerging notoriety in the face of the crucial global scenario.

V. CONCLUSIONS

Addressing the theme of Environmental Education in contemporary school environments is a necessity in view of the environmental crises that society has been facing. Having its principles included in the pedagogical guidance documents is indispensable so that the theme can be developed in the pedagogical practice of teachers, to meet social demands.

The research consisted of the analysis of pedagogical guidance documents in order to verify if there is an approach to Environmental Education in the respective documents. The PPP of Colégio Municipal Custódio Sento-Sé/BA recognizes the importance of the school's social role and the construction of social values for the promotion of citizenship, however, environmental issues are not addressed in an explicit and objective way.

However, contemporary society needs an education that can work to develop skills, making individuals able to find solutions to problems through the interaction of knowledge and people. Much is said about Environmental Education, but it is still a distant reality within the School Unit that was researched, taking into account the instructions contained in the PPP.

Therefore, the results of this research collaborate to rethink the fundamental importance of Environmental Education to be explicit in the pedagogical guidance documents, enabling the respective approach in the school environment in an effective way in the teaching pedagogical practice. Thus, contributing to the formation of citizens who seek actions to preserve and conserve the environment, to ensure the survival and quality of life of the various existing beings.

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Opening Effect of Core Type Shear Wall used in Multistoried Structures: A Technical approach in Structural Engineering

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Abstract— The reduction of the overall budget of the project leads to the cost effective one and there should be such criteria of reduction of the cost in different manner. To make economic structure without losing the stiffness criteria, the work has been performed in two stages. The former one is building with single shear wall core and the latter one is building with dual core shear wall; the entire work has performed with four different phases. In first phase total 5 buildings that are modeled with different openings in single core types shear wall and then second phase performs the analysis procedures of the same. The third phases have total 6 buildings that are modeled with different openings in dual core types shear wall and then fourth phase performs the analysis procedures of the same. The result analysis has been performed and then conclusions are drawn. Building with 25% opening area in single core type shear wall and 50% opening area in dual core type shear wall performs well to reduce the cost of the project.

Keywords— Deduction Area, Earthquake Effects, Opening Area, Response spectrum, Shear Wall, Wall Area Reduction, Wall Deduction Ratio.

I. INTRODUCTION

Shear wall is a firm and stiff member, is a structural component used generally around the lift areas. Shear wall has constructed from foundation base to the top of the structure. These walls have the ability to resist the lateral forces along with the uplift forces due to the pull of wind. It has to resist the force that aim to push the walls over. The shear walls are connected with column components; thereby transfer the entire horizontal and vertical loads throughout itself. The shear walls do not need extra finishing or plastering when construction is going on.

II. OBJECTIVES OF THE CURRENT STUDY

The main purpose is to find the optimum building case to counteract earthquake forces and analysis is done using software STAAD Pro. So for this, different loads applied and parametric values obtained are considered and the point of comparison on different building models is as follows:

1. Use of response spectrum method in with and without opening dual configuration multistoried structure.

2. To take 10 different buildings, (5 for Single Core + 6 for Dual Core) comparing them among each heads by using Response Spectrum Method of dynamic analysis using Staad pro software.
3. To calculate maximum displacement and then comparing all the 5 single core cases and 6 dual core cases.
4. To compare base shear in both X and Z direction and then comparison have performed on all the 5 single core cases and 6 dual core cases.
5. To explore the possibilities of overall structural resistance by minimal use of shear wall area.
6. To determine maximum Axial Forces in column and then comparison have performed on all the 5 single core cases and 6 dual core cases.
7. To evaluate maximum Torsional Moments in beams along X and Z directions and then comparison have performed on all the 5 single core cases and 6 dual core cases.

To obtain the best building with opening threshold criteria, all buildings are thoroughly observed and compared their parametric values.

III. PROCEDURE AND 3D MODELING OF THE STRUCTURE

As per criteria for earthquake resistance design of structures, a commercial building (G+20) with plinth area 625 sq. m. for single core and 750 sq. m. for dual core has taken for analysis. A total of five different cases have been chosen for parametric analysis for single core type shear wall and total six different cases have been chosen for parametric analysis for dual core type shear wall, its description shown below with its own abbreviations. Various input parameters of buildings are shown in Table 1 with earthquake input parameters taken respectively.

M 30 grade of concrete with Fe 415 grade of steel is used in the entire analysis procedure. Dead loads, Live loads, Response spectrum loads are applied on the structure with various load combinations. Figure 1 and figure 2 shows floor plan and the entire sectional 3D views of the single core building. Figure 3 and figure 4 shows the typical floor plan and entire sectional 3D views of the dual core building. After then, the comparative result of various parameters has shown with graphical representation of each core case.

Table 1: Input Parameters Used

Constraint	Assumed data for all buildings
Soil type	Medium Soil
Seismic zone	III
Response reduction factor (ordinary shear wall with SMRF)	4
Importance factor (For all semi commercial building)	1.2
Damping ratio	5%
Fundamental natural period of vibration (T_a)	$0.09 \cdot h / (d)^{0.5}$
Plinth area of building (For Single Core)	625 sq. m
Plinth area of building (For Dual Core)	750 sq. m
Floors configuration	G + 20
Height of building	77 m
Floor to floor height	3.5 m
Depth of foundation	3.5 m
Beam sizes	450 mm X 600 mm
Column sizes	550 mm X 650 mm
Slab thickness	170 mm (0.17 m)

Shear wall thickness	270 mm (0.27 m)
Material properties	M 30 Concrete Fe 415 grade steel

Different building model cases selected for analysis using Staad Pro software

When Single Core is used:-

Table 2: List of buildings framed with assigned abbreviation for Single Core Shear Wall

S. No.	Buildings framed for analysis when Single Core Type Shear Wall used	Abbreviation
1.	Building with 100 % shear wall area used	Core 1
2.	Building with 90 % shear wall area used	Core 2
3.	Building with 87.5 % shear wall area used	Core 3
4.	Building with 83.33 % shear wall area used	Core 4
5.	Building with 75 % shear wall area used	Core 5

When Dual Core is used:-

Table 3: List of buildings framed when dual core is used with assigned abbreviation

S. No.	Buildings framed for analysis when Dual Core Type Shear Wall used	Abbreviation
1.	Building with 100 % shear wall area used	Dual Core 1
2.	Building with 90 % shear wall area used	Dual Core 2
3.	Building with 87.5 % shear wall area used	Dual Core 3
4.	Building with 83.33 % shear wall area used	Dual Core 4
5.	Building with 75 % shear wall area used	Dual Core 5
6.	Building with 50 % shear wall area used	Dual Core 6

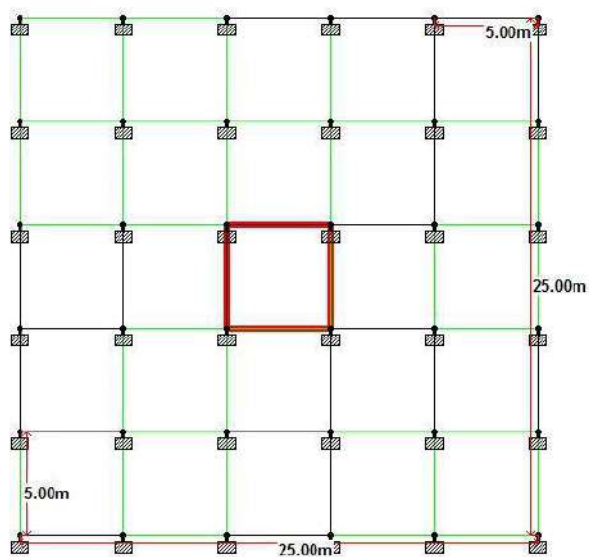


Fig. 1: Typical floor plan of single core

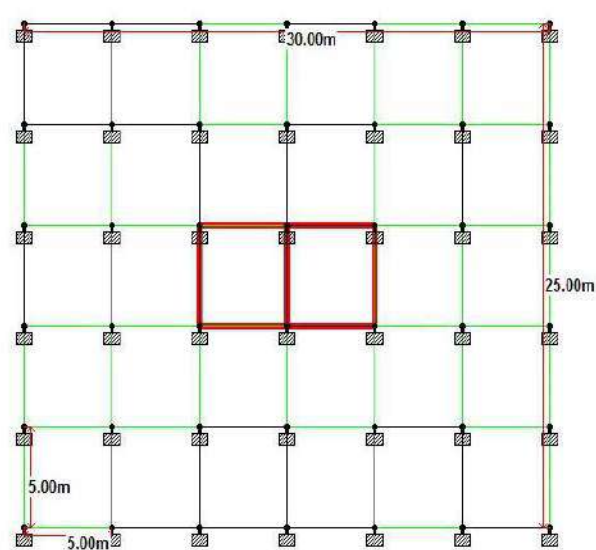


Fig. 3: Typical floor plan of Dual Core

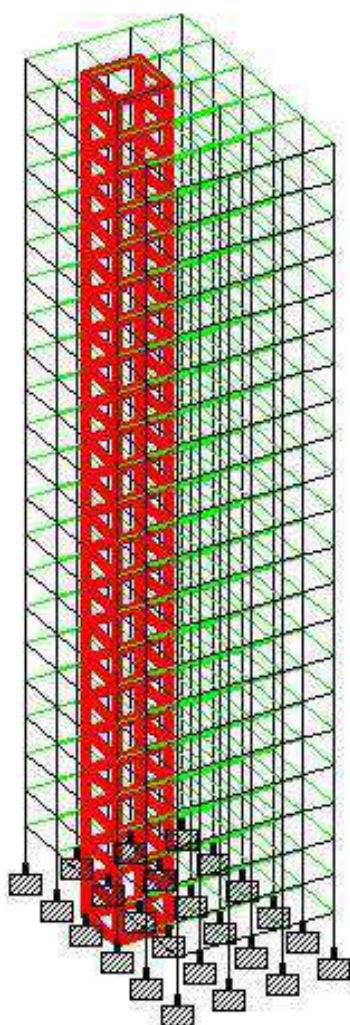


Fig. 2: Sectional 3D view of Single Core

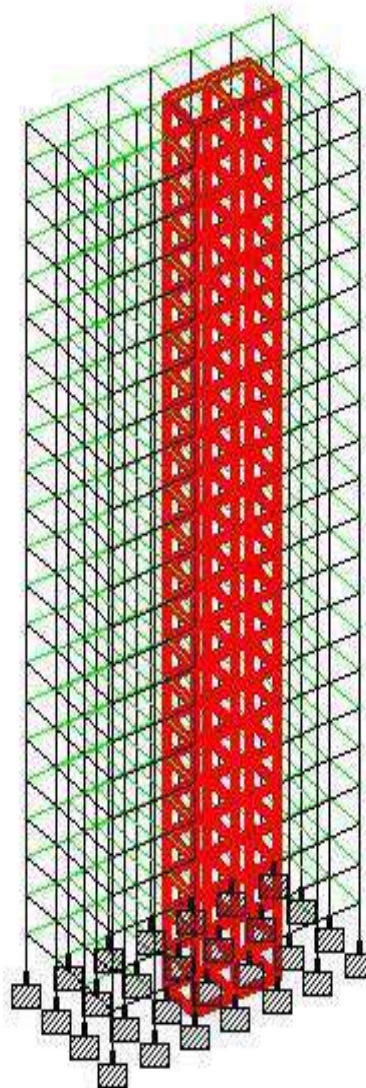


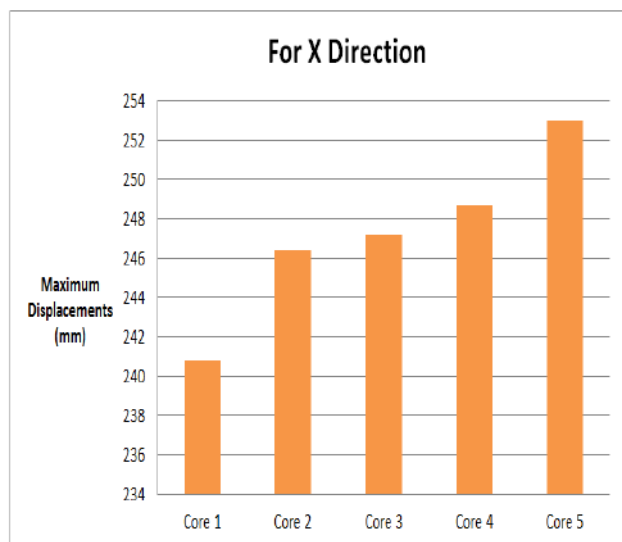
Fig. 4: Sectional 3D view of Dual Core

IV. RESULTS ANALYSIS

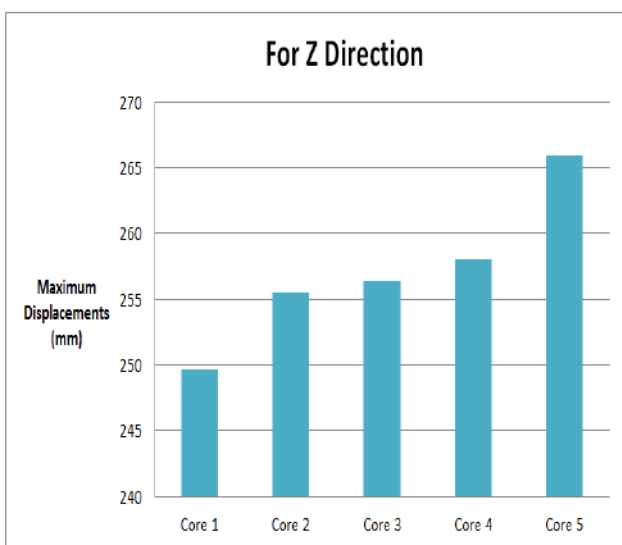
To reduce the overall cost and to reduce the weight of the structure, For the stability of the structure by changing the grade of concrete in columns at different pairs, parameters such as the nodal displacement in both X and Z directions, base shear in both X and Z directions, column axial forces, and last but not the least beam torsion values in both X and Z directions.

The above parameters obtained by the application of loads and their combinations on various cases of the multistory building as per Indian Standard 1893: 2016 code of practice.

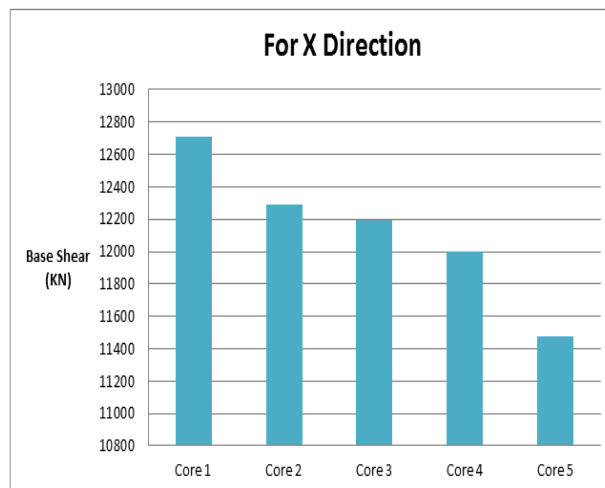
Result of each parameter and for both single and dual core has discussed with its graphical form below:-



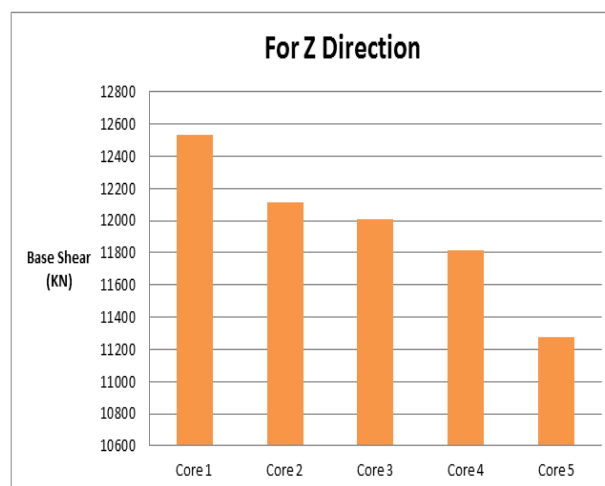
Graph 1: Graphical Representation of Maximum Displacement in X direction for all Single Core Cases



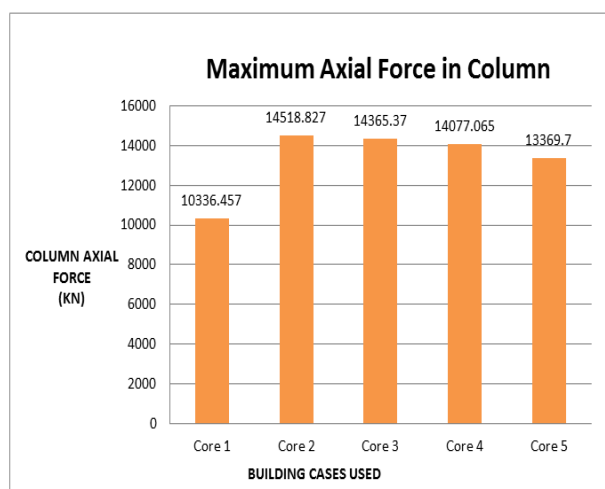
Graph 2: Graphical Representation of Maximum Displacement in Z direction for all Single Core Cases



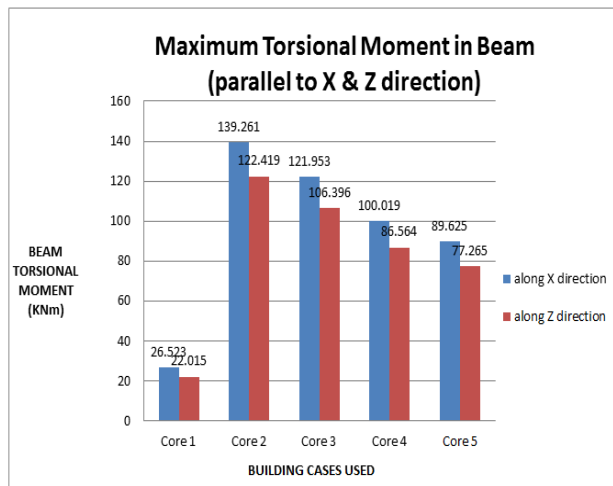
Graph 3: Graphical Representation of Base Shear in X direction for all Single Core Cases



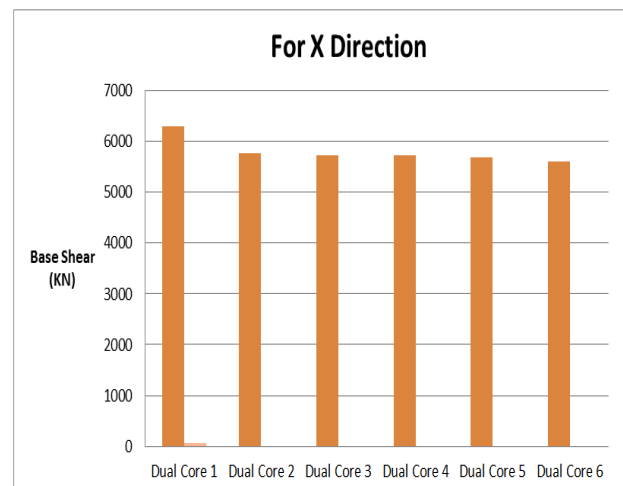
Graph 4: Graphical Representation of Base Shear in Z direction for all Single Core Cases



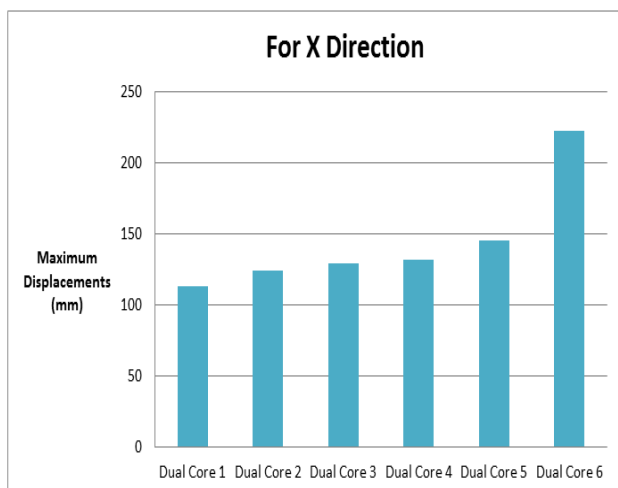
Graph 5: Graphical Representation of Maximum Axial Forces in Column for all Single Core Cases



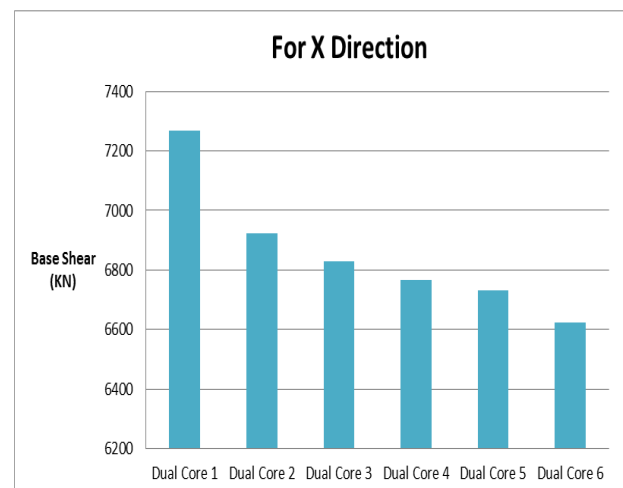
Graph 6: Graphical Representation of Maximum Torsional Moment in beams along X and Z direction for all Single Core Cases



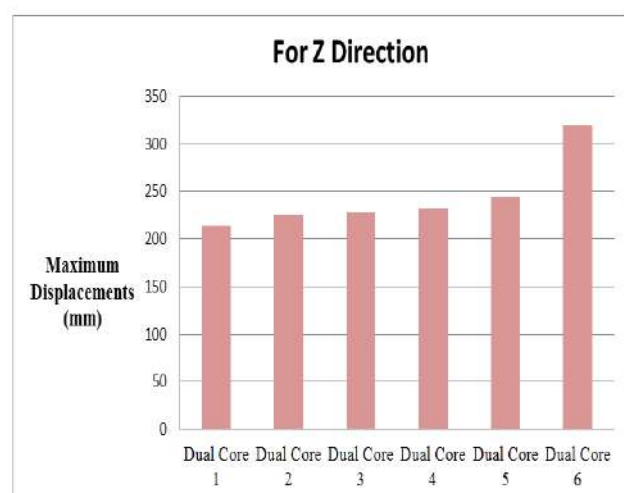
Graph 9: Graphical Representation of Base Shear in X direction for all Dual Core Cases



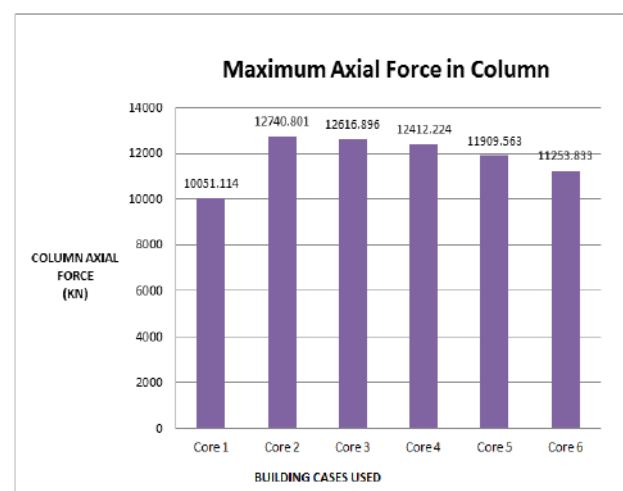
Graph 7: Graphical Representation of Maximum Displacement in X direction for all Dual Core Cases



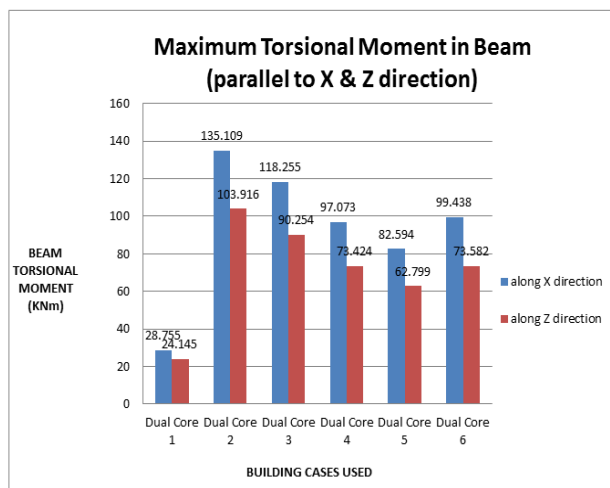
Graph 10: Graphical Representation of Base Shear in Z direction for all Dual Core Cases



Graph 8: Graphical Representation of Maximum Displacement in Z direction for all Dual Core Cases



Graph 11: Graphical Representation of Maximum Axial Forces in Column for all Dual Core Cases



Graph 12: Graphical Representation of Maximum Torsional Moment in beams along X and Z direction for all Dual Core Cases

V. CONCLUSIONS

Conclusions evolved by analyzing the result data of various parameters for all five Single Core are as follows:-

1. Maximum displacement in X direction and Z direction increases due to reduction in Shear Wall and when the opening crosses 10%, there is an increase in displacements for single core cases.
2. Base shear values decreases as the weight of the structure decreases since there is an increase in opening area percentage. For this, in both X and Z directions, building core case 5 shows the best parametric values at 25 % shear wall opening.
3. Values of Maximum Axial forces in column first increases from 0% to 10 % opening area and then the values constantly decreases and hence building core case 5 is economical among all.
4. Torsion in beam shows limiting parametric values up to building core case 5 when there will be deduction in shear wall area.

Conclusions evolved by analyzing the result data of various parameters for all six Dual Core Cases are as follows:-

1. Maximum displacement in X direction and Z direction increases due to reduction in Shear Wall and when the opening crosses 10%, there is an increase in displacements for dual core cases.
2. Base shear values decreases as the weight of the structure decreases since there is an increase in opening area percentage. For this, in both X and Z

directions, building dual core case 6 shows the best parametric values at 50 % shear wall opening.

3. Values of Maximum Axial forces in column first increases from 0% to 10 % opening area and then the values constantly decreases and hence building core case 6 is economical among all with 50% opening area.
4. Torsion in beam shows limiting parametric values under dual core case 2 when there will be deduction in shear wall area.

Due to Seismic effects, for single core structures, building core case 5 shows best parametric values among all. Similarly, for dual core structures, building core case 6 shows best parametric values among all.

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Numerical Analysis of Free Convection flow in Square Enclosure Partially Heated from below using the Multigrid Method

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Abstract— The present work investigates the efficiency of the Multigrid method when applied to solve two-dimensional laminar steady free convection flow in a square enclosure partially heated from below. The numerical method includes finite volume discretization with upwind scheme on structure orthogonal regular meshes. The performance of the correction storage (CS) Multigrid algorithm is compared for different numbers of sweeps in each grid level. Up to two grids, for both Multigrid V- and W- cycles, are presented. The results are mainly analyzed in terms of the average heat transfer at the walls of the enclosure and Multigrid performance on the rate of convergence. It is also shown that convective heat transfer has a characteristic behavior for each boundary conditions adopted in given ranges of the governing parameters.

Keywords— Multigrid, Free convection, Finite Volume, Numerical Methods.

Abbreviated title: Numerical Analysis of Free Convection Using the Multigrid Method

Nomenclature

C_p	Specific heat at constant pressure
CPU	CPU Time (s)
g	Gravitational acceleration
Gr	Grashof number
h	Average convective heat transfer coefficient
H	Height of the enclosure
L	Domain length / height
k	Thermal conductivity of the fluid
M	Maximum grid number
Nu	Average Nusselt number,
p	Thermodynamic pressure
Pe	Peclet number
Pr	Prandtl number
R_{ij}	Residue
T	Temperature
t_w	Temperature of the isothermal vertical wall

S_φ	Source term for φ , $\varphi = U, V, p, t$
U	Component of velocity along x axis
V	Component of velocity along y axis
w	Width of the inlet, and the vent
x, y	Cartesian coordinates
Subscript	
i, j	Nodal index
in	Input values
k	Grid level
nb	Neighboring
Greeks Characters	
α	Thermal diffusivity, $\rho C_p / k$
β	Coefficient of thermal expansion, $\left(\frac{-1}{\rho}\right)\left(\frac{\partial p}{\partial t}\right)_p$
ε	Dimensionless length of the heat source, $= l/L$
ν	Kinetic viscosity of the fluid
μ	Dynamic viscosity
ρ	Density of fluid
φ	General variable
Γ_φ	Diffusion coefficient for φ , $\varphi = U, V, p, t$
ν^{cg}	Number of Coarsest-grid iterations
ν^{pre}	Number of pre-smoothing iterations
ν^{post}	Number of post-smoothing iteration

I. INTRODUCTION

This study promotes a discussion surrounding the efficiency of the Multigrid method applied in a specific configuration. Multigrid methods have been used in many different calculations as a result of its facilitated converge capability. In single-grids, convergence rates solutions are greater in the beginning of calculations, reducing this sensibility while the iterative processes goes on. This hard-to-converge behavior is due to the iterative methods which smooth out only those Fourier error components of wavelengths smaller than or equal to the grid size. Naturally, this effect becomes more significant as the mesh becomes refined. At another level, Multigrid methods cover a broader range of wavelengths through relaxation on more than one grid, making it easier to converge.

A Multigrid cycle is a repetitive procedure practiced at each grid level according to the grid hierarchy. The V- and W- cycles are types of Multigrid that determines the convergence criterion and the number of iterations in each step along consecutive grid levels visited by the algorithm. Within each cycle, the intermediate solution is relaxed before (pre-) and after (post-smoothing) the transportation of values to coarser (restriction) or to finer (prolongation) grids [[1]-[3]].

The Multigrid method can be roughly classified into two major categories. The CS formulation, where algebraic equations are solved for the corrections of the variables and the Full Approximation Storage (FAS) scheme, where variables themselves are handled in all grid levels. Since much work has been done on both major classifications, specific recommendations are admitted. The application of

the CS formulation is recommended for the solution of linear problems being the FAS formulation more suitable to non-linear cases [[1]-[3]]. Therefore, an exception has been disclosed in the work of [[4]], who reported predictions for the Navier-Stokes equations successfully applying the Multigrid CS formulation. In the literature, however, not too many attempts in solving non-linear problems with Multigrid linear operators are found.

Acknowledging the advantages of using multiple grids, [[5]] presented numerical computations applying this technique to recirculating flows in several geometries of engineering interest. There, the correction storage (CS) formulation was applied to non-linear problems. Later [[6]], analyzed the effect of Peclet number and the use of different solution cycles when solving the temperature field within flows with a given velocity distribution. In all those cases, the advantages in using more than one grid in iterative solution was confirmed, furthermore, [[7]], introduced the solution of the energy equation in their Multigrid algorithm. Temperature distribution was calculated solving the whole equation set together with the flow field as well as uncoupling the momentum and energy equations. A study on optimal relaxation parameters was there reported. More recently, [[8]] analyzed the influence of the increase of points of the mesh and optimal values of the parameters of the Multigrid cycle for different geometries. Also, [[8]-[11]], presented a study on optimal convergence characteristics in solution of conductive-convective problems.

Much work has been done with enclosure geometries, studying heat and mass transfer, (simultaneously or not) because of its engineering response value. The reason for the attention behind the physical nature of buoyancy-induced flows is well represented in [[12]]. Cooling of electronic devices before its excessive heating, recovery of remnant oil in petroleum reservoirs, dispersion of atmospheric pollution and its implications in adjacent cities, spreading chemical and nuclear waste in soil, are just some examples of its importance.

The current work considers that free convection conditions can be imposed inside a square cavity and aims to study the interactions between buoyancy forces and heat elements inside. This application involves the work showed in the literature that has been discussed by many authors. The interaction between buoyancy forces and the heated elements and the numerical analysis of Multigrid solution applied into momentum and heat transfer forms the main objective of current work.

II. GOVERNING EQUATIONS

The following equations emerge from the mathematical descriptions of fluid flow and convective heat transfer in the enclosure. These governing equations are based on two-dimensional, incompressible, laminar flow in Cartesian coordinate system.

$$\frac{\partial U}{\partial x} + \frac{\partial V}{\partial y} = 0 \quad (1)$$

$$U \frac{\partial U}{\partial x} + V \frac{\partial V}{\partial y} = -\frac{1}{\rho} \frac{\partial p}{\partial x} + \nu \nabla^2 U \quad (2)$$

$$U \frac{\partial V}{\partial x} + V \frac{\partial V}{\partial y} = -\frac{1}{\rho} \frac{\partial p}{\partial y} + \nu \nabla^2 V + g [\beta_T (T - T_{ref})] \quad (3)$$

$$U \frac{\partial T}{\partial x} + V \frac{\partial T}{\partial y} = \alpha \nabla^2 T \quad (4)$$

Where U and V are the velocity components in x and y directions respectively, ρ is the density of the fluid, p is the total pressure and ν is the kinematic viscosity of the fluid. The gravity acceleration is defined by g and β_T is the thermal expansion coefficient. T and T_{ref} are the temperature and the reference temperature, respectively, and α is the thermal diffusivity.

The transport dimensionless parameters, Grashoff (Gr), which provides the relationship between fluid buoyancy and viscosity, Prandtl (Pr), that provides the relationship of momentum diffusivity and thermal diffusivity and the Rayleigh number (Ra), which is an associated number of buoyancy-driven flow (natural convection) are given by:

$$Gr = \frac{g \beta_T \Delta T H^3}{\nu^2}, Pr = \frac{\nu}{\alpha} \quad (5)$$

$$Ra = Gr \cdot Pr \quad (6)$$

III. NUMERICAL MODEL

The solution domain consist on a number of rectangular control volumes (CV), resulting in a structure orthogonal non-uniform mesh. Grid points are located according to a

cell-centered scheme and velocities are store in a collocated arrangement[[13]]. A typical CV with its main dimensions

and internodal distances is sketched in Fig. **Error! Reference source not found..**

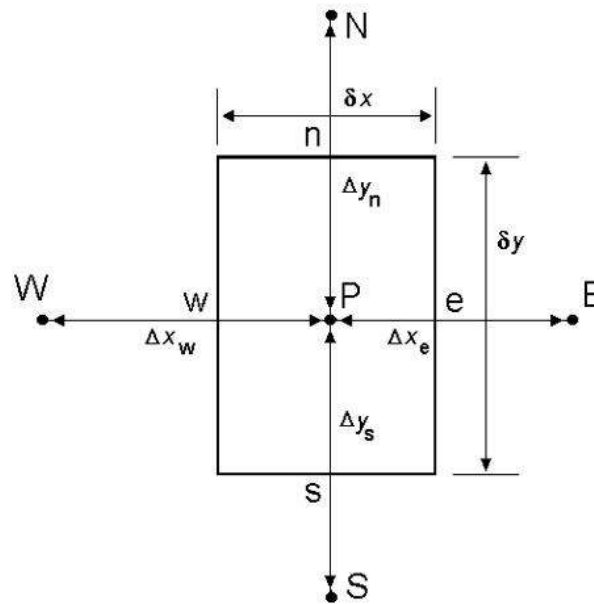


Fig. 1– Control Volume for discretization.

Writing equations (1), (2), (3) and (4) in terms of a general variable $\varphi = \{1, U, V, T\}$ with

$$\Gamma_\varphi = \left\{ 0, \mu, \mu, \frac{\mu}{Pr} \right\} \text{ and } S_\varphi = \left\{ 0, -\frac{\partial P}{\partial x}, -\frac{\partial P}{\partial y}, 0 \right\}$$

one gets,

$$\frac{\partial}{\partial x} \left(\rho U \varphi - \Gamma_\varphi \frac{\partial \varphi}{\partial x} \right) + \frac{\partial}{\partial y} \left(\rho V \varphi - \Gamma_\varphi \frac{\partial \varphi}{\partial y} \right) = S_\varphi \quad (7)$$

After integrating it over the CV of Fig. **Error!**

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$$\int_{\partial V} \left[\frac{\partial}{\partial x} (\rho U \varphi) + \frac{\partial}{\partial y} (\rho V \varphi) \right] dV = \int_{\partial V} \left[\frac{\partial}{\partial x} \left(\Gamma_\varphi \frac{\partial \varphi}{\partial x} \right) + \frac{\partial}{\partial y} \left(\Gamma_\varphi \frac{\partial \varphi}{\partial y} \right) \right] dV + \int_{\partial V} S_\varphi dV \quad (8)$$

A set of algebraic equations are resulted from the integration of terms in (8), as one can name it, convection, diffusion, and source. Since these procedures are described somewhere else (e.g. **Error! Reference source not found.**)

they are not repeated in this paper. To summarize, convective terms are discretized using the upwind differencing scheme (UDS) and diffusive fluxes make use of the central differencing scheme (CDS).

The final discretization for grid node P is done by using the integrated transport equation (8) with the substitution of all approximate expressions for interface values and gradients.

$$a_P \varphi_P = a_E \varphi_E + a_W \varphi_W + a_N \varphi_N + a_S \varphi_S + b \quad (9)$$

With the east face coefficient, for example, being defined as:

$$a_E = \max[-C_e, 0] + D_e \quad (10)$$

In (10), $D_e = \mu_e \delta_y / \Delta x_e$ and $C_e = (\rho U)_e \delta_y$ are the diffusive and convective fluxes at the CV east face, respectively, and as usual, the operator $\max[a, b]$ returns the greater between a and b .

IV. MULTIGRID TECHNIQUE

The wanted effect of the Multigrid approach in this work is for the convergence rate to become independent on

the grid spacing and the numerical solution faster. The task behind the Multigrid method is to involve a hierarchy of successively coarsened grids into the iterative solution process. When done, an adequate strategy for the movement through the different grid levels should follow, along with consistently transferring data with the discretization scheme between the grids. This process allows an efficient error reduction over a wide spectrum of frequencies.

If an iterative scheme as the one described below is applied to the system of equations on a given grid, it turns out only those frequencies of the solution error can be reduced efficiently, which corresponds to the grid spacing. The high frequencies of the error are reduced a few iterations, while the low frequencies nearly remain unchanged. At another level, the steps usually taken in Multigrid algorithm are the reduction of high frequency errors (smoothing), computation of residual error (residual computation), decimation of the residual error to a coarser

grid (restriction), and the interpolation into a finer grid. The present development about the Multigrid technique is also presented in [[5],[6],[10],[11]] and for this reason the development is not repeated here.

V. RESULTS AND DISCUSSION

The computer code was run on an IBM PC machine with an INTEL CORE 2 DUO 2.0 GHz processor. Grid independence studies were conducted such that the solutions presented herein are essentially grid independent. For both cycles, pre- and post-smoothing iterations were accomplished via the Gauss-Seidel algorithm while, at the coarsest-grid, the TDMA method has been applied [[13]].

The Fig. 2 a) represent general geometries that were run with the finest grid having 66x66 grid points highlighted in Fig. 2 b).

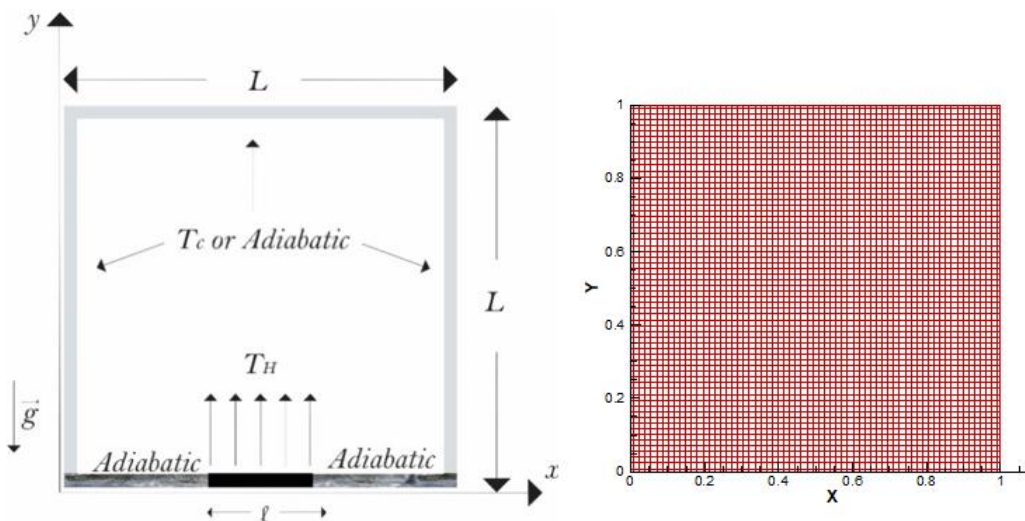


Fig. 2 - a) Geometries and boundary conditions and b) computational grid.

The main difference between the present work and the work from [[14]] is that here it is used the prescribed values (temperature - T_H) while in the reference work is used heat fluxes. This particularity reinforces a permanent regime with constant physical properties of the flux.

In order to understand better the implications of this new configuration and construct a simpler idea of the square cavity, for comparison meaning, Fig. 3 shows the streamlines and isotherms, respectively, of a clear square cavity heated on the left and cooled from the opposing side for Rayleigh numbers ranging from 1×10^3 to 1×10^6 .

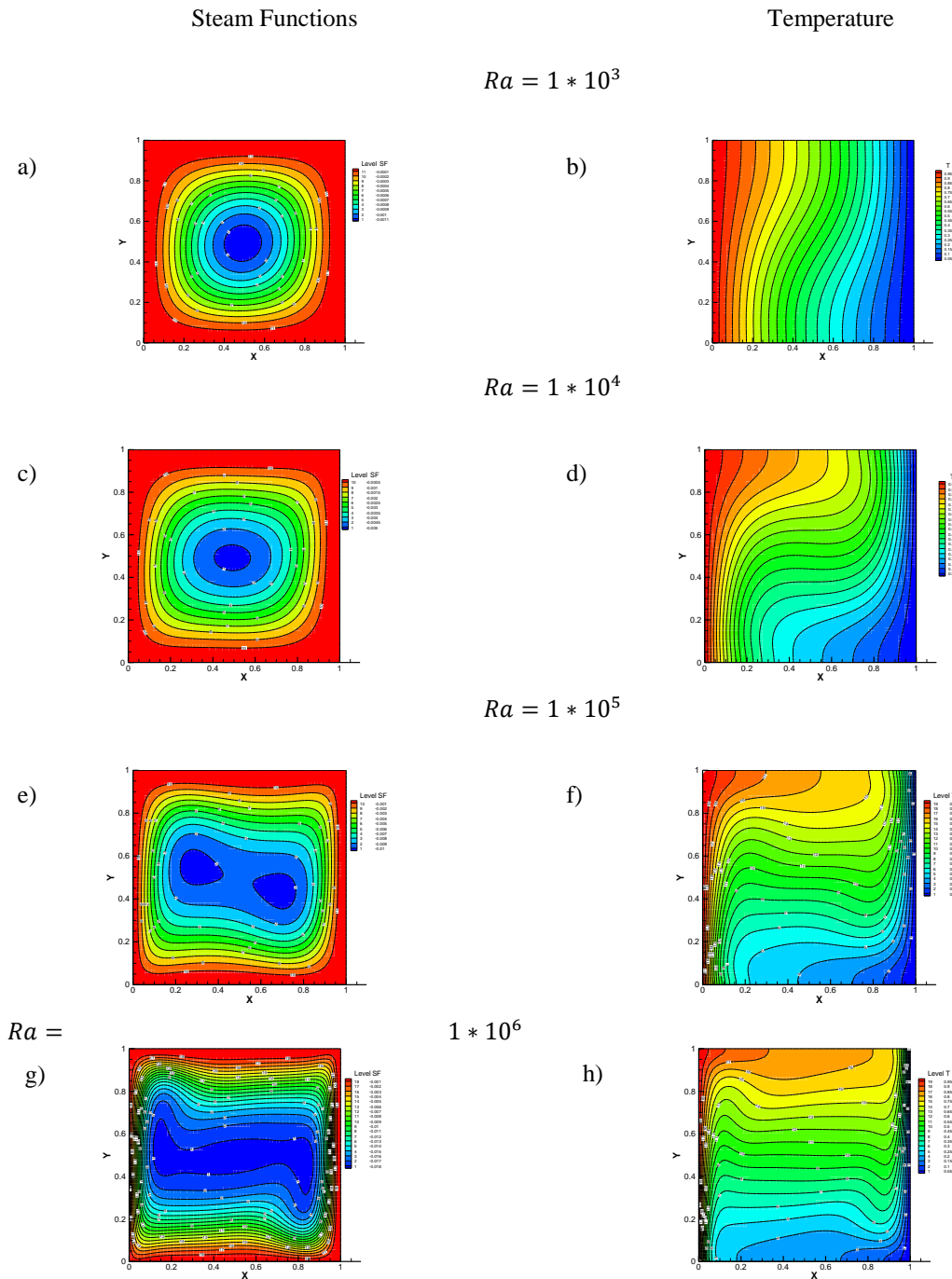


Fig. 3 - Natural Convection in Square Cavity from left to bottom $Ra = 1 * 10^3$, $Ra = 1 * 10^4$,
 $Ra = 1 * 10^5$ and $Ra = 1 * 10^6$, respectively.

In Fig. (3a), $Ra = 1 \times 10^3$, the streamlines indicates an existence of one centered vortex while corresponding isotherms, Fig. (3b), indicates a conductive heat transfer, expressed by the almost parallel pattern with the heated wall. The vortex is generated by the horizontal temperature

gradient across the section. This gradient, $\frac{\partial T}{\partial y}$ is negative everywhere, inducing a clockwise oriented vorticity.

When the Rayleigh number is increased to $Ra = 1 \times 10^4$, Fig. (3c), the vortex in the middle of the

cavity starts to shape differently, slightly into a more elliptic configuration. The isotherms, Fig (3d), therefore, have a considerable convection advance, and the parallel

configuration is undone, especially in the middle of the cavity. Temperature gradients are stronger near the vertical walls, but decrease in the center region.

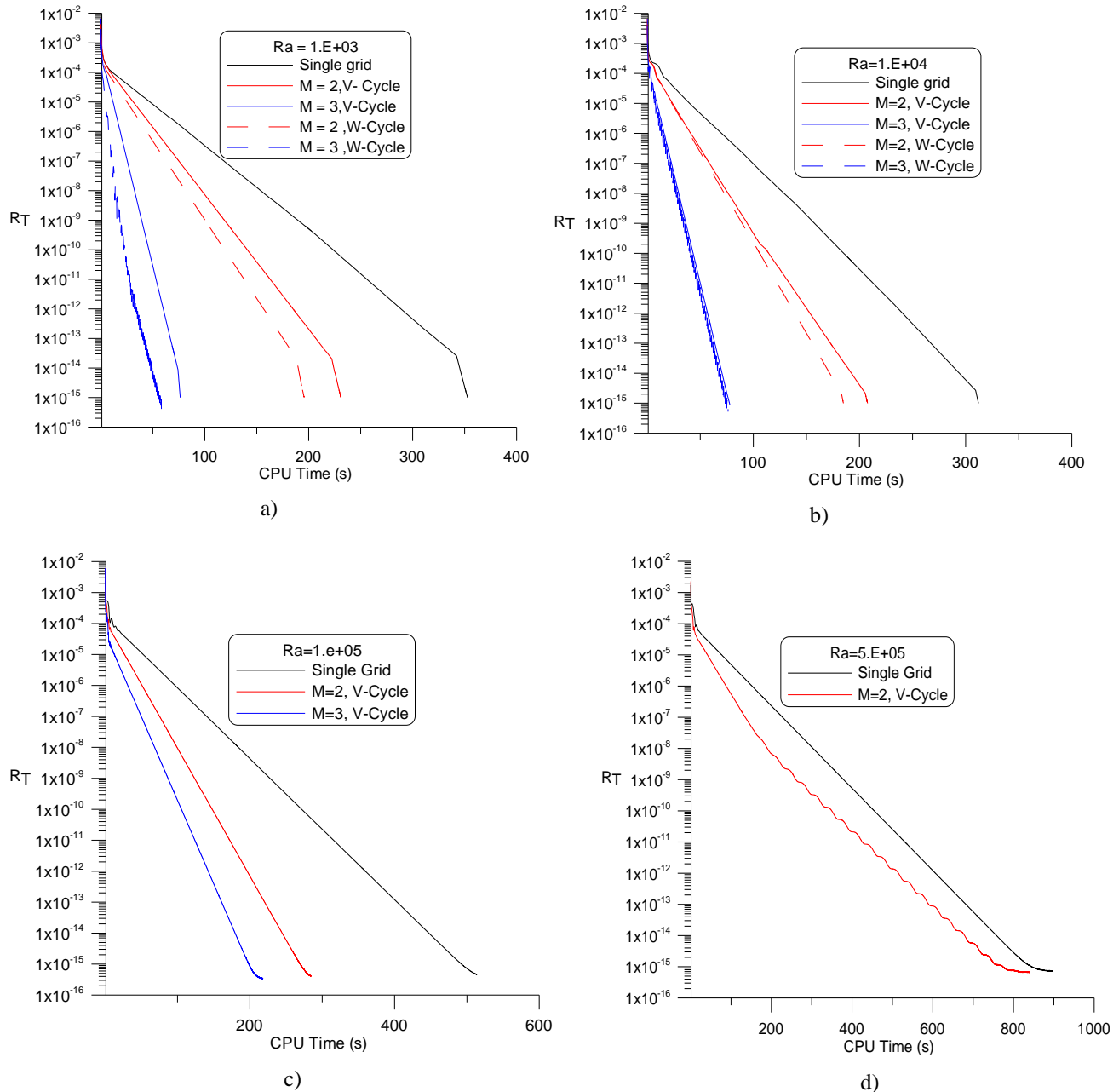


Fig. 4 – Temperatures residues history for different values of the Rayleigh number: a) $Ra = 1 \times 10^3$,
b) $Ra = 1 \times 10^4$, c) $Ra = 1 \times 10^5$ and d) $Ra = 1 \times 10^5$

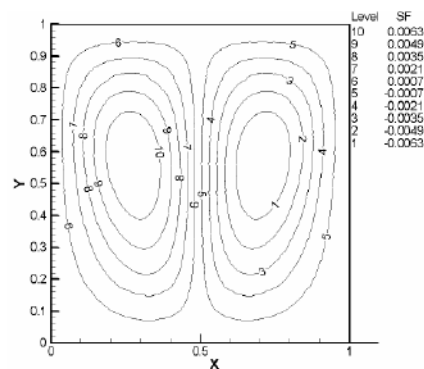
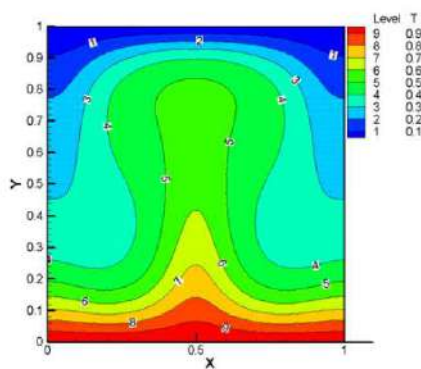
For $Ra = 1 \times 10^5$, Fig. (3e), the elliptical behavior continuous and the centered vortex is stretched so that two secondary vortices can be shown inside of it. Heat transfer by convection in the viscous boundary layer alters the temperature distribution to such an extent that temperature gradients in the center of the domain are close to zero. Fig. (3e) shows that, with this change in the sign of the source term negative, vorticity is induced within the domain. This also causes the development of secondary vortices in the core. Fig. (3f) continuous its convection advance in the square cavity indicating a faster movement of the flux closer to the walls.

Finally, in Fig. (3g), $Ra = 1 \times 10^6$, one can see an initiative attempt for a three vortices configuration inside the main vortex. Corresponding Fig. (3h) shows that heat transfer is mostly convective, again due to the faster movement on boarders.

Fig.4 above, shows the residue history for temperature with different values of $Ra = 1 \times 10^3$ to 5×10^5 , up to 3 grids, for the V- and W-cycles. For a three grids, with $Ra = 1 \times 10^3$ one can notice a slight advantage in using the W-cycle, while in $Ra = 1 \times 10^4$ that advantage is almost unnoticeable. Now, looking at higher Rayleigh numbers, $Ra = 1 \times 10^5$ to $Ra = 5 \times 10^5$, the V-cycle can be better stipulated. This change of cycle due to the increase in the Rayleigh number happens because of the changing flux attempt to turn turbulent. An explanation for this matter are on many references of Multigrid approximation on turbulent flow, which in most of the cases use the FAS formulation.

Another configuration, shows the results of isotherms and streamlines of a clear square cavity heated on the bottom and cooled from the top for a Rayleigh number of $Ra = 4 \times 10^4$. The work of [[12]] is used for comparison.

Reference [[12]]



Present Results

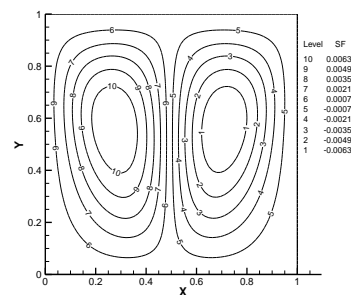
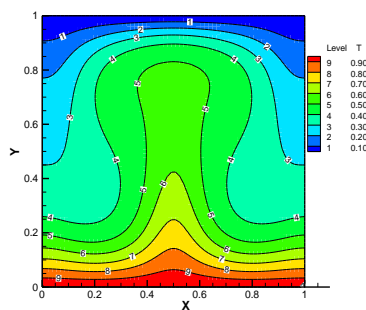


Fig. 5 – Isotherms and Streamlines for a clear square cavity heated from bottom and from the ceiling for $Ra = 1 \times 10^4$, comparison between [[12]] and present research.

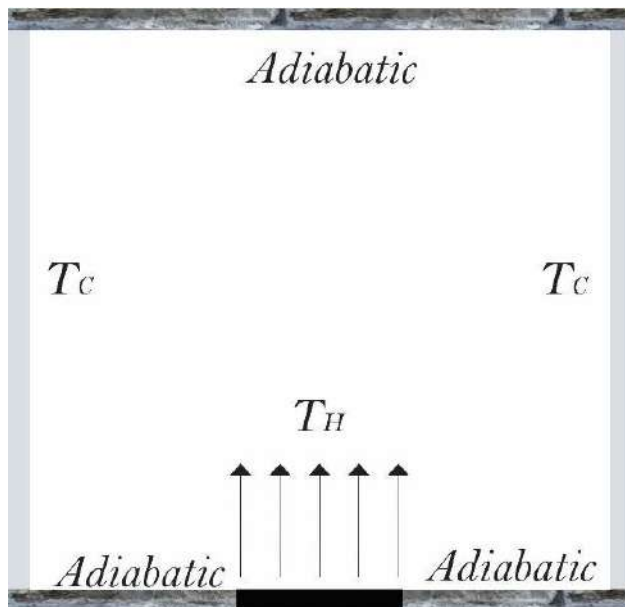
In Fig. 5, it is easy to see the similarities in the results of both works. Studying these results, one can note the plume

shaped structure starting at the bottom of the cavity moving towards the top. Circulatory motion brings the bottom hot

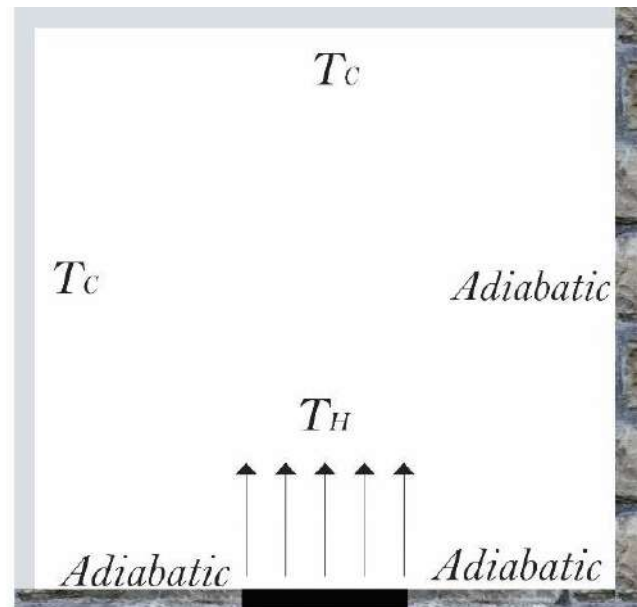
temperature stream up to the top wall, substantially penetrating into the flow core.

From these results, is expected a better understanding and a certain familiarization with the final configuration, Fig. 2a, due to the heated bottom in the square cavity. Additionally, Fig. 5 represents the only possible solutions for that Ra number, reinforcing the final results and the geometry qualitatively.

Final configuration, square cavity partially heated from above, is separated into two different forms, denoted as C_1 and C_2 . The C_1 structure has both lateral walls cooled at temperature T_c and top wall adiabatic, while C_2 has left lateral wall and top wall cooled at temperature T_c and right lateral wall adiabatic. Fig. 6 is a representative scheme of C_1 and C_2 . Notice that for all configurations the total surfaces of the cooled walls are identical.



Configuration C1



Configuration C2

Fig. 6 - Thermal configurations of the cavity.

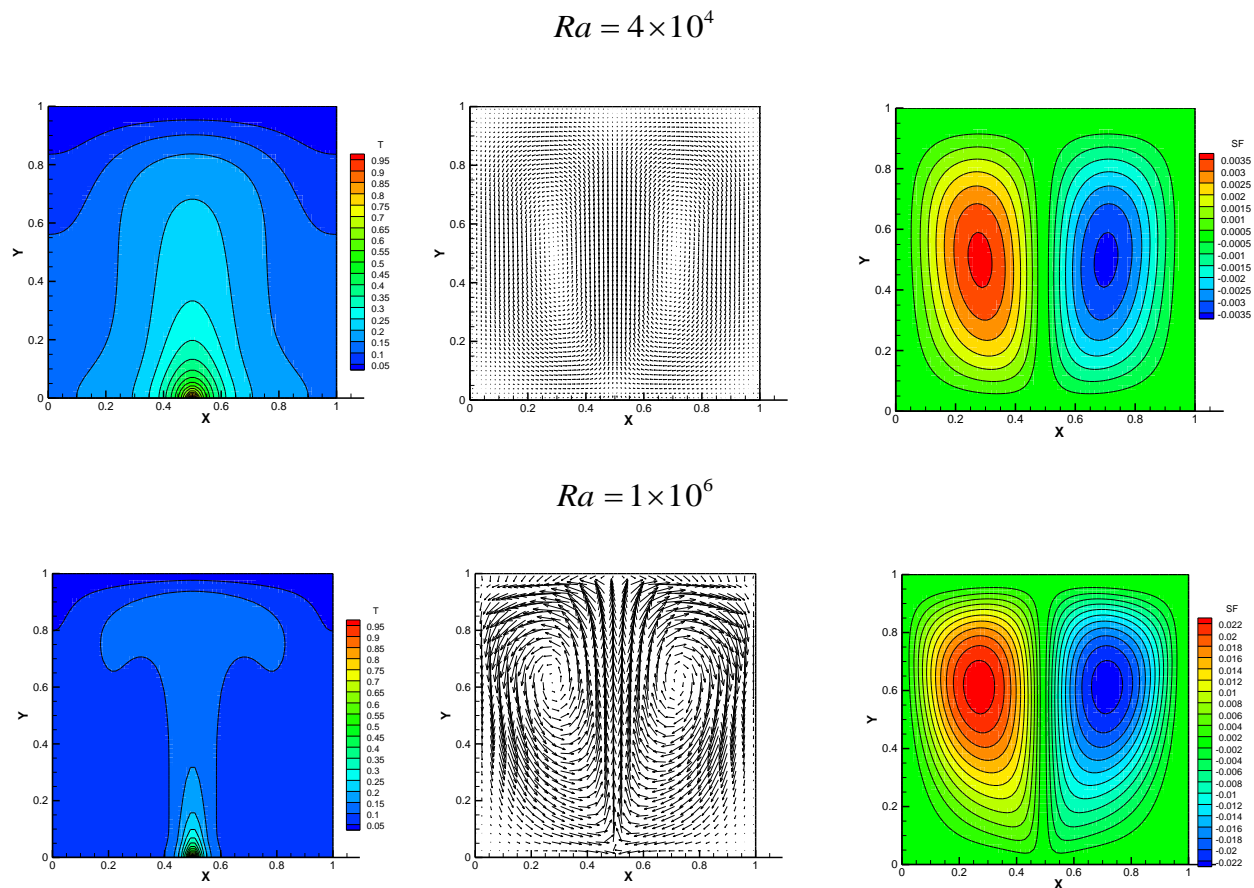


Fig. 7 – Isotherms, vectors and isotherms in the cavity for $\varepsilon = 0.03$.

Final results can be seen in Fig. 7, 8 and 9 for C_1 and C_2 conditions, side by side, as Rayleigh number increases top to bottom. As ε was incremented, the streamlines and isotherms related are plotted.

First observation lies on the boundary thermal conditions. When these conditions are symmetrical, about the vertical mid plane, i.e., case C_1 , the fluid motion is also symmetrical and two counter-rotating cells are formed in the cavity. The isotherms are also symmetrical about the vertical mid plane and it is noticed that the temperature gradient becomes steeper and bigger at the hot surface where a thermal plume may be located. In case C_2 , fluid flow takes a direction towards the adiabatic wall on the side of the cavity,

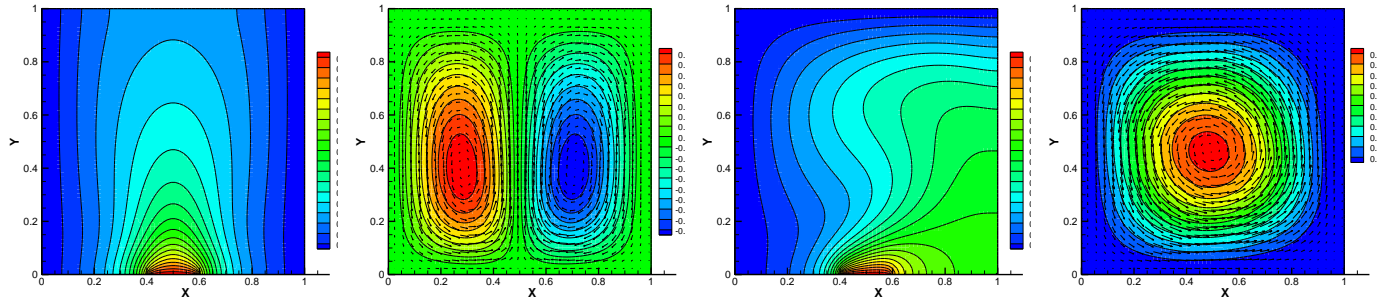
making the flow asymmetric and characterized with a single-cell of anticlockwise circulation.

In each case the stagnation point is observed at the middle of the bottom wall. It is easy to see the similarity between case C_1 and the bottom-heated arrangement in Fig. 5, making a plume shaped pattern. Similar behaviors of the flow and thermal fields are observed at other Rayleigh numbers as an increment for the following Figures. Finally, Fig. 10 presents temperatures residues history for different values of the Rayleigh number, $Ra = 4 \times 10^4$ and $Ra = 1 \times 10^6$ for the case it was presented in Fig. 7. Once more again the Multigrid solution has the best results at least in the computational effort reduction.

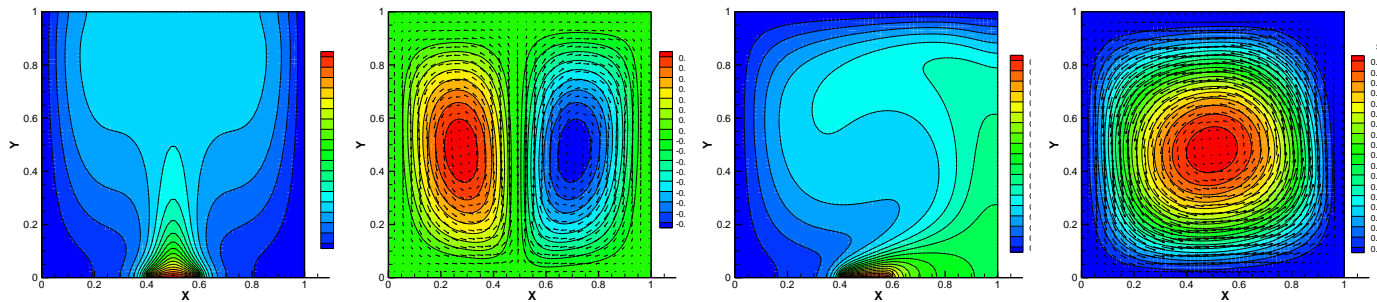
Boundary Condition - C_1

Boundary Condition - C_2

$$Ra = 1 \times 10^4$$



$$Ra = 1 \times 10^5$$



$$Ra = 1 \times 10^6$$

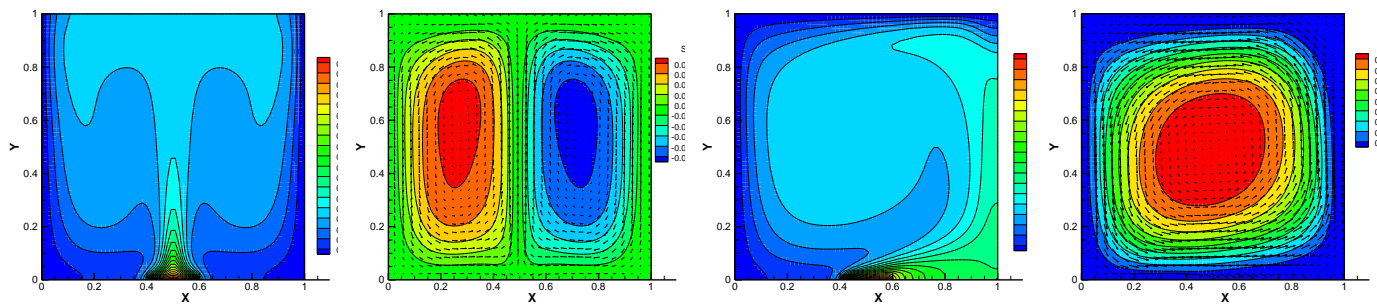


Fig. 8 - Streamlines and isotherms in the cavity for $\varepsilon = 0.2$.

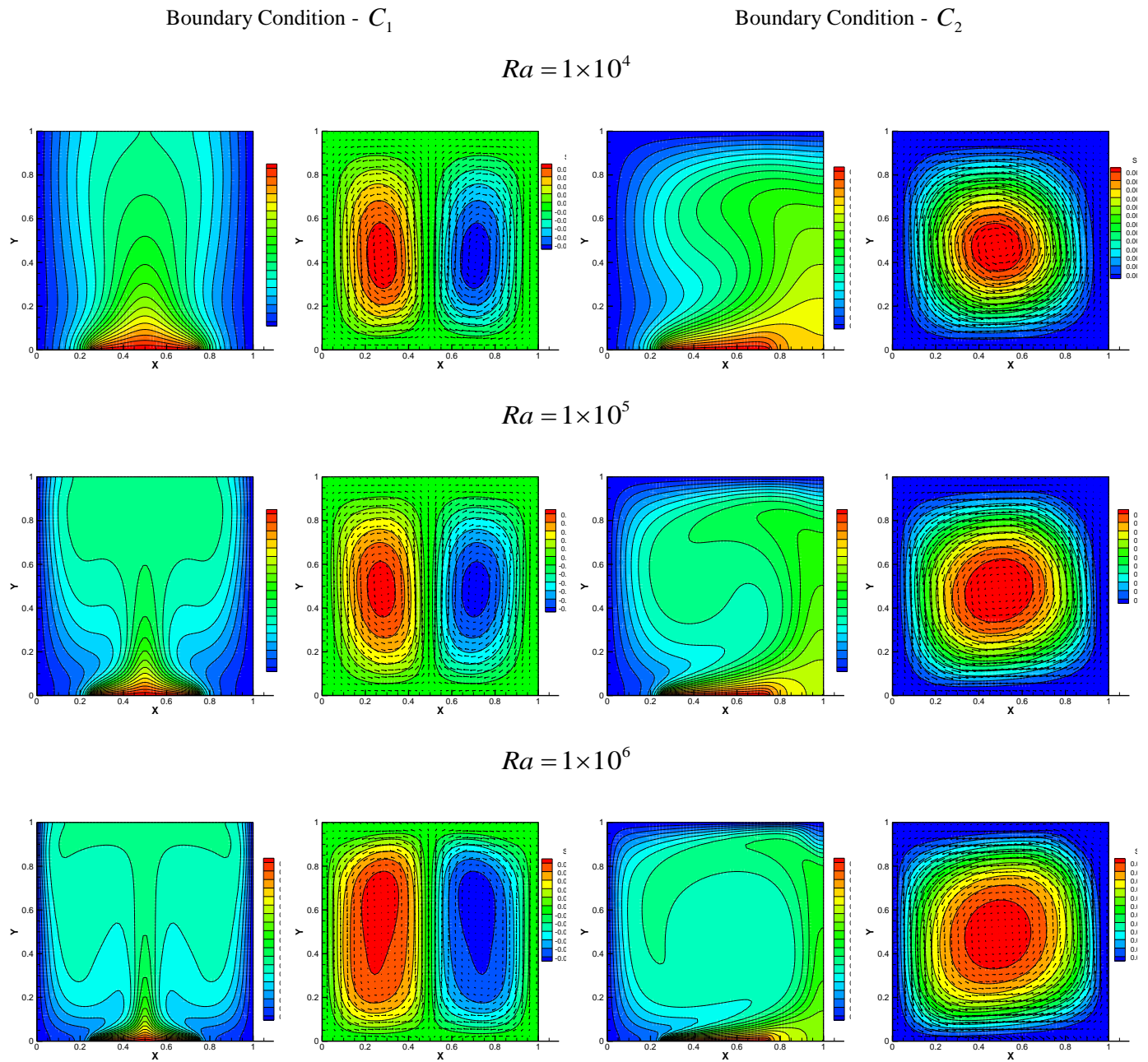


Fig. 9- Streamlines and isotherms in the cavity for $\varepsilon = 0.5$.

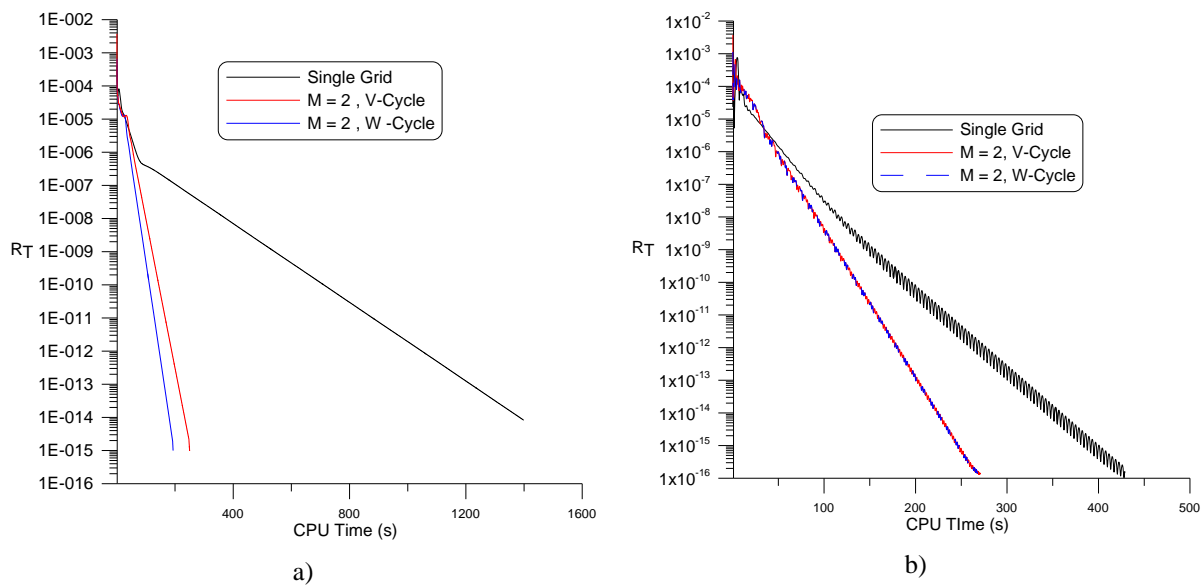


Fig. 10 – Temperatures residues history for different values of the Rayleigh number: a)

$Ra = 1 * 10^4$ and b) $Ra = 1 * 10^6$

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The global issue of statutory rape: Brazil's experience

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Abstract— *Background: More women, and especially those younger than 14 years, have reported their first sexual intercourse as coerced. These age groups need to be targeted for interventions to delay sexual debut and prevent sexual coercion. This study sought to compare the prevalence of sexual debut (SD) in adolescents under 14 years old before and after the implementation of the Statutory Rape Law in Brazil.*

Methods: We conducted a retrospective analysis of medical records of 591 pregnant adolescents aged 10-18 years served at teaching maternity hospital of Brazil's National Health System (Sistema Único de Saúde – SUS). Sociodemographic data and information on clinical history of SD were collected.

Results: The prevalence rate of SD under 14 years of age was 26% in 2006 versus 48.5% in 2016 ($p < 0.001$). In 2006, the median age of the partner was 19 years versus 17 years in 2016 ($p = 0.001$).

Conclusions: The prevalence of early sexual debut was significantly higher 7 years after the implementation of the Statutory Rape law as compared to 3 years prior.

Keywords— *Sexuality; Date rape; Adolescent; Statutory rape.*

I. INTRODUCTION

Researchers suggest that in some instances early sexual debut is the result of sexual violence including rape and other forms of coercion (Ankomah, Mamman-Daura, Omoregie, & Anyanti, 2011). Data from longitudinal research carried in South Africa shows that more women, and especially those younger than 14 years, reported their first sexual intercourse as coerced. The data show that these age groups need to be targeted for interventions to delay sexual debut and prevent sexual coercion (Richter, Mabaso, Ramjith, & Norris, 2015).

Data from the World Health Organization show that one in five girls has been sexually abused during childhood, with estimates from some countries placing that proportion closer to one in three (World Health Organization [WHO], 2014).

According to the Epidemiological Bulletin issued by Brazil's Health Surveillance Secretariat, there were 76,716 cases of sexual abuse against women under the age of 19, which accounted for 92.4% of all reported cases of sexual abuse in Brazil. Moreover, 67.1% of these women were aged 10 to 14 years. The bulletin highlighted the difficulty in giving visibility to the problem due to its intimate nature, the victims' poor autonomy to communicate the event, the social stigma and the feeling of shame (Brasil, 2018).

Peer group pressure (50%), monetary gain (27.5%), personal satisfaction (16.7%), curiosity (4.2%) and lack of home guidance from parents and relatives (1.7%) have been reported as the most common reasons for having premarital sex (Duru, Ubajaka, Nnebue, Ifeadike, & Okoro, 2010).

Another factor that contributes to early sexual debut is child marriage. Brazil ranks fourth in absolute numbers of women married by age 15. However, Informal unions are more common than formal marriages involving underage girls and adult men and usually occur after a period of courtship, casual sex or dating (Taylor, Lauro, Segundo, & Greene, 2015).

In certain given societies, culture, honor, tradition, and religion undergird adult-adolescent marriage. Therefore, understanding the practical physical and mental health needs related to child marriage should underpin any plans for development at the community, state, regional and international levels (Equality Now, 2014). Faced with this problem, Canada set the general age of consent for sexual activity at 16 years old (Fleming, O'Driscoll, Becker, & Spitzer, 2015).

The age of marriage in Brazil is 16, with parental consent required when individuals are under the age of 18 (Brasil, 2008). The law sets out that marriage under the age of 16 may be allowed only in two cases: 1) to avoid the imposition or enforcement of criminal penalties; or 2) in case of pregnancy. However, child marriage is very common and widely accepted in Brazil, which is ranked fourth in the number of girls married to a partner by the age of 15. These girls usually seek older husbands to escape from sexual and other violence in the home, or because of teenage pregnancy or the lack of job opportunities (Taylor et al., 2015).

In Brazil, with the purpose of protecting young adolescents, Law No. 12 015 was put into effect in 2009 to alter art. 1 of Law No. 8072 of 1990. The law defines in its article 217-A "Statutory Rape" as any action that, even with consent, may result in "sexual intercourse or practice of another libidinous act with individuals under the age of 14 (fourteen) years". Punishment for this crime is 8 to 15 years of imprisonment. It should be noted, however, that if the perpetrator is under the age of 18, it is still a crime. However, in Brazil, the age of criminal responsibility is 18 years old. Therefore, individuals under the age of 18 will not be sent to jail (Brasil, 2009).

Therefore, the changes in this law should have implications for the fight against crimes against sexual freedom, either with regard to coverage of cases or redefinition of penalties (Nucci, 2014). However, the rates have not decreased, and a significant proportion of cases are not reported to the police (Gallo et al, 2016).

Thus, considering the hypothesis that the rate of early sexual debut in girls under the age of 14 may have decreased in 2016 compared with 2006 after the implementation of the Statutory Rape Law in 2009, our

study aimed to compare the prevalence of early sexual debut (SD) in adolescents under 14 years old before and after the implementation of the Statutory Rape Law in Brazil.

II. METHODS

This quantitative research is based on a retrospective analysis of secondary data collected from medical records of pregnant adolescents who attended the Pediatric and Adolescent Obstetrics and Gynecology Clinic at the Assis Chateaubriand Maternity Hospital, a teaching hospital affiliated with the Federal University of Ceará. The hospital is part of Brazil's National Health System – the Unified Health System (*Sistema Único de Saúde – SUS*) – and has been serving the population of Ceará since 1965. It is a reference center with the mission of promoting education, research and tertiary health care.

The study used a census of medical records of adolescents who attended the clinic in 2006 and 2016 in order to assess the age of sexual debut before and after the implementation of Law No. 12 015, which defines Statutory Rape as any sexual act with an individual under the age of 14. The years analyzed corresponded to the period when the data were fully consolidated.

Data were collected from the medical records of pregnant adolescents who spontaneously sought the clinic for prenatal care. The medical record was completed by the doctor's assistant during the first prenatal care consultation.

Data were collected using an author-developed form that addressed sociodemographic information (age, education, partner's age, marital status, knowledge and use of contraceptive methods) and clinical history (age of sexual debut and menarche). The study was carried out from September to November 2017 after approval from the Research Ethics Committee (Approval No. 1.898.946).

Inclusion criterion was: age between 10 and 18 years, as the clinic served girls up to 18 years of age. Medical records that did not inform the age of the adolescents were excluded.

The results were organized and consolidated using the Statistical Package for the Social Sciences, version 23.0 (SPSS Inc., Chicago, IL, USA). The results were analyzed using inferential statistics (Pearson's Chi-squared test, Fisher's Exact test, and Mann-Whitney U) test with the significance threshold set at 5%. The Shapiro-Wilk test was used to test the normality of the quantitative variables.

III. RESULTS

The quantitative variables presented a non-normal distribution ($p < 0.001$). In all, 591 medical records were assessed. Of these, 319 corresponded to adolescents who attended the clinic in 2006, whose age ranged from 12 to 18 years, with a mean age of 16.2 ± 1.5 years. The other 272 medical records corresponded to adolescents who attended the clinic in 2016, whose age ranged 12 to 18 years, with a mean age of 15.2 ± 1.4 years.

Table 1 shows a statistically significant difference in adolescents' age of sexual debut between the two periods ($p < 0.001$). The prevalence of early SD was 26% among the study cohort in 2006 as compared to 48.5% in 2016.

Table 1. Sexual debut by year. Fortaleza, Brazil, 2017.

Age of SD	2006	2016	p value
	n (%)	n (%)	
<14	83 (26.0)	132 (48.5)	<0.001
≥ 14	236 (74.0)	140 (51.5)	

Source: Research data. Chi-squared test. SD = Sexual Debut.

Table 2 shows the characteristics (marital status, years of study and knowledge and use of contraceptive methods) of the adolescents whose SD occurred before the age of 14 years. The adolescents' mean years of study was 8.6 ± 2.7 years in 2006 and 8.0 ± 2.2 years in 2016.

Table 2. Characteristics of the adolescents whose SD occurred before the age of 14 in 2006 and 2016. Fortaleza, Ceará, 2017.

Variables	2006 (n=83)	2016 (n=132)	p value
	n (%)	n (%)	
Age of SD			0.453 ²
10	-	3 (2.3)	
11	6 (7.2)	13 (9.8)	
12	24 (28.9)	30 (22.7)	
13	53 (63.9)	86 (65.2)	
Marital status			<0.001¹
Married or living with a partner	80 (96.4)	92 (71.9)	
Single or living without a partner	3 (3.6)	36 (28.1)	
Years of study	8.6 \pm 2.7	8.0 \pm 2.2	0.279 ³
Knowledge about contraceptive methods			0.009¹
Yes	72 (93.5)	78 (79.6)	
No	5 (6.5)	20 (20.4)	
Use of contraceptive methods			0.041¹
Yes	32 (50.8)	63 (67.0)	
No	31 (49.2)	31 (33.0)	

¹ Pearson's Chi-squared Test; ² Fisher's Exact Test; ³ Mann-Whitney U Test

Years of study were similar in both groups. In all, 80 (96.4%) adolescents in 2006 and 92 (71.9%) adolescents in 2016 were married or lived with a partner, with a statistically significant difference between the years ($p < 0.001$) and significant standardized residuals.

Most of the adolescents knew contraceptive methods – 72 (93.5%) in 2006 and 78 (79.6%) in 2016

($p = 0.009$) – and how to use them – 32 (50.8) in 2006 and 63 (67.0) in 2016 ($p = 0.041$).

Table 3 depicts the median and the quartile values for SD, age of menarche, and age of the partner at SD in 2006 and 2016. The median age of SD was 13 in both years, with no significant difference ($p = 0.915$).

Table 3. Characteristics of sexual debut before the age of 14 in 2006 and 2016. Fortaleza, Ceará, 2017.

Variables	2006 (n=83)		2016 (n=132)		p value
	Mean \pm SD	Median (1 st – 3 rd quartile)	Mean \pm SD	Median (1 st – 3 rd quartile)	
Age of SD	12.6 \pm 0.6	13.0 (12.0 - 13.0)	12.5 \pm 0.8	13.0 (12.0 - 13.0)	0.915
Age of menarche	11.2 \pm 1.1	11.0 (10.0 - 12.0)	11.2 \pm 1.1	11.0 (11.0 - 12.0)	0.715
Age of the partner at SD	21.0 \pm 6.3	19.0 (17.0 - 23.0)	18.2 \pm 3.4	17.0 (16.0 - 20.0)	0.001

Mann-Whitney U test

The median age of menarche was also the same in both cohorts. The age of the partner at SD ranged 12 to 45 years in 2006 and 12 to 30 years in 2016, with a median of 19 years in 2006 and 17 years in 2016 ($p=0.001$).

IV. DISCUSSION

Most studies on sexual debut focus on girls aged 15-19 years. Given that, the present study is relevant because it analyzes sexual debut in girls under 14 years of age, which may contribute to the planning of public health policies targeted at this population group.

The statistically significant difference ($p<0.001$) in the number of pregnant adolescents under 14 years of age in 2006 (26%) compared with 2016 (48.5%) demonstrates that Brazilian girls are having sex at earlier ages, which, in Brazil, is considered Statutory Rape, as defined in Law 12 015 (Brasil, 2009). However, as mentioned previously, even with the existence and redefinition of the Law, the number of cases continue to grow, with major implications for adolescents (Nucci, 2014).

It should be noted that our study analyzed the medical records of pregnant adolescents who attended a reference pediatric and adolescent obstetrics and gynecology clinic. Data from a study of 21 countries with complete statistics on teenage pregnancy rate showed that, among countries with reliable evidence, the highest rate among 10- to 14-year olds was in Hungary (1.19/1000 pregnancies) and the lowest was in Switzerland (0.09/1000). In addition, the study reported that the proportion of teen pregnancies that ended in abortion ranged from 17% in Slovakia to 69% in Sweden (Sedgh, Finer, Bankole, Eilers, & Singh, 2015).

The adolescents analyzed in the present study had a mean of seven years of study in both periods. In Brazil, there have been two models of sex education: the biological-centered and preventive approach and the

biopsychosocial approach. The first focuses on the biological aspects of sexuality and on the prevention of STD and pregnancy in adolescence. The latter introduces a broader concept of sexuality, which includes social, cultural and subjective aspects (Vieira & Matsukura, 2017).

The relevance of sex education for adolescents is emphasized by the results of a national study on the sexual behavior of Brazilian adolescents. Adolescents who did not receive pregnancy prevention education at school exhibited increased sexual intercourse ($OR=1.41$) and unprotected sex ($OR=1.87$) (Oliveira-Campos et al., 2014).

It should be noted that despite knowing contraceptive methods (93.5% in 2005 and 79.6% in 2016), most of the adolescents analyzed (50.8% in 2005 and 67.0 % in 2016) did not use any. This finding is consistent with the findings of a study in which less than half (45%) of the adolescents consistently used condoms with the most recent partner (Fortenberry, 2013).

Early sexual intercourse has been associated with unprotected sex and more partners over a lifetime (Oliveira-Campos et al, 2014; Shafii, Stovel, & Holmes, 2007). In addition, ESD is associated with increased risk for sexually transmitted infections. One fourth of current Danish adolescents do not use any protection at their sexual debut. Therefore, strengthened preventive measures are still needed (Stryhn & Graugaard, 2014).

In this context, research using nationally representative data from the National Survey of Family Growth (NSFG) to examine timing of sexual initiation and contraceptive use in adolescents aged 10 to 19 years found that girls who start having sex at 14 or younger are less likely to have used a contraceptive method at first sex and take longer to begin using contraception (Finer & Philbin, 2013).

In this regard, the World Health Organization (WHO, 2014b) advocates for a human rights-based

approach to adolescent health that should be clear about the obligations and duties of governments, focus on equity, support interventions and policies that are needed, especially those that are culturally sensitive and controversial, such as sexuality education and informed consent, and ensure that adolescents are listened to and engaged.

Research has reported that girls in the United States are maturing at an earlier age than they did 30 years ago and that research on this topic is necessary to inform health professionals of the current trends and incidence of precocious puberty to better meet the physical and psychosocial needs of these girls and their families (Sandra & Cesario, 2007). Such early maturation was observed in our study as the median age at menarche was the same (11 years) in the two periods analyzed (2006 and 2016).

Early menarche has been associated with early coitarche before age 15 in Swedish girls, which is in turn associated with an increased risk for STD and unintended pregnancy. However, there is a liberal attitude towards sexual relations among adolescents in Sweden, where education on sexuality and personal relationships has been part of the national school curriculum since 1956 and youth polyclinics are tailored to the needs of adolescents to form a network over the country in order to support young people in developing responsible sexual behavior and to minimize reproductive health problems (Edgardh, 2000).

Another important finding that justifies the implementation of the Statutory Rape Law is the age of the partner at adolescents' SD. Partners were much older than the adolescents, particularly in 2006 (before implementation of the Statutory Rape Law), when the median age of partners of adolescents aged 14 or less was 19 years compared with 17 years in 2016 (after implementation of the Statutory Rape Law) ($p=0.001$).

A study of 294,484 incidents of sexual assault involving a single victim and single offender found that older men have much higher rates of offending (Felson & Cundiff, 2014). Thus, the implementation of Law No. 12.015/2009 made Statutory Rape a more severe crime in Brazil and may have decreased the number of adult men who engage in sexual intercourse or other libidinous acts with younger girls, although it did not reduce the number of girls who had sex at ages 14 and less.

It should be noted, however, that most of the adolescents (96.4% in 2006 and 71.9% in 2016) in our study were either married or had a partner. This finding is consistent with the findings of a study which showed that many adolescents start sexual activity within an established

relationship characterized by terms that indicate relative commitment and exclusivity (e.g., friend, boyfriend/girlfriend or fiancée) (Manning, Giordano, Longmore, & Flanigan, 2012).

Early age of sexual initiation is much more tolerated than marriage at an early age. Research has found that over half of men and girls believe that girls are able to consent to sex between ages 15 and 18 and that the percentage of men who believe girls are able to consent to sex at ages 13 and 14 (20%) is nearly double girls' agreement about sexual consent in reference to the same age group of girls. In addition, one-quarter of the men surveyed (compared to 16% of girls) also believe that when a girl's body shows signs of puberty, she is ready to have sex with an adult above the age of 18 (Taylor et al., 2015).

Any kind of sexual act against a child has serious consequences, especially if perpetrated by someone who is responsible for or who has power or control over the child or anyone who is in a position of trust. Moreover, the population aged 10 to 14 years living in unfavorable conditions are at an increased risk compared with their counterparts, and girls are particularly vulnerable to pregnancy, HIV and violence (Pinheiro, 2006).

According to the Global Status Report on Violence Prevention 2014, child protection services were the most widely reported of all services (69% of all countries), followed by medico-legal services for victims of sexual violence. However, the quality of these services and their accessibility to victims were not ascertained, and these relatively high levels of reported availability may conceal low-quality services (WHO, 2014a). In Brazil, few States have carried out a thorough review of the legal framework so that it can address violence against children more effectively, and implementation of laws, including legal reforms, remains a challenge (Pinheiro, 2006).

The increase from 26.0% to 48.5% in the rate of early sexual debut in girls aged under 14 years in the analyzed period show that the Statutory Rape law, put into effect in 2009, has been ineffective in preventing early sexual debut in girls under the age of 14. Effective interventions during adolescence may reduce the adverse long-term impacts of violence and abuse in childhood and prevent them from undermining future health (WHO, 2014b).

Marriage and statutory rape laws in Brazil seem contradicting as early marriage is associated with early sexual debut (Duru et al., 2007). This contradicting aspect undermines a more detailed analysis of the problem and is a limitation of the present study.

It should be noted that although our study used a census of medical records, it focused on adolescents attending one single maternity hospital. Therefore, the results presented cannot be extrapolated because the population analyzed may be different from populations in other regions. In addition, there were no reports of coerced sex and there was no information on the reason that led adolescents to early sexual debut. However, it should also be noted that the study was carried out in a reference center for child and adolescent health care located in the fifth largest city in Brazil and that its findings are consistent with the findings of other national and international studies, thus suggesting that they may also be found in other places.

V. CONCLUSIONS

The results of our study are expected to draw attention to Statutory Rape, a problem whose magnitude points to the need for implementing government actions towards this problem. Our findings also show that adolescents are having sex at earlier ages and although most of the adolescents analyzed were either married or lived with a partner, further research should be carried out to improve knowledge on the issue so that public policies can be used more effectively.

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Intensification of the leachate treatment process of nitrocellulose production

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Abstract— Purification of cellulose is one of the most important steps in the production of nitrocellulose for explosives. However, it generates highly polluting wastewater. In this study, nitrocellulose industry wastewater (leachate) was characterized and treated chemically and biologically. Untreated leachate had a pH of 12.4 ± 0.5 , color of $27,065 \pm 879$ units, chemical oxygen demand (COD) of $7,615 \pm 252$ mg/L, biological oxygen demand (BOD) of $4,413 \pm 194$ mg/L, total organic carbon (TOC) content of $2,455 \pm 158$ mg/L, total solids of $8,613 \pm 232$ mg/L, fixed solids of $3,845 \pm 103$ mg/L, and volatile solids of $4,768 \pm 129$ mg/L and was toxic to *Escherichia coli* and *Artemia salina*. Industrial-scale chemical treatment followed by pilot-scale biological treatment reduced COD by 97%, BOD by 99%, and TOC by 97% and eliminated toxicity.

Keywords— Delignification, Explosives, Nitration, Treatment, Wastewater.

I. INTRODUCTION

The discharge of untreated or inadequately treated wastewater into water bodies can cause serious damage to aquatic ecosystems. Wastewater may contain high levels of phosphorus, nitrogen, antibiotics, herbicides, pesticides, heavy metals, and organic matter [1-4]. Such contaminants have been associated with acute and chronic toxicity, endocrine-disrupting effects, and antibiotic resistance [4].

Several biological, chemical, and physical wastewater treatments have been proposed [5-10], but their implementation in industries is not always feasible from operational and economic points of view. Prior to biological treatments, wastewater may need to be treated chemically to reduce the negative effects of recalcitrant contaminants on biological agents [10-13]. Chemical treatments remove or convert contaminants through chemical reactions. Typical chemical processes include coagulation, precipitation, and chemical oxidation [5]. Chemical precipitation is achieved by using reagents capable of reacting and forming stable precipitates with contaminants. The precipitate can then be removed. Organic matter is transformed into carbon dioxide, water, and inorganic ions via degradation reactions involving oxidizing species, particularly hydroxyl radicals [11-13].

In biological treatments, contaminant removal is achieved by the action of microorganisms. The process is based on the self-regeneration of water bodies, whereby organic material is transformed into inert substances [12]. Activated sludge processes are the most commonly used biological treatments. Aerobic microorganisms digest organic matter and form flocculated particles (active sludge) and a liquid practically free of suspended solids and organic material. The organic matter is broken down via biological oxidation, resulting in CO_2 , H_2O , NH_3 , energy, and other products [12, 13]. Activated sludge treatment can be combined with other processes to improve the quality of the final effluent [10-13].

Textile, paper, and explosives wastewaters are opaque and have a high color because of the presence of lignin and its derivatives. In water bodies, these industrial wastewaters prevent light penetration and, consequently, photosynthesis. Furthermore, they contain high amounts of organic matter and toxic chemicals [14, 18, 32].

Nitrocellulose is the main raw material used to produce nitroglycerin, an explosive liquid present in smokeless gunpowder, propellants, and dynamites. Nitrocellulose production involves the following steps: mechanical separation, delignification, and bleaching of cotton fibers, nitration of cellulose, and stabilization of nitrocellulose [16]. The delignification process generates

leachate containing up to 10,000 mg/L of lignin, determined as soluble and insoluble Klason lignin. Lignin degradation products, such as hemicelluloses, extractives, and proteins, are also released during the delignification step [16, 19-26]. Resin and fatty acids from extractives and lignin degradation products are responsible for the high chemical oxygen demand (COD), biochemical oxygen demand (BOD), toxicity, and color in nitrocellulose industry wastewater [22].

This study aimed to characterize and intensify of the treatment of the leachate to reduce its color, organic load, and toxicity by integration of processes: chemical followed by biological treatment.

II. MATERIALS AND METHODS

Nitrocellulose industry leachate was collected and stored according to the National Guide for Sample Collection and Preservation [27]. Treated and untreated leachate was characterized following the Standard Methods for the Examination of Water and Wastewater [28], with modifications. Toxicity tests using *Escherichia coli* and *Artemia salina* were carried out in triplicate according to the methods described by Garden et al. (1990) [29] and Hartl and Humpt (2000) [30], respectively, with modifications.

2.1. Acute toxicity assay

E. coli was cultured in medium containing K_2HPO_4 , KH_2PO_4 , trisodium citrate, $(NH_4)_2SO_4$, and $MgSO_4$ diluted in 800 mL of deionized water to the concentrations shown in Table 1.

Table 1: Composition of the culture medium used for *Escherichia coli*

Compound	Concentration (g/L)
K_2HPO_4	7.0
KH_2PO_4	3.0
Trisodium citrate	0.5
$(NH_4)_2SO_4$	1.0
$MgSO_4$	0.2
D-Glucose	4.0

Source: Authors, 2020.

The culture medium was placed in a microwave oven and boiled for 10 min. A 200 mL solution of 10% (w/v) glucose was prepared and boiled for 5 min. The two solutions were cooled to 90 °C and mixed, and the pH was adjusted to 7.0 ± 0.2 using 4 mol/L NaOH.

A 100 mL stock solution containing 100 mmol/L Na_2CO_3 (previously oven dried at 120 °C for 1 h) was prepared and diluted to obtain 0.25, 0.50, 1.0, 2.0, and 3.0 mmol/L solutions. Aliquots of 135 μ L were used to construct a calibration curve using a conductometry system [29]. The culture medium was inoculated with *E. coli*, and CO_2 concentration was monitored until reaching 0.5 mmol/L. The initial pH of the samples was adjusted to 7.0 ± 0.2 using 1 mol/L NaOH or 1 mol/L H_2SO_4 . Leachate was added to culture flasks at concentrations of 2, 6, and 10%, and CO_2 measurements were taken at 30 min intervals. The experiment lasted for 3 h.

2.2. Chronic toxicity assay

A. salina cysts (eggs) were incubated in 3.8% (w/v) NaCl in deionized water at 28–30 °C under a 60 W fluorescent lamp for 24 h. After hatching, larvae were separated and placed in 5 mL vials containing 1 mL of saline solution. Vials contained 10 larvae each and received the addition of 1.5 or 3.0 mL of leachate, corresponding to 30 and 60% (v/v), respectively. Vials were then filled to 5 mL with saline solution and incubated for 24 h at 28–30 °C. A control vial was prepared and subjected to the same conditions but without the addition of leachate. Dead and live larvae were counted in each vial, and results were expressed as the percentage of dead larvae [30].

2.3. Industrial-scale chemical treatment of leachate

Leachate is transported from the nitrocellulose production plant to the treatment plant via a 4-inch PVC pipe. The liquid is sieved (SS) and is discharged, by gravity, into the reservoir tank (RT). Then, it is pumped into RST 1 and RST 2, which are operated alternatively in batch. In RSTs, leachate is acidified to pH < 1.5 using the acid wastewater from the nitration step or, when not available, sulfuric acid. Solutions are mixed using air diffusers. After 2 h, the supernatant follows to the compartmentalized tank for coagulation (CT), pH adjustment (AT), flocculation (FT), and decantation (ST). Solids retained in the decanter are sent to a filter press (FP). The filtered liquid returns to the treatment system, and the sludge is directed to the final treatment step at the outlet of the decanter. The chemically treated leachate is then subjected to biological treatment using an activated sludge process in a sequencing batch reactor.

2.3.1. Chemical treatment

Fig. 1 shows a scheme of the treatment system used for the chemical treatment of leachate. The system has a capacity for processing 40 m³/h. The project was designed on the basis of experimental bench-scale results. The reaction and settling tanks (RST 1 and RST 2) were

designed taking into account the decanting time. Flow, hydraulic retention time, and other process parameters were taken into account in the design of the coagulation,

alkalization, flocculation, and settling tanks, according to literature data [11-13].

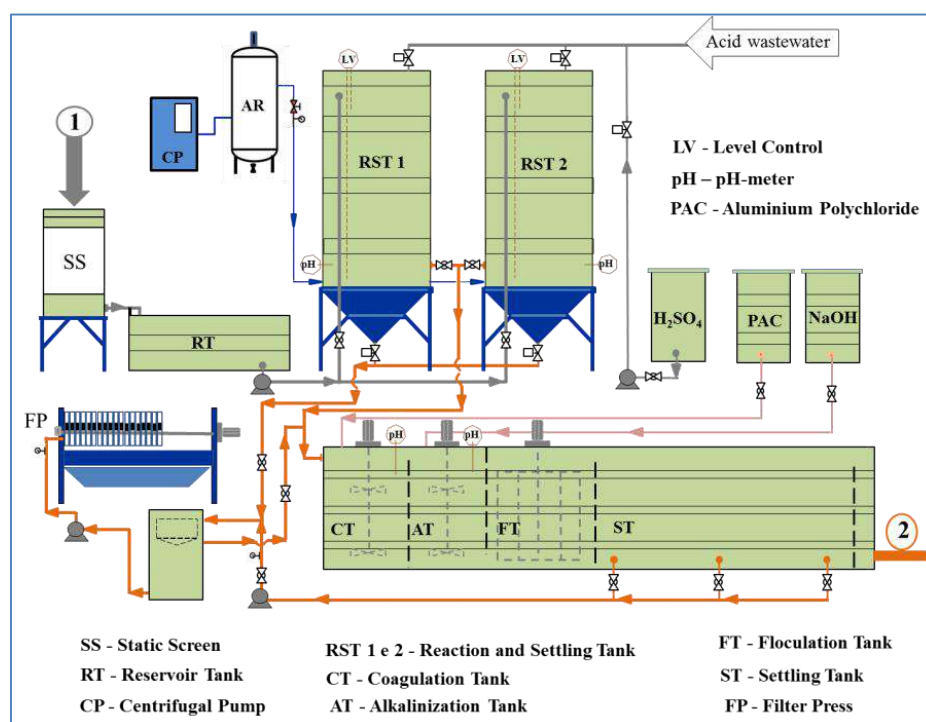


Fig.1: Industrial chemical system for treatment of nitrocellulose leachate

Source: Authors, 2020.

2.4. Pilot-scale biological treatment

Biological reactions were carried out in a 500 L stainless steel reactor (Fig. 2) equipped with three valves and operated in sequencing batch mode with 6 h cycles consisting of fill, react, settle, and draw periods. The time for sludge sedimentation ranged from 20 to 30 min [12]. Air was supplied to the system using an air compressor and diffusers.

The airflow was adjusted to provide a minimum oxygen concentration of 3 mg/L and ensure that the microbial biomass remained in suspension during the entire reaction period. Prior to the reaction, the pH of leachate was adjusted to 7.0 ± 0.3 with 10% (w/v) NaOH solution. pH (B-374 pH-meter, Micronal, São Paulo, Brazil), dissolved oxygen (TO 401 analyzer, Digimed, São Paulo, Brazil), and temperature were monitored throughout the process [13].

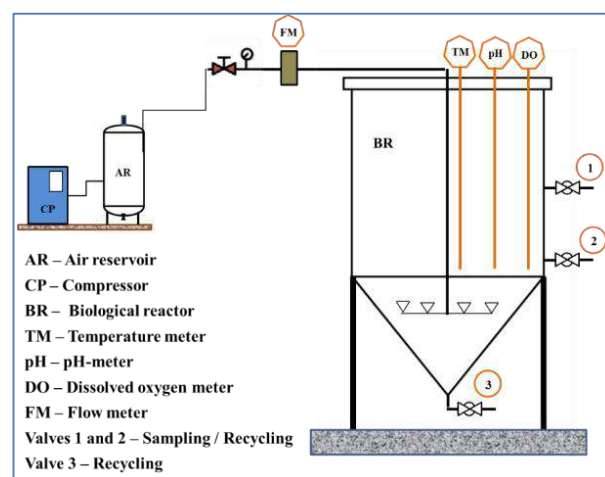


Fig.2: Schematic diagram of the biological reactor

Source: Authors, 2020.

III. RESULTS AND DISCUSSION

Table 2 presents the physicochemical characteristics of leachate before and after industrial-scale chemical treatment and pilot-scale biological treatment.

Table 2: Physicochemical characteristics of untreated, chemically treated, and chemically and biologically treated leachate

Parameter	Untreated	Chemically treated	Chemically and biologically treated
pH	12.4 ± 0.5	7.1 ± 0.3*	7.1 ± 0.3*
Color (units)	27,065 ± 879	1,988 ± 84	2,113 ± 132
COD (mg/L)	7,615 ± 252	908 ± 38	198 ± 17
BOD _{5,20} (mg/L)	4,413 ± 194	369 ± 14	43 ± 7
TOC (mg/L)	2,455 ± 158	153 ± 10	83 ± 7
TS (mg/L)	8,613 ± 232	3,472 ± 86	288 ± 13
FS (mg/L)	3,845 ± 103	1,540 ± 49	176 ± 16
VS (mg/L)	4,768 ± 129	1,932 ± 76	112 ± 9
N (mg/L)	25 ± 6	1.9 ± 0.2	4.7 ± 0.6
P (mg/L)	<5	<5	<5

Results are presented as mean ± standard deviation. * The pH was adjusted to 7.0 ± 0.3 with 10% (w/v) NaOH solution before the reaction. COD, chemical oxygen demand; BOD_{5,20}, biochemical oxygen demand (5 days at 20 °C); TOC, total organic carbon; TS, total solids; FS, fixed solids; VS, volatile solids; N, nitrogen; P, phosphorus.

Source: Authors, 2020.

Untreated leachate had a very high color intensity (27,065 ± 879 color units), COD (7,615 ± 252 mg/L), BOD_{5,20} (4,413 ± 194 mg/L), and TOC content (2,455 ± 158 mg/L). The COD/BOD ratio was 1.73, indicating that leachate is susceptible to biological degradation [11]. Nevertheless, an industrial chemical process was used before biological treatment.

Chemical treatment decreased color intensity by 93%, COD by 88%, BOD_{5,20} by 92%, and TOC by 94%. After biological treatment, COD was reduced by 97%, BOD_{5,20} by 99%, and TOC by 97% compared with untreated leachate. No changes in color intensity were observed, suggesting that activated sludge is not effective in removing or degrading color compounds present in nitrocellulose leachate. Chemical processes, such as coagulation, are widely used as tertiary treatment for the removal of suspended solids, organic matter, and phosphorus [31, 32].

However, in this study, the chemical process was used to intensify the biological process for the treatment of leachate from nitrocellulose production. Fig. 3 and 4 show the effects of integrated treatment.

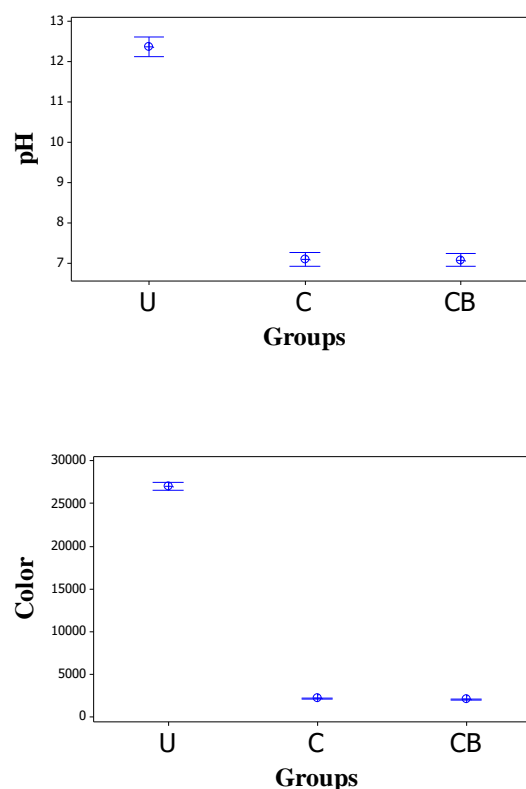


Fig.3: pH and color. The circle is the mean and the lines above and below are the 95% confidence intervals.

Source: Authors, 2020.

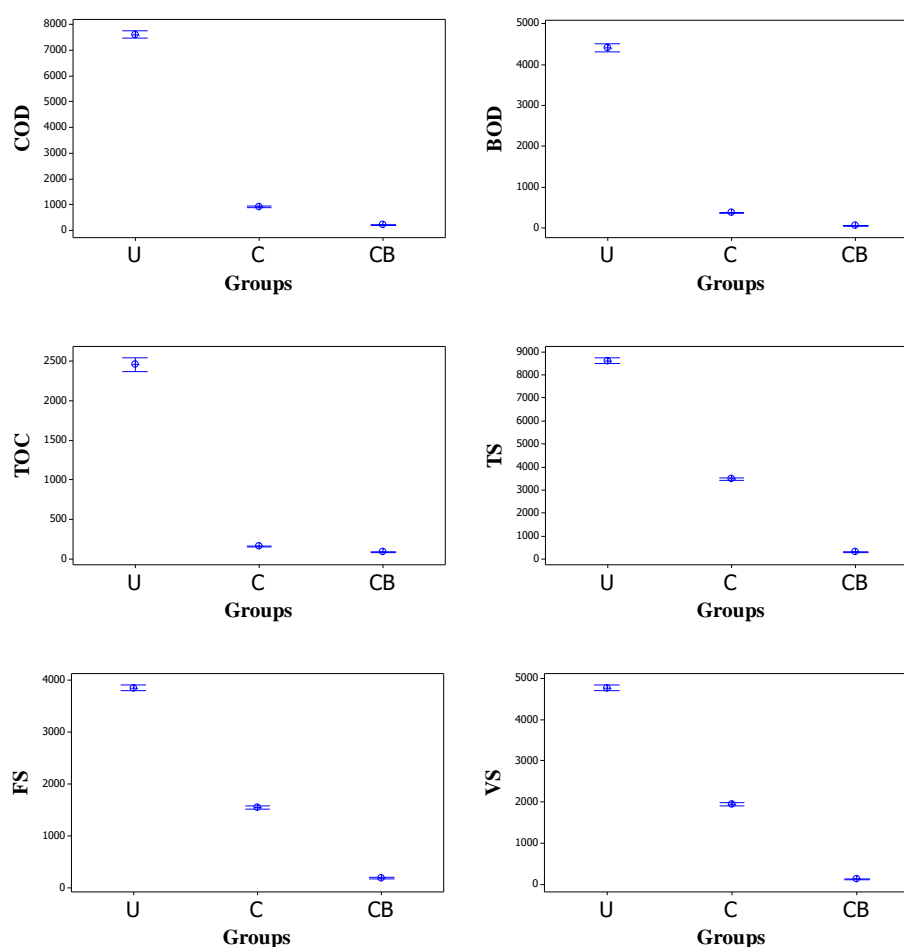


Fig.4: Chemical oxygen demand (COD), biochemical oxygen demand (BOD), total organic carbon (TOC) content, total solids (TS), fixed solids (FS), and volatile solids (VS) in untreated (U), chemically treated (C), and chemically and biologically treated (CB) leachate. The circle is the mean and the lines above and below are the 95% confidence intervals.

Source: Authors, 2020.

BOD_{5,20} values of untreated leachate ($4,413 \pm 194$ mg/L) were well above those commonly reported for domestic sewage (300 mg/L)[12, 13, 33, 34]. This parameter is widely used to indicate whether wastewater is suitable for discharge. Therefore, a model was developed to predict the BOD of biologically treated leachate (Eq. 1).

$$\text{BOD} = 4027.73 - 1.05 \times \text{COD}_u + 7.17 \times 10^{-5}(\text{COD}_u)^2 - 1.19 \times 10^{-5}\text{COD}_u\text{FS}_c \quad (1)$$

where COD_u is the chemical oxygen demand of untreated leachate and FS_c is the fixed solids content in chemically treated leachate. The analysis of variance for the proposed model is presented in Table 3.

Table 3: Analysis of variance for the model

Source	df	Seq SS	Adj SS	Adj MS	F	P
Regression	3	629.59	629.589	209.863	4.16747	0.0284069
COD _u	1	31.53	245.346	245.346	4.87209	0.0458797
COD _u × FS _c	1	337.00	301.819	301.819	5.99354	0.0293136
COD _u × COD _u	1	261.06	261.059	261.059	5.18413	0.0403523
Error	13	654.65	654.646	50.357		
Total	16	1284.24				

Source: Authors, 2020.

All model parameters were significant at $P < 0.05$. A P-value of 0.27 was obtained for the Anderson–Darling statistic, ruling out the hypothesis of normality of data. This result indicates that the model can adequately predict BOD values after biological treatment. With an $R^2 = 0.49$, the model shows that the characteristics of untreated and chemically treated leachate influence the performance of biological treatment.

We calculated the 95% confidence intervals for experimental results and model predictions (Fig.5). The model indicates that the combined treatment can reduce BOD to less than 60 mg/L.

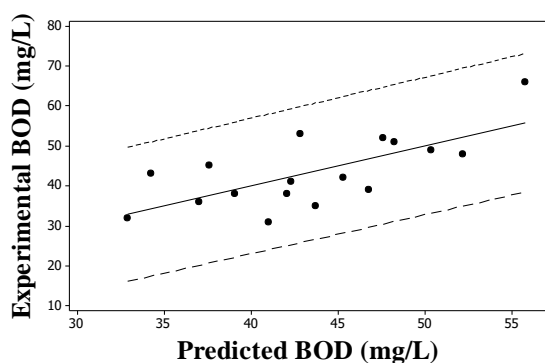


Fig.5: Experimental and predicted biochemical oxygen demand (BOD) of leachate after chemical and biological treatment. Black dots are experimental points, the solid line is the best fit, and the dashed lines are the 95% confidence intervals.

Source: Authors, 2020.

The acute toxicity of untreated leachate was assessed using *E. coli*. Black pulp at 2% immobilized 69% of microorganisms. At 6 and 10%, leachate completely immobilized *E. coli*. After chemical treatment, bacteria mobility was not affected by 2% leachate. At 6 and 10%, chemically treated leachate decreased bacterial mobility by 16 and 50%, respectively. Biologically treated leachate did not affect *E. coli* mobility.

Untreated leachate at concentrations of 30 and 60% showed chronic toxicity to *A. salina*, killing all microorganisms. Toxicity was not fully eliminated by chemical treatment. At 30 and 60%, chemically treated leachate killed 36 and 62% of micro crustaceans, respectively. Wastewater treatment should eliminate as many toxic compounds as possible, as contaminants are generally carcinogenic [35, 36]. The complexity of wastewater composition can further increase its recalcitrance to degradation [35]. Chemical treatment, despite reducing the organic load of leachate by more than 90%, was not sufficient to eliminate toxicity. Therefore, a

second treatment was necessary. After treatment with activated sludge, leachate was not toxic to *A. salina* at the tested concentrations.

The toxicity of leachate to the two microorganisms was probably due to the high concentration of organic matter and the presence of high molecular weight compounds (>kDa) derived from lignin. The recalcitrance to activated sludge treatment may be related to the limited ability of microorganisms to metabolize high molecular weight compounds [19, 20].

Nitrocellulose industry wastewater is highly toxic to the environment because it contains chlorophenols, chlorolignins, organic acids, acid resins, and dioxins [23, 32], as well as high levels of organic matter and metal ions [22]. There are few studies analyzing the toxicity of nitrocellulose to aquatic organisms [37-39], but many studies reported the detrimental effects of other explosives, such as 2,4,6-trinitrotoluene (TNT), 1,3,5-Trinitroperhydro-1,3,5-triazine (RDX), and 1,3,5,7-tetranitro-1,3,5,7-tetrazocane (HMX) [40-46].

IV. CONCLUSION

Leachate had high levels of lignin and organic matter, as evidenced by the high COD ($7,615 \pm 252$ mg/L), color intensity ($27,065 \pm 879$ units), and toxicity to *E. coli* and *A. salina*, which indicates that this wastewater can cause serious environmental contamination if released untreated.

Industrial chemical treatment reduced color intensity by 93%, COD by 88%, BOD by 92%, and TOC content by 94%. However, these reductions were not sufficient to meet regulatory requirements for wastewater discharge. Therefore, chemically treated leachate was subjected to a biological treatment with activated sludge, which reduced COD (198 ± 17 mg/L), BOD (43 ± 7 mg/L), and TOC content (83 ± 7 mg/L) to levels below regulatory limits. Chemical treatment did not eliminate toxicity but increased the susceptibility of leachate to biological treatment. Overall, the results show that integrated chemical and biological processes are promising for the remediation of leachate.

All wastewater generated by the pulp nitration step was reused for pH correction in the leachate treatment process. The reuse of the effluent from the nitration step made it possible to reduce the expenses with reagents for pH correction of this effluent before its release into the environment.

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The Aftermath Impacts on the Abolition of Slavery and Slave Trade on the Social and Political Issues in the British Sphere of Influence in Cameroon 1807-2011

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Abstract— The suppression or abolition of the Slave trade was quiet successful in a wider dimension involving the British Sphere of influence: It is the case in the southern Cameroons from 1807-2011. After the abolition, some prints, marks or scars were left behind; what is known as impacts which actually prevailed up till date or today. These impacts entirely could be examined in two main levels: the social and the political aspects. Within these two spheres of studies, the inconvenience proposed for rectifications and has been forwarded based on some social affiliated problems in the world and the chosen vicinity or area. Furthermore, accompany with case files we examine some marriages in the said area and some political institutions as reactions after the suppression or abolition of slavery and slave trade. In addition, a positive reaction that ameliorates situations after the halting of the act, Social ills emerged and political means resolved.

This work has been carried out with the use of some documents, Archive materials, articles and interviews. Here, what we should also learn is the fact that the application of some laws is still under-going processes even after the study period.

Keywords— southern Cameroons, slave trade, 1807-2011, abolition, impacts, Social, Political aspects, marriages, institutions.

Résumé— La suppression ou l'abolition du commerce des esclaves a véritablement réussi dans une large mesure dans la zone d'influence britannique : ceci a d'ailleurs été le cas dans le Cameroun méridional de 1807 à 2011. Après l'abolition, certaines empreintes, marques et séquelles sont restées. C'est ce qui peut être considéré comme les impacts qui ont subsisté jusqu'à nos jours. Ces impacts pourraient être examinés à deux niveaux : les aspects sociaux et politiques. A l'intérieur de ces deux cadres d'analyse, nous avons présenté pour réparations certaines atrocités qui ont eu un impact notable sur le plan social dans le monde en général et sur notre zone d'étude en particulier. Bien plus, à travers des études de cas, nous examinons certains mariages dans ladite zone et certaines institutions politiques comme corollaires de l'abolition de l'esclavage et du commerce des esclaves. Aussi, on a observé des réactions positives ayant eu pour objectifs d'améliorer les conditions de vie après l'abolition. Ainsi, on va assister à l'émergence de certains fléaux sociaux suivis des réponses politiques pour les résoudre.

Ce travail a été mené avec l'appui de certains documents d'archives, des articles et interviews. Ici, ce que nous devons aussi apprendre est le fait que l'application de certaines lois est toujours d'actualité même après cette période d'étude.

Mots-clés— Cameroun méridional, commerce d'esclaves, 1807-2011, abolition, impacts, aspects politiques et sociaux, mariages, institutions.

I. INTRODUCTION

In 1807 the British in the House of Common abolish Slavery and Slave trade and ratify it in 1833. Before, as early as noted, the main countries, those in charge and were at the fore front of all that surrounds Slavery and the Slave Trade in the area at one time; British Sphere of influence: the case of pre-colonial Cameroon, southern Cameroons, British southern Cameroon, west Cameroon, unitary Cameroon and part of The Republic of Cameroon that runs from the periods 1807 to 2011, decided to put an end to this entire act in the following times. Before then, Denmark has made the Slave trade illegal for her own nationals in 1805, Holland in 1814, France in 1818, while in 1815 and 1817 Spain and Portugal respectively, restricted Slave Traders to the sea south of the Equator. The British abolished the act in 1807 and even went as far as carried this new anti-slavery policy to establish a naval patrol in West Africa waters. Sierra Leon was declared as a Freed-Slave settlement in 1808. The slaves in the above also settled in the area, British Southern Cameroon. The long period of Slavery and Slave Trade in the World and British Sphere of influence put humankind in a delima. This act was abominable in diverse forms. But, aftermath checked, it was unveiled that the cat has changed and taken another shape. The greatest dismay to this cross examination, matters change direction. As impact people started using other means to keep people still in bondage hence dealing with “innocent culprit” like husbands of some women in marriage with the intention of putting the suitors or husband to difficult situation of slavery. Also with this, putting their daughters in to slavery, thus selling them as a way for money makings in the name of marriage, within the territory of British influence was a result or impact of the Slavery and slave trade. It should be noted that there were some problems that came as a result of the abolition and some that still prevailed in another sense of the same problems.

The aforementioned impact went along way to evoke another impact which was the making of laws in States institutions which could bring to an end and subdue the new negative impact for the achievement of positive dreams. This is not an evil of a society but a history that takes place in the world at large involving British southern Cameroon. Here, the question that we need to ask is what are the socio-political impacts of the Abolition of Slavery and Slave trade in the British southern Cameroons? To answer this question it will be interesting to examine, firstly, the Social impacts and secondly, the Political impacts after the Abolition of Slavery and Slave Trade.

II. SOCIAL IMPACT IN THE AFTERMATH OF THE ABOLITION OF SLAVE TRADE IN BRITISH SOUTHERN CAMEROONS

After the abolition of Slavery and Slave Trade, the general idea was that slave Trade has finally come to an end. But to our greatest dismay the end of Slave Trade did not provoke the end of the Slavery and enslavement. It should be noted that the New forms and New motives of servitude have appeared. Also, It should be known that in the colonial period many actors like the Colonial Administration, United Nations (U N) and other International Organisations, the Non-governmental Organisation (N G O), continue to fight against the said practices leading to human servitude.

2.1. A Delight or plight of Maltreating Suitors

Many things remain uncertain about the slave trade and its impacts. The general picture after a good survey of incidents, it was couple in great destructiveness, which is clear. The destructiveness can be shown to be the logical impact in the manner of receiving suitors. The British Sphere of influence had connective characteristics of this phenomenon. Henceforth, after the ruling of reviewed in the value of the potentiality of putting to an end the slave trade and slavery brought many changes in the atmosphere. Some individuals took abolition principles as plight in their hands and inflicted injuries to innocent's citizens, a delight of treating suitors who had been married legally to their wives and had at least six and more children. Families kept asking dowries and victimizing their suitors for no reason.¹ An example of such a situation could be examine or seen in a complain from Wakum, Big Babanki, Bafut area, Bamenda Division, 23rd September 1946 addressed to the Honorable Resident Cameroons Province, Buea through the district officer, Bamenda Division, Bamenda. These lines of the Complain run thus,

... I beg to state that i am a citizen of Big Babanki, Bafut Area, in the Bamenda Division and during the time of the Ex-German Government i married the daughter of the late chief of Bikom and paid full dowry. The amount paid was £12:s and in addition i paid to the family two bags of salt, and the woman in

¹ Walter Rodney, “Europe and the roots of African underdevelopment to 1885” In (ed. Walter Rodney) *How Europe underdeveloped Africa*. Panaf publishing, Abuja, Nigeria, 2005 pp. 108-109.

question was then given to me. When she was then given to me... we then came to big Babanki my native home where we remained and made the family of six children.

I have been living peacefully with my wife and children and in this period when even my children have become men and women i have been taken on a surprise to see that a summons has been issues against me for the native court of Kom by the plaintiff maintaining that i did not pay full dowry. The plaintiff admits that only the sum of £12. - Dowry was paid to the late chief.

When the date for trial arrived i came to the native court and was surprised that i was roughly handled by a court messenger who began to flog me in order to frighten your most humble petitioner to leave the court in order that the right i deserve in this case should be set aside. ...²

Due to the fact that abolition of all forms of enslavement was stipulated and put to effectiveness, some people took it as a delight, means to challenge the laws and their enemies and inflicting harms to some innocent villagers. Mr. Wakum decided to justify his claim as he married rightfully with a full dowry payment during the time of the Ex-German Government to the late Chief of Bikom and have already given birth to six children. Henceforth making a family of six not including him and his wife. From the complain we head nothing about the wife (opinion) which indicate the claim to Mr. Wakum was false. Furthermore, as Mr. Wakum claimed they have stayed for a very long period of time with a family of six children, the suitor and complainer were not given any sum to pay as claim which is not justified by the native law and custom. The children of the complainer in number is claimed without any support reasons, meanwhile the messenger flog him which indicated that it was arranged by his opponent best known to him why.

2.2. Double payment of Marriage Dowry

² BAC File N°, 36/35.Wakum of Big Babanki Request for Residents Review in Kom native court civil suit N°79/46, 1946, P.1. The object of the complain goes thus: Kom Native court civil suit N°79/46. Ngongkule versus Wakum, claim return of dowry (£12 & 4 children.)

Additionally, the summon was a surprise one hence was not legal entirely. If it was justified the court members should have question Mr. Wakum and the messenger for the action but the cold attitude towards such unreasonable oppression such induce practices will only be repeated to other victims who might be accused falsely. Also, on the 10th September 1947 while in Kejom Keku still in the Bafut area, complain to the Bekom (central) court under civil suit N°79/46 the same matter, the native court judgment was modified. The suitor was asked to pay £12:- and retain his legitimate children. This determines the fact that the suitor paid dowry twice. The petitioner hope British justice will triumph over the matter.³ However, there were some case judgments that went ahead to explain the concept of abolitionism. In this case, it was very effective in all entirely as some women became liberated. This could explain the action put or enforced by the United Nations Organisation (UNO) through conventions in the British Southern Cameroons. Some other examples will involve a case held in the native court of Bum on the 19th day of June 1951 before the following members Ful of Laibum, Nanambang, Tateh of Ngunifisy Name of Mulung. It is with Ful of Laibum as plaintiff and Defendant Yoh of Kom. Claim, return of wife Ndum (f) or dowry of £20 taken by defendant 4 years ago. Under (sgd) W.J Griffith verdict: judgment for Plff for his wife Ndum (F) or dowry of £20 in 2 months with costs. The wife is further enslaved forcefully and the husband as he has been placed to pay double dowry, a trick of fostering slavery in another form.

Furthermore, still under (sgd) W.J Griffith Ag. D.O 13:10:51 to 23:2:52, paid; CRN°83718 of 11/11/38. C.S. N°8/38, plff: Ful of Laabum vs. Deft: Fulchunde of Gunabum. "Return of 27 Nkom clothes and 2 guns or £27 being dowry for 3 women and to return 7 small children owed by deft about 3 years ago" claim admitted. "I do not know what the plff summons me for. I know that the women are with me. I did not refuse to give them to him. About the children, they are with me. I did not give any of them to a husband. The 2 guns are with me." Actually, the cost was not paid. Signed by the Bum chief, Misom and Ngwi with mark.⁴

2.3. Women Enslavement (Sold and Resold)

³Ibid. This case rightly showed that the judgment was not rightly meted or given, in this region hardly do you find a family sending or accepting their daughters into marriage to any person without having claimed their full dowry,

⁴BAC. File N° 36/294, date Registered 18:4:52 Mr.Yoh Application for residents Review in Bum native court civil suits N° 22/51, Achieves N° NW/La/d/1952/16, pp.1-2.

In January 1952, Wum division at Kuk village Fungom Area from Nemesikong, petition against Bainan Njang of Aghem claim to have paid dowry to late Njo late uncle Kwafon and later the woman was passed over to Chenegi. This woman was sold and resold in the name of marriage. From one man to another further putting or enslaving the woman as stipulated in the following lines.

That after an interval of one year my late uncle Kwafon wanted the woman and Njo Njang then informed him that the girl Ikai was formerly engaged by one Chenegi who paid 3 goats and that he Njo Njang had refunded the 3 goats to Chenegi who paid same and that Njo Njang had refunded them. He asked that my late uncle should give 3 goats and Kwafon gave 2 goats, 3 yards munchi cloth for one goat to his late uncle. He went on that in one occasion Kwafon sent 24 calabashes of salt for 2 goats and after 1.5 years he sent £121-for 2 goats valued 61-each...⁵

As a consequence after abolition, the woman under dispute was that of his late uncle who married her by dowry following native custom. Due to the presence of the late chief of Kuk, the chief gave her to his sons not only in pretext of servitude of women but as a sign of enslavement. The judgment went in favour of the chief because of his position.⁶ The chief paid actually the dowry to the father but it was not handed or passed onto the petitioner late uncle. With the acknowledgement that the dowry for the woman was not recovered, the Kuk council stands as the main witness sued defendant which he end up cost the case both in court and review and has therefore applied for resident review. Several other matters or cases were brought to court such as the seen below.

The consequences or impact of the abolition of slavery and slave trade was equally applied in another case at the Kom native court between Maricus Chia of Njinikom versus Tobi of Fundong with the claim, return of daughter Ngoinkung or £20 price taken by defendant to Fundong about 20 years ago. The claim was not admitted. But finally the judgment for plaintiff for £15 in 3 months and cost at once. The uncle exchanged 29 years ago and died 23 years ago. The claim came late as such according to the native law

⁵BAC. File no 361/292, NW/La/D: 1952/12, date Registered 1st April 1952, Ngemesikeng-Application for Residents Review in Fungom C/S 67/51.

⁶Ibid [the Woman was brought out of conflict and handed to one raby as such his right obtained, end slavery]

and custom which it was expired. The decision of the native court and the distinct officer was that, claim dismissed.⁷ Also, MrKubensum of Tunfombii at Kom claimed £100 bride price on 2 daughters taken by defendant 11 years ago by Tohru Teji Ngwaa. According to Astom-Smith's confirmatory judgment (P.156 of C.R.B 10/42_ in which the court passed instruction to sue Akoni for the Dowry or bride price, which the plaintiff did not do this. Akoni was reported dead as also is the mother of the girls. The Fon at this moment of the case is late Akoni's son and successor as such the claim was dismissed and signed by the (sgd) Francis Prestom Potts. D.O and (sdg) B.N Ntane C.N.C.⁸

Moreso, in Aghem native court another case on marriage was heard. The parties involved were Awa Djembong of Zongetu versus Mfensen of Su, claim refund of £25 maternal bride price paid on behalf of wife, Mbi Nsen. The following decision was taken and upheld under Mr. R.T Elkerton at Wum on 8th October, 1957. Neither dowry nor bride price was paid by plaintiff to defendant, and therefore there is no justification for claiming a refund. During the German times, a small girl in the compound of Tega Nko was given to Kukai as wife, because of "ill-treatment" and "badly beaten" she was hospitalised, while plaintiff was imprisoned. Finally the plaintiff admits that he paid neither dowry, no bride price to defendant. This claim should have been in respect of a refund of bride price alleged to have been paid by him to the mother of Mbi Nsen, who was also mother of the defendant. Here it is noted that defendant's mother is now dead. The property of mother was not claimed hence case was dismissed.⁹

2.4. United Nations Methods to end the aftermath Calamities

In The Supplementary Convention on Slavery, Slave Trade and institutions and practices similar to slavery. Adopted by a conference of plenipotentiaries convened by Economic and Social council resolution 608 (XXI) of 30th April 1956 and done at Geneva on 7 September 1956, entry

⁷BAC. File No 361/399/, Date registered 25/05/1954, NW/La/d. 1954/10, Tobi of Fundong, Application for residence review in Kom N.C Civil suit No 29/52 [The native courts ordinance Cap.142 laws of Nigeria in the review jurisdiction of the resident Bamanda, Westmacott, Ag resident, Bamenda] p.15

⁸BAC. File No 361/524. Mr.Kubensum of Funfombi, Application for resident review in Kom native court civil suit No 65/55, NW/La/d.1958/3, date open, 25/03/56.

⁹BAC. File No 361/668/NW/La/d, 1957/12, date registered 12/08/57, Residents Review in Aghem Native court Civil suit No101/57. Review in Bum Civil suit No. 67/51, p.11

in to force: 30 April 1957, that was promulgated by the United Nation in 1957.

Preamble: The States Parties to the present convention considering that freedom is the birth right of every human being...

Section I, Institution or Practices Similar to Slavery.

Article 1: Each of the States Parties to this convention shall take all practicable and necessary legislative and other measures to bring about progressively and as soon as possible the complete abolition or abandonment of the following institution and practices where they still exist and whether or not they are covered by the definition of slavery contained in article 1 of the slavery convention signed at Geneva on 25 September 1956:

(a) :-...

(b) :-...

(c):-Any institution or practice whereby:

- (i) A woman, without the right to refuse, is promised or given in marriage on payment of a consideration on money or in kind to her parents, guardian, family or any other person or group: or
- (ii) The husband of a woman, his family, or his clan, has the right to transfer her to another person for value received or otherwise; or
- (iii) A woman on the death of her husband is liable to be inherited by another person:

(d):-Any institution or practice whereby a child or young person under the age of 18 years is delivered by either or both of his natural parents or by his guardian to another person, whether for reward or not, with a view to the exploitation of the child or young person or of his labour.

Article 2: With a view to bringing to an end the institutions and practices mentioned in article 1(c) of this convention, the states parties undertake to prescribe, where appropriate, suitable minimum age of marriage, to encourage the use of facilities whereby the consent of both parties to a marriage may be freely expressed in the presence of a competent

civil or religious authority, and to encourage the registration of marriage.¹⁰

The effectiveness of the convention put in place under the United Nations was means that brought about methods and procedures to end the social calamities that at the time were perpetrating the communities of British southern Cameroons. Still in the southern Cameroons a case was presented in the court of the Resident Bamenda province holding at Wum on the 18th of March 1953 before J. Brayne-Baker, Esquire acting resident between Wanyang of Su versus Mbala of Fin with claim return of £30 taken about three years ago on daughter Yunga (F). In this case, Mr. Tumenta was the interpreter and the District officer Mr. W.T Griffith confirmed the judgment of the native court, an adjournment order was signed on the 22nd of October 1952¹¹. In the case, Wambang inherited Yunga (f) from his late brother which she late got married to one Keban after having received dowry of £9 awarded to him whom he did not accept due to the long duration and it is noted his brother had paid a much larger sum to Mbala the daughter's father. Evidently, at this moment, it is clear that the several conventions organised went effective and put things in order as many cases of marriage divorce were regulated and some dismissed to avoid slavery in marriage.¹²

From Neng Ewe, We village, Fungom area, Wum Division, Bamenda, 13th October 1954 to the honourable province Bamenda through the district officer. Fungom native court. A case between Sadras Boubiwo of We versus Neng Ewe, of We claim refund of thirty pounds being dowry of his late sister alleged owed Nine years ago from date of summons in the native court. It was paid to his father and mother.¹³ At the final analysis the woman was accused for having committed adultery, the wife was returned to the husband, which he escaped. She admitted that her mother received bride price from the plaintiff as such she was highly responsible for the payment of the dowry by soft installments. The married was divorced which the court said if she was to marry to anybody else the plaintiff had the right

¹⁰ The Supplementary Convention on Slavery, Slave Trade and institutions and practices similar to slavery enforced on 30 April 1957.

¹¹ BAC. File No 361(308) NW/La/d, 1952/15, date registered 6/10/52, subject Wanyang of su Application for Residents.

¹² Ibid. [The emptiness of the court case is due to the UNO enforcement of abolition principles]

¹³ BAC. File No 361(415) NW/La/d/1954/6, Fungom NC Civil, p.1

to sue that person for his dowry to be refunded.¹⁴ This case was witnessed this 13th day of October 1954 and written by H.J.S. Ngongi, writer for the Honourable Resident, C/O D.O Wum Division at Wum.¹⁵

A means or methods that often engaged many people into slavery were marriages in either forms on the man or woman. When the actions were condemned by abolitionists' leaders, people were not sold into marriage, no matter what. They were advised to follow the legal procedures. As such due to the abolition act through juries which they found insufficient evidence, slaves were acquitted under marriage bondages. "Habitual runaway were considered risks to the community and to the slave holder, so they were held in jail until they could be exported."¹⁶ Most women and men ended up during the typical slave period learning their homes but ended up moving into more slavery. So some parents requested the return of their daughters and bride price refunded. Still another case in which the two parties concerned Biam of Usu versus Metangba of Isu in Fugom Native court with claim return of daughter Chia or £40 bride price taken by defendant one year ago. The claim was not admitted and when judged it was dismissed by F. Potts.¹⁷

Another glaring circumstance with proceedings from court, No753 of 5th November 1957 which was headed by the D.O on the 4th of September 1957. Both parties present. Pius Chia Ndum of Wembong as Plaintiff versus Suo Bi (m) of Jikfun defendant which the claim was dismissed by I. Griffin, (sdg) ADO and the claim was refunded of 3 daughters. The judgment of the court held continued and gave liberty to pursue his claim in the usual manner (sdg) M.N.H Milne at Laikom, 3-corner on the 06/12/1958. Furthermore, another episode or case took place in 1959 between Kang Ntumba V.H of Nundabili versus Kume of Mbuk-Bum with claims refund of £100 B.P or Nte Ndeh Bong taken by defendant 2 years ago. The suit was head by the district officer on the 18th of March 1959 and head on May 19th 1959 (D.O, J.H Beeley Esg). Decision arrived at was that the plaintiff daughter Nte Ndeh is already an adult and has married Jam and has a child 1.5 month old

and the defendant has admitted that he has received £30 dowry from Jam if he consider what he received is not sufficient, he can take action against Jam.¹⁸ Many of such situation occurred in the Mamfe, Kumba, Victoria Divisions in British southern Cameroons.

III. POLITICAL IMPACT IN THE ABOLITION OF SLAVE TRADE IN SOUTHERN CAMEROON.

3.1. Ex-slaves, slaves participation in Politics.

Politically, due the abolition of slavery and slave trade, slaves became integrated in to political affairs of the Kingdom. Bafut became an entity in the grassfields involving others, some few villages with an organised political system raised slaves to talk within political issues in different ways, directly and indirectly as similar as the freeborn citizens. The slaves were military soldiers protecting the political figures such as the Fon who played glaring role internally as Mathias L. Neba emphasized;

The army was summoned in the past by the appropriate signal by use of a slit wooden drum "kwin" which was ensconced in a shed in the plaza of the palace. When the army assembled, it was briefed on its objectives. Each soldier provided his own arms, spears, clubs, cutlasses, bow and arrow. When guns became available around the middle of the nineteenth century, it became a mark of prestige to have one and people exerted every effort to get them. With the availability of guns, the Fon supplied the gun powder. The Bafut went to war, not only to ward off attacks, but often to maintain their supremacy over their tributary subjects in particular those to the north. Sometimes the wars resulted from raids and counter raid for slaves, but at other times, the Bafut attacked other people for alleged insults to their Fon. The rationale of different wars determined the

¹⁴ Ibid, P.2.

¹⁵ Ibid.

¹⁶ Wilma A. Dunaway, *The African-American Family in Slavery and Emancipation*, Cambridge, Cambridge University press, 2003, pp .42-43.

¹⁷ BAC. File No361/601, date registered 18th /10/1956, NW/La/d.1956/8, Fugom civil court 59/56.

¹⁸ B A C. File No 9034/3-17, NW/La/d. 1957/5. Pius Chis Ndum of Wombong vs Suo Bi of Jikfon at Kom Native court civil suit, No144/56 and File No 9034/S.33 Kang Ntumba V.H of Mundabiliv Kume of Mbuk-Bum at Bum Native court suit N°28/58 in NW/La/d.1959/3

different weapons, strategies and tactics used.¹⁹

Most war tactics were developed in the entire grass fields of British sphere of influence in Cameroon by ex-slaves and slaves, a case of study at this juncture is Bafut, and the slaves were those who master very well the beating of the wooden drum *Kwinto* to summon the people for meetings of the Fon request. The army constituted the slaves in Bafut. During discussions their opinions count as they give impressive information concerning the clan indirectly or directly, information around the kingdom that the Fon is not current or aware of. They decide if they can go for war or not. They follow strictly decision of the Fon *Mbeh*. That could have been the reason that made the Bafut slaves were skillful in the fabrication of den guns, knives, cutlasses and other utensils and masks in different categories as their right was giving. The waging of wars during the slave active period had developed the people in its entirety. Also, the Fon was very active as he will supply the army constituting slaves with gun powder. The large kingdom grew larger as a result of the slaves' participation. The *Tikar* slave Bafou Firlo'o who left Bafou Fondong behind, took over from the Fon Nebachi as Fon and controls the Kingdom hence participating in politics. This however made the Fon great and admired due to the number of slave found in his palace and entire village. The Fon was also respected as regard the number of slaves he had and their active participation in political matters. Several honours and gifts were given to successive chiefs, The Fon or Chiefs usually attributed or award medals and red feathers to more slaves who performed their duties efficiently. After the abolition some Fon and chiefs in Bafut still kept and placed duties on slaves, for some slaves to work as errand men or boys in political affairs of the Kingdom from one palace to the other within the Grassfields. Finally slaves help to maintain the political integrity by bringing together via the Fon issues concerning territorial disunity for the intention to make proposals for solutions in the Kingdom.²⁰

3.2. Reactive influence from the Common Wealth of Nations

As regard the abolition result in the Common Wealth of Nation, the British who annexed and colonised Nigeria and British southern Cameroons under the Queen of England (British sphere of influence in Cameroon) has initially decided after the Berlin West African conference in 1884-1885 that slavery and Slave Trade should be abolish in Africa which also involved southern Cameroons. Talks on abolition of slavery and slave trade in later times, under Lord Roseberry Adelaide made the first reference to the British Empire as a "commonwealth of Nations" in 1884 which slave was not taken out of the territory any longer legally. Later, it then became the British Dominion; British southern Cameroons became part of this empire under the mandate era that has expelled slavery and the trade over her dominion. The conferences attended should be noted that in later period it was differentiated as "imperial conferences" not "colonial conferences" attended by countries under British rule and seeking independence thus connectivity found in the two areas or regions hence all malpractices connected to slavery and slave trade was abolished or abandoned. It should be noted that, it was as a result of this, colonisation exercise that Nigeria was let free by The British until on 1st of October 1960, as Nigeria obtained her independence, thus a more advanced method to stay away from slavery and slave trade in Nigeria. Also, British southern Cameroons also follow on 1st of October 1961 under British auspices, a giant step to undo slavery and the slave trade as laid down principles to combat the aftermath practices of slavery and slave trade after the abolition in the British Sphere of influence was introduced.²¹

Additionally, several organizations were formed to end slavery and the slave trade trafficking of women and children and prostitution among which was The Centre for Human Rights and Peace Advocacy (CHRAPA) in the Fight against Child Trafficking with one of her main office at Ghana Street Bamenda, Cameroon was created in June 2006. A Non-Governmental Organization (NGO). This NGO seek to monitor and promote Human Rights through the promotion of a culture of human rights, good governance, gender equality and human dignity. CHRAPA had witnessed and identified with an estimation of about 25% of children from the Boyo division, Donga Matum, and Bui division 17%, Menchum 15%, Ngokintujia 11%, Mezam 10%,

¹⁹ Matthias L. Neba, *The Bafut and the Germans, 1889-1907*. (ed. V G Fanzo and Chem-Laughee) In *Nso and its Neighbours*. Reading in Social History of the Western Grassfield of Cameroon. Edited assisted by M. Goheen and E.M Chilver, Yaounde, 1986, p.89.

²⁰ Ibid.

²¹ Kasali Adeyote and co, *Social studies*, Ibadan, Oxford University press Department, 1978, pp.47-53.

Nigeria 5% more coming from the interior.²² Out of the 22 cases identified, Bamenda central registered zero while Santa had 12, Awing 4, Bali 5 which 80% were 18 years and 20% were over 18 but trafficked below 18 which served their masters while waiting for settlement. This took place before 2011 and has been checked.

3.3. Disgruntlement for no or less payment or settlement of house-help

Many of the house-help did not receive any settlement but left in agony. Some were less paid. From information gotten their conditions like payment, working time, and treatment were not respected. Few of them at least received payment ranges between 5,000 to 10,000 francs per month. This is not even the authorised fixed rate of payment which is 20% accepted receiving this sum. The sum could be received as contract stipulated for a period of 5 to 8 years. Most of them work as house help, sellers and baby seaters. They work as from 5a.m and stop at 10p.m while some starts (sell oils) 7a.m to 6:30p.m. More than 75% complain of constant corporal punishment given to them hence serious beaten, poor feeding, held in captivity. CHRAPA was formed to combat all these mess but much is still to be done as CHRAPA is handicapped financially.²³ Most children who are orphans are sent or exported from Cameroon and Nigeria to Gabon and Congo, Equatorial Guinea as many of these classes of victims are found in the entire territories. There is no complexity about this form of interval trafficking, it is usually for domestic work, even though in some cases, the victims are forced in to prostitution instead of domestic solitude that had been promised to them. Traffickers became more sophisticated when dealing with cross-frontiers especially on crimes on transactions without visas finally led them into farm plantations, Market assistants, catering workers and domestic workers.²⁴

3.4. Constitutional Laws Committees setup included in Government Plans and granting of Jobs

3.4.1. The Role of Constitutional Laws Committee

As a consequence or impact of slavery and slave trade abolition, to end slave trade and slavery in Cameroon the constitutional law committees of the National Assembly examined some bills in 2011 in the political bench, the "Sitting of November 26th 2011 regulated the trafficking in persons and slavery" under the Vice Prime Minister, Amadou Ali in the constitutional laws committee. Among important matters (issues) discussed "The instruments include the Penal Code, United Nations Convention against Trans-national organized crime and its protocol to prevent, suppress and punish Trafficking in persons especially women and children". Also some particular sections like 292 on forced labour, 293 on slavery, 294 on slavery and being in debt bondage. The Government enacted law N° 2005/15 of 29 December 2005 which dealt on the fight against child trafficking and slavery.²⁵

3.4.2 Granting of jobs

More so, it was noted that lack of job availability had course much problems hence another commission sad on the issue of job granting, giving greater right to The President of The Republic as authorized to ratify the Project, under the convention, N° 144,²⁶ on international job that was adopted in Switzerland on the 2nd of June 1976 at Geneva. This was done when the President launch the Recruitment of Cameroonian Youths in 2011, outside and within Cameroon and later other jobs opportunity has come up like the recruitment of two thousand University lecturers in State Universities in subsequent years. Morso, another law deposited before the chambers, No. 155 gave authority to the President of The Republic to ratify the convention on Security of Job and Health of Workers. This was also adopted in Geneva at Switzerland on 12 June 1981. This convention was to be applied to all sectors with no exception. The member of Government represented to this commission was Robert Nkili minister of works and social security, and was assisted by the minister of External Relations In charge of The Islamic World, Adoum Gargoum.²⁷

²²BAC.The U.S State Department "Trafficking in person Report 2006".

²³BAC.Cameroon Human Right Report, March 2005.(Illiteracy, high birth rate, and polygamy often is behind the enormous problems), March 2005.

²⁴BAC.These commonly found within the CEMAC and ECOWAS regions Cameroon Harmonizes Trafficking, slave laws. 26 November 2011.

²⁵Emmanuel Kendemen, "Cameroon harmonizes trafficking slavery laws". In *Cameroon Tribune*, Monday, November 28, 2011 p, 3 [... The bill tabled in parliament is intended to ... regulatory lapses contained in the December 2005 law... fight against child trafficking and slavery. It has three chapters divided into eight sections.]

²⁶BAC.law project that authorized the President of the Republic to ratify the convention N° 144"

²⁷ Jean Francis Belibi, " Deux Projets de loi déposes Vendredi" Sécurité, Sante et normes du travail. In *Cameroon Tribune*, 2011.

IV. CONCLUSION

In the nutshell, the two major aspects, the social impact and the political impact of the Abolition of Slave Trade in Southern Cameroon have been explained. This abolition of slavery and slave trade started when the British came reasoning that it will be important to stop this brutal life as they saw the millions of people who are dying all over the world. As a result, slaves were to be set free such as the case of James Summerset in England.²⁸ In Africa, the inhabitants were the culprit or prey to be enslaved. Before the proclamation of the abolition by European countries, many had prayed very seriously to “break the chains” following resistances and advocacy, the legacy of the abolition was also felt in British southern Cameroons under the British. Converts out with the fact that the transatlantic slave trade that had once loaded more than 100,000 Africans per year was abolished. Between 1935 and 2011 the vast trans-oceanic extension of slavery created, was dismantled and dislocated above seventy percent, before 1950. The main warehouse, by the 1960 when French Cameroon gained her Independence and 1961 when southern Cameroon gained her Independence by joining French Cameroon, it has wantonly decreased. By 2011 laws have been effectuated to take care of this act that perpetrated the societies and British southern Cameroons.²⁹

The Political institution under The League of Nations Reports and Conventions after slavery and slave trade abolition in the 1930s, the British imperial domination operated under the banner of antislavery, not slavery. By the first half of the twentieth century, the institution, universal status of human existence had been revised as an institution fated for inexorable extinction a world with limited crime against humanity was accepted. People got “free air”, “free soil” at home on which all seats and nations have agreed from the time of Adam” no seats and nations disagreed on the subject, its acceptability required no more demonstration than the light of day, the existed “cruel failure” emanating from diverse action groups and personalities against the slave

trade. These laws abide in the entire British southern Cameroon. Therefore, what are some of the Emigrational, Private and other International laws made to combat and forbade the impact of the abolition of slavery and the slave trade in British Southern Cameroons?

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The use of personal protective equipment by nurses during consultations with leprosy patients

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Abstract— *Leprosy is caused by Mycobacterium leprae, which has tropism through peripheral nerves. Although there are leprosy control programs implemented in Brazil with effective treatments and specific health policies the country was unable to stabilize epidemiological indicators and nurses are part of a collective process of this work. The objective of this work is to identify the use of Personal Protective Equipment by the professional during consultations with leprosy patients. This is a descriptive exploratory research with qualitative approach, field research, carried out in the Family-FHS Health Strategy of the Guanabara neighborhood in the municipality of Ananindeua/Pará. Data Analysis was used. The best way to understand this process is to verify the strategies exercised in the FHS being the best scenario for the professional to develop health actions. It is observed that fhs nurses are a professional who always needs to seek knowledge, because at all times he finds several situations related to the education and training of professionals under his supervision.*

Keywords— *Leprosy, Treatment, Nursing.*

I. INTRODUCTION

One of humanity's oldest evils is Hansen's leprosy or disease, which is also known as Leprosy, Lazarus Evil and Morféia. An infectious disease is considered, which presents chronic evolution, being granulomatous and mutilating in nature, and may also be curable (if diagnosed early and treated properly), or not (VIDERES, 2010).

Leprosy has as an etiological agent *Mycobacterium leprae*, or Hansen's bacillus, which has affinity for peripheral nerves, especially Schwann cells. Mainly affecting shallow nerves of the skin and peripheral nerve trunks (located in the neck, face, middle third of the arm, below the elbow and knees), in addition, can affect the eyes and internal organs (liver, mucous membranes, bones, testicles and spleen) (BRAZIL, 2017).

Transmission occurs through the upper airways by daily contact with patients not treated with lepromatosa leprosy and active borderline. Daily contact between healthy and infected relatives increases the risk of developing the disease by 3.5 times compared to the general population. Extradomiciliary contacts (neighbors, school, work) with daily interactions with multibacillary patients also increase the risk of contracting the disease. After infection, the incubation period is long and variable, and clinical manifestations occur on average 2 to 10 years later. (Marciano, et al, 2018).

The Family Health Strategy (FHS) treats health promotion and disease prevention practices, but a fundamental issue here when talking about the resolution of the population's most common problems prioritizes several specific areas of as a control of hypertension and diabetes, tuberculosis control, prevention of cervical cancer, and others. Based on these points, we can highlight leprosy control, a disease that has increasingly been configured as a public health problem and a challenge for health professionals and managers due to its high prevalence and the negative impact it causes in health of the population. (RODRIGUES, et al., 2015).

Although there are leprosy control programs implemented in Brazil with effective treatments and specific health policies the country has failed to stabilize epidemiological indicators and are still among endemic countries. It is then necessary to review the actions currently carried out to plan effective changes to disease control (BRASIL, 2009).

In the Family Health Strategy (FHS), nurses are part of a collective work process, acting directly in leprosy control actions whether individually with the carrier, family or community; professionals work in disease prevention, search and diagnosis of cases, treatment and follow-up of patients, prevention and treatment of disabilities, management of control activities, system of registration and epidemiological surveillance and research (Son, et. al, 2010).

Therefore, the objective of this work was to identify the use of Personal Protective Equipment by the professional during consultations with leprosy patients.

II. METHODOLOGY

This study is characterized as a descriptive exploratory research with qualitative approach, field research, conducted in the Family-FHS Health Strategy of the Guanabara neighborhood in the municipality of

Ananindeua/Pará, in this place three strategies work and works a multidisciplinary team.

The sampling consisted of three FHS nurse professionals working in consultation with leprosy patients. The participants were instructed and informed about the research and were only included after reading, approving and signing the Free and Informed Consent Form.

In the data collection, a research instrument composed of seven categories with open questions was used, to which for this work, only three categories were used, whose appeal was elaborated by the authors of the research.

A visit was made to the basic health unit of Guanabara in Ananindeua, where the family health strategy of the Guanabara neighborhood also operates, to schedule the days and times to conduct the research with the three nurses that make up the FHS team at the time there was an opportunity for interaction between the probable researchers and the researchers favoring the opening of both parties, and thus creating a link of mutual trust. At the time the project was presented to the research participants with the intention of clarifying the purpose, objectives and relevance of the study in question, to the professional and scientific environment, and trying to sensitize them of the importance of participation and volunteering in said research.

The participants were instructed in relation to the guarantee of anonymity through the pseudonymous codification used for each member of the study, being named as nurse1, nurse2 and nurse3, thus preserving the identity of the respondents. Later, we attended on the days and times scheduled to collect data through delivery of the interview script for nurse1 and 2 in the morning shift and to nurse3 in the afternoon shift, with an average time of 20 minutes for the return of the script, without harming your work routine.

Nurse professionals, who work in leprosy nursing consultations with a minimum time of 6 months, of both sexes and who agreed to participate in the Research after reading and signing the TCLE were included.

Thematic Analysis was adopted in order to examine the meaning of the information of the declarants (or meaning nuclei), contextualizing them. According to Minayo (2012), the pre-analysis stage, study of the content or coding and treatment of the results obtained/interpretation are processed.

This research was submitted to the evaluation of the Ethics Committee on Research with Human Beings of

the Paulista University and approved under CAAE No. 22928819.1.0000.5512, Approval Opinion No. 3.677.044.

This research poses low risks in relation to the exposure of participants. In case of embarrassment when answering the questions, withdrawal in the research through being working hours. The benefit is given as a subsidy for nursing professionals and future professionals to better understand the importance of consultation with leprosy patients, in addition to clarifying information to the community to demystify the prejudice that is still with the disease that may have cure. Not least, make the study available for future research in the college library.

III. RESULTS AND DISCUSSIONS

1 IDENTIFICATIONS OF THE PROFILE OF RESEARCH INSTRUMENTS

Table 1 shows the identification of the profile of research instruments in relation to Age, Gender, Time of Service in the Place, Specialty and Master's degree.

Table 1- Identification of the Profile of research classes in relation to Age, Gender, Service Time, Specialty and Master's, year 2019

NURSE	AGE	SEX	SERVICE TIME	SPECIALIZATION	MASTERS
NURSE 1	47	F	13 Years	Intensive Care, Epidemiology and Higher Education Unit	No
NURSE2	56	F	28 Years	Public Health, Gynecology and Obstetrics	No
NURSE 3	50	F	8 Years	Public Health	No

Source: Authors of the research, 2019.

We sought to construct a comparison of the data obtained with the theoretical framework used in the research, with the purpose of basing in scientific evidence the answers obtained in order to achieve the objectives proposed for the beginning of the research.

2 CATEGORIES ANALYZED

The application of the script with semi-structured questions the nurses offered us subsidies for more accurate analysis and comparison. After the analysis of the acquired data, 7 (seven) categories emerged, described below:

Category 1 - professional performance in consultations for the treatment of leprosy

It is clear that the nurse's actions provide guidance that pass the promotion and prevention of diseases making the patient aware of their health condition

Three nurses participated in the study, obeying the inclusion criteria. The age group of the interviewees is between 47 and 56 years, with a mean age of 51 years, it is observed that 100% (the total of 03) are female; in relation to the length of service in the Health Institution, an average of 16.3 years was obtained.

Regarding the specialty, it is perceived that of this total: 66.66% (2 in total) are specialist in Public Health; 33.33% (1 in total) in gynecology and obstetrics and 33.33% (1 in total) specialist in intensive care unit, specialist in epidemiology and specialist in Education for higher education. None of the professionals interviewed have the degree of master's degree, the interviewees are enumerated and arranged from 1 to 3 and identified as nurse (referring to the nurses who participated in the interview) in the table below.

favoring them to participate more seriously in consultations.

Below we highlight the statements of each nurse:

"Through the systematization of nursing care, where nursing processes (data collection, nursing diagnosis and nursing evaluation)" (Nurse 1).

"Clarification on the disease, treatment and prejudice that still exists" (Nurse 2).

"The measures of promotion people with leprosy follow the same as the general population, with special attention the conditions of housing, sanitation, leisure, food and work and others" (Nurse 3).

Also on this issue according to Vinicius (2016), the professional in the midst of the attributions conceived by the State and Federal Council of Nursing, administers, educates and offers assistance, which aim to strengthen the bond in the search to contribute to the improvement of

the quality of health and life of the individual in the family environment.

Category 2 - training for professionals

It is observed that fhs nurses are a professional who always needs to seek knowledge, because at all times he finds several situations related to the education and training of professionals under his supervision.

It is clear that for Porto (2007), the level of information of the professionals who make up the FHS on general and specific aspects of leprosy must be satisfactory, so that there is excellence of services and quality in care.

We highlight the speech of each nurse:

“YES, 1^o semester of 2018” (Nurse 1).

“YES, there 6 Years” (Nurse 2).

“YES, about 5 years ago” (Nurse 3).

With regard to what was presented, it is necessary to train health teams in order to eliminate the disease, in order to diagnose and treat cases early, guide contacts and direct the population in search of health services (LANA et al., 2008).

According to Paschoal et al (2006), it is of fundamental importance for the professional belonging to a nursing team to reflect on the education process within a health unit, because it should understand and understand the practices, the essence of work in the face of users, the performance in the face of an exercise and the reasons for this realization; it is up to the professional to understand all these devices for a complete and correct performance of activities, seeking a full effectiveness and professional competence.

Category 3 - use of ppe during consultation

It is of paramount importance the use of personal protective equipment not only by the nurse, but by the entire professional team of the unit, it is always necessary to organize all the materials that will be necessary to use in the procedures. It was noticed that the PPE most used by the professionals in the consultation are the glove and the coat. In addition, they assumed that they do not often use PPE as a mask and goggles.

The answers of each nurse are described below.

“When we have we use yes, the N95 mask and procedure gloves” (Nurse 1).

“Sometimes gloves” (Nurse 2).

“Yes, gloves” (Nurse 3).

Regarding what was displayed according to Melo (2014), the most important thing is adherence to use

together with proactive attitudes on the part of each professional in order to comply with accident prevention measures and seeking the protection of the patient, of co-workers and of himself. For this, it is necessary that trust in the work routine, its internalization and mastery of the technique do not trivialize the risks existing in health work.

IV. CONCLUSION

It is concluded that professionals have sufficient notions about the treatment and control of the disease. The best way to understand this process is to verify the strategies exercised in the FHS being the best scenario for the professional to develop health actions. Nurses' actions contribute preventing incidence, controlling the disease through tests, evaluation of signs and symptoms and mainly treatment guidance for the patient and his family with comprehensive and humanized care.

It was also observed the relevance of the patient in being well received and never discriminated soon it is necessary to have a satisfactorily trained team encouraging the client to the treatment offered.

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IOT based Coal Mine Safety Monitoring and Controlling

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Abstract— At this moment are shifting through an IoT (Internet of Things) screen, prosperity tries for excavators which is commonly fundamental in underground mining spaces. At this moment, system is making using explicit sensors sort out subject to MEMS used to screen the ecological variables parameters of underground mine place and drives each and every perceived parameter/ascribes to/characteristics to ARDUINO based ATmega2560 Microcontroller Unit (MCU). The MCU unit is used to make a totally robotized investigating structure with high exactness, smooth control and consistency. Decisively when a fundamental condition is seen alert is given by the structure and comparative estimations is given to webserver by beginning ESP8266 module subject to Wi-Fi correspondence. The apparent assortments in the characteristics are appeared on webserver page that makes less referencing for the underground control network to screen and to make critical quick move to hinder genuine mischief. At the same time using NRF24L01 handset module to transmit data from the mine fragment which can be used to screen and brief move to be made.

Keywords— AP ordering, information extraction, ready framework, fracking sand interface, GRNN convention.

I. INTRODUCTION

As overall essentialness use additions and customary oil resources decay, breaking development is one of the noteworthy progressions to improve the maltreatment of oil and gas resources. It is unprecedented vitality for the improvement of low-vulnerability stores and the instigation of low-yield wells. In light of the capriciousness of the stratum, various perils will be looked during the time spent breaking improvement, especially sand plug, which is the most notable, causing financial disasters and natural tainting, pummeling spillage in the course of action, and scraps the advancement well, etc. At present, the Internet of Things (IoT) has been commonly used in different fields, which makes huge data assessment stacked with challenges. Definite data examination is basic to develop reasonable logical models. The oil business is a little bit at a time moving towards knowledge. Different sensors presented at the well site which can assemble data set up an IoT circumstance. The examination of the data assembled at the well site is made arrangements for removing key information by using data mining development, which can recognize data designs, and direct peril desire. Right now, use of data mining advancement to the early notification of splitting improvement is of uncommon immensity for

avoiding the sand plug setback that occurs during the breaking technique.

II. RELATED WORK

The paper proposes an early advice system for the threat of sand plug subject to twofold logarithmic curve. Directly off the bat, the coupled time region assessment and GRNN figuring are used to envision the oil weight and bundling pressure parameters in the twofold logarithmic curve slant sand plug risk advised. Also, a while later the inclination change is applied to perceive and condemn the sand plug, which can comprehend the early caution of sand connection of breaking. Finally, to improve the precision of twist incline figuring, the improved AP gathering estimation is used to segment the oil weight and weight twist followed by twist fitting, at the same time find out the inclination of the fitted curve. The standard duties of the paper are according to the accompanying: (1) An early reprimand model for the twofold logarithmic curve of sand connection of separating is worked in the paper. (2) The time game plan examination computation is proposed which can be foresee the oil weight and bundling pressure in the early notification model, and the GRNN estimation

is used to update the desire realizes the time region assessment. (3) Improved AP gathering computation is used to bundle the checking data to improve the precision of risk notice. The rest of the paper is formed as follows. Region 2 gives four numerical models which joins twofold logarithmic twist model, time plan model, GRNN, improved AP clustering. Fragment 3 depicts a perceptive model for coupling time plan time space examination with GRNN. Section 4 blueprints the improved AP gathering early advice model. Fragment 5 gives building application examination

III. LITERATURE SURVEY

1. “Capacitive Interfacing for MEMS Humidity and Accelerometer Sensors”, Norliana Binti Yusof, Norhayati Soin, Siti Zawiah Md.Dawal, 2010, IEEE.

The paper proposes an early reprimand procedure for the risk of sand plug subject to twofold logarithmic twist. Directly off the bat, the coupled time region examination and GRNN figuring are used to predict the oil weight and bundling pressure parameters in the twofold logarithmic curve slant sand plug chance caution. What's more, a while later the inclination change is applied to perceive and condemn the sand plug, which can comprehend the early reprimand of sand fitting of breaking. Finally, in order to improve the precision of twist slant tally, the improved AP gathering computation is used to divide the oil weight and weight twist followed by twist fitting, at the same time figure the inclination of the fitted curve. The essential duties of the paper are according to the accompanying: (1) An early counsel model for the twofold logarithmic twist of sand connection of making is constructed laugh hysterically in the paper. (2) The time course of action examination count is proposed which can be envision the oil weight and bundling pressure in the early notification model, and the GRNN estimation is used to update the desire realizes the time space assessment. (3) Improved AP gathering computation is used to pack the watching data to improve the precision of risk notice. The rest of the paper is sifted through as follows. Region 2 gives four logical models which fuses twofold logarithmic twist model, time game plan model, GRNN, improved AP gathering. Portion 3 portrays a perceptive model for coupling time plan time zone examination with GRNN. Territory 4 diagrams the improved AP packing early reprobation model. Section 5 gives building application assessment.

2. “A Wireless Home Safety Gas Leakage Detection System”, LuayFraiwan, KhaldonLweesy, AyaBani-Salma, Nour Mani, 2011, IEEE.

A remote security contraption for gas spillage recognizable proof is proposed. The contraption is made arrangements for use in nuclear family prosperity where mechanical assemblies and radiators that use combustible gas and liquid oil gas (LPG) may be a wellspring of danger. The structure moreover can be used for various applications in the business or plants that depend upon LPG and combustible gas in their undertakings. The structure setup involves two essential modules: the distinguishing proof and transmission module, and the tolerant module. The ID and transmitting module perceives the distinction in gas center using an extraordinary distinguishing circuit worked thus. This module checks if an alteration in gathering of gas (es) has outperformed a certain pre-chosen edge. In case the sensor recognizes an alteration in gas center, it impels and differing media alert and gives a sign to the authority module. The authority module goes about as a flexible alert device to allow the convey ability inside the house premises. The system was had a go at using LPG and the alert was impelled as a result of progress in center.

3. “MQTT Based Environment Monitoring In Factories for Employee Safety”, Ravi Kishore Kodali and Aditya Valdas, 2017, IEEE.

Prosperity of laborers, in any industry, especially at the creation line level is one of the most noteworthy edges to be considered by associations. This is of focal importance, both for the flourishing of the delegates and that of the organization all things considered. In preparing plants where working conditions are unforgiving and agents need to take staggering caution while moving toward their work, it is typical for episodes to occur. With numbers going as high as into the thousands it is noteworthy that there is an extent of security for the agents from any possible risky conditions. As a response for this issue, we propose a checking structure to be presented in mechanical offices. With this structure, we will have the choice to screen fundamental security parameters of the work environment in these mechanical offices so we are particularly mindful of the prosperity condition and the possibility of occurrence of any misfortune. For the structure of this system, we use an ESP8266 Wi-Fi chip engaged microcontroller Node MCU. To this are related three sensors - one to screen temperature and suddenness (DHT sensor), a ultrasonic sensor (HC-04) and a smoke sensor (MQ2 sensor). These sensors constantly screen the earth in the workplace and move the data onto the Losant IoT Platform, which is one of the most amazing cloud stages which help screen data by different portrayals and further game plans.

4. "Safety of Underground Mine Coal Worker", Mrs. R.R. Thorat, Dr. L. K. Ragha, Prof. R.D. Patane, 2014, IJAEM.

To be productive, security best practices in any affiliation must be significantly pervaded into the corporate culture and maintained from top organization on down through the positions. Prosperity is actually everybody's movement. This is especially huge in mining and other high-chance endeavors where prosperity care and consistency are essential in helping with thwarting disasters, wounds and fatalities. Mine chiefs and individual diggers need to hold quick cautiously to operational prosperity strategies. Directors need to give the right contraptions and getting ready to every agent to guarantee the life, prosperity and security of the workforce, similarly as to guarantee significant worksites and assets. As driving mining affiliations certainly know, making a secured working environment infers a dynamically useful and productive mining movement. It moreover prompts progressively noteworthy degrees of worker certainty and occupation satisfaction, which subsequently improves laborer upkeep. Taking a sweeping point of view toward improving pro security preparing and safe work practices is a sound undertaking that conveys benefits for long stretch accomplishment.

5. "A disposable flexible humidity sensor directly printed on paper for medical applications", D Barmpakos, A Segkos, C Tsamis and G Kaltsas, 2017, IOP Publishing.

The present examination shows an inkjet – printed interdigitated cathode group on paper substrate and its appraisal as soggy sensor. Inkjet dot course of action assessment has been acted in order to achieve repeatable results regarding made dots, in perspective on the driving pulses applied on the inkjet piezoelectric segment. Dot plan has been watched using stroboscopic sway. Three assorted paper substrates, to be explicit high sparkly inkjet photo paper, brilliant inkjet photo and matte inkjet photo paper have been surveyed to look at closeness with the ink. Relative tenacity estimations have been done in a controlled circumstance. Material corruption, long stretch response and memory sway are a segment of the viewpoints which were considered inside the edge of the present work. The proposed sensor allows to novel biomedical applications given the versatile substrate nature and the low – cost, single – step produce approach.

IV. EXISTING SYSTEM

In existing method, there is no data transmission from mine territory to watching station for checking the status of

excavators and the environment. Difficult to screen each and every person to the barometrical status. There is no fast wellbeing endeavors available at the hour of emergency.

V. PROPOSED SYSTEM

In our proposed structure we are going to screen the status of workers and the data invigorated to cloud using IoT similarly as send data remote to the watching station.

Speed response. Fast move to be made. Screen also control without a moment's delay

VI. MODULES

1. FIRE SENSOR
2. GAS SENSOR (MQ2)
3. ACCELEROMETER
4. RELAY (2)

1. FIRE SENSOR:

This fire sensor circuit mishandles the temperature distinguishing property of an ordinary sign diode IN 34 to recognize heat from fire. At the present time it recognizes heat, an uproarious alarm reproducing that of Fire separation will be made. The circuit is unnecessarily unstable and can distinguish a climb in temperature of 10 degree or more in its locale. Ordinary sign diodes like IN 34 and OA 71 shows this property and the inside restriction of these contraptions will lessen when temperature rises.

The fire sensor circuit is exorbitantly sensitive and can recognize a rising in temperature of 10 degree or more in its locale. Standard sign diodes like IN 34 and OA 71 showcases this property and within restriction of these devices will lessen when temperature rises. In the pivot uneven mode, this effect will be progressively basic. Ordinarily the diode can make around 600 mille volts at 5 degree centigrade. For each degree rise in temperature; the diode makes 2 mV yield voltage. That is at 5 degree it is 10 mV and when the temperature rises to 50 degree, the diode will give 100 mille volts. This voltage is used to trigger the remainder of the circuit. Transistor T1 is a temperature controlled switch and its base voltage depends upon the voltage from the diode and from VR and R1. Commonly T1 conducts (as a result of the voltage set by VR) and LED sparkles. This shows run of the mill temperature.

2. GAS SENSOR (MQ2):

Fragile material of MQ-2 gas sensor is SnO₂, which with lower conductivity in clean air. Right when the goal burnable gas exist, the sensor's conductivity is progressively higher close by the gas center rising. You should use clear electro circuit, Convert change of

conductivity to look at caution sign of gas obsession. MQ-2 gas sensor has high affectability to LPG, Propane and Hydrogen, also could be used to Methane and other burnable steam, it is with negligible exertion and suitable for different application. Sensor is delicate to flammable gas and smoke. Smoke sensor is given 5 volt to control it. Smoke sensor show smoke by the voltage that it yields. More smoke more yield. A potentiometer is given to change the affectability. In any case, when smoke exist sensor gives a basic resistive yield reliant on union of smoke. The circuit has a hotter. Power is given to hotter by VCC and GND from power supply. The circuit has a variable resistor. The check over the pin depends upon the smoke in air in the sensor. The deterrent will be cut down if the substance is more. Besides, voltage is extended between the sensor and weight resistor.

2.1 WORKING PRINCIPLE

The MQ2 has an electrochemical sensor, which changes its impediment for different assemblies of vacillated gasses. The sensor is related in course of action with a variable resistor to outline a voltage divider circuit (figure showed up underneath), and the variable resistor is used to change affectability. Right when one of the above vaporous segments cooperates with the sensor resulting to warming, the sensor's resistances change. The alteration in the block changes the voltage over the sensor, and this voltage can be examined by a microcontroller. The voltage worth can be used to find the block of the sensor by knowing the reference voltage and the other resistor's restriction. The sensor has differing affectability for different sorts of gasses.

3. ACCELEROMETER:

The MQ2 has an electrochemical sensor, which changes its impediment for different assemblies of vacillated gasses. The sensor is related in course of action with a variable resistor to outline a voltage divider circuit (figure showed up underneath), and the variable resistor is used to change affectability. Right when one of the above vaporous segments cooperates with the sensor resulting to warning, the sensor's resistance changes. The alteration in the block changes the voltage over the sensor, and this voltage can be examined by a microcontroller. The voltage worth can be used to find the block of the sensor by knowing the reference voltage and the other resistor's restriction. The sensor has differing affectability for different sorts of gasses.

4. RELAY (2):

Moves are the fundamental protection similarly as trading contraptions in a huge bit of the control strategies or equipment. All the exchanges respond to at any rate one

electrical sums like voltage or stream with the ultimate objective that they open or close the contacts or circuits. A hand-off is a trading device as it endeavors to confine or change the state of an electric circuit beginning with one state then onto the following.

Gathering or the sorts of moves depend upon the limit with regards to which they are used. A part of the classes consolidate cautious, reclosing, coordinating, right hand and checking moves.

Protective exchanges diligently screen these parameters: voltage, current, and power; and if these parameters harm from set cutoff focuses they make alarm or detach that particular circuit. These sorts of moves are used to guarantee equipment like motors, generators, and transformers, and so forth.

VII. FIGURES AND TABLES

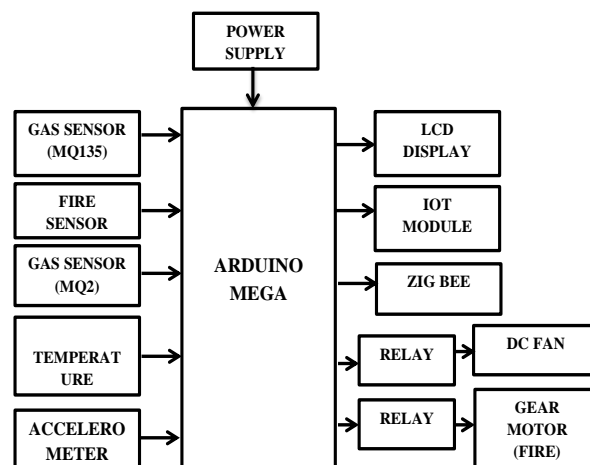


Fig 1: block diagram of transmitter

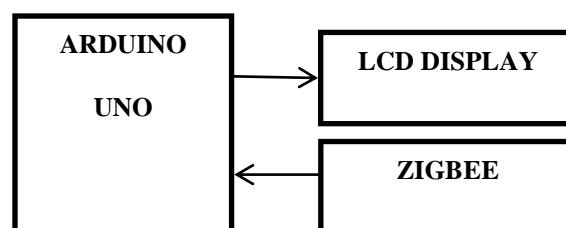


Fig 2: block diagram of receiver

Framework game plan is the applied model that depicts the structure, lead, and more perspectives on a structure. A structure graph is a proper layout and delineation of a framework, shaped with an authoritative objective that supports considering the structures and practices of the structure. Framework organizing can consolidate structure parts and the sub-structures made, that will take energy to execute the general structure. There have been attempt to

formalize vernaculars to delineate structure plan; everything considered these are called making plot tongues.

VIII. FUTURE ENHANCEMENT

Later on investigate, intellectualization is an issue territory. Despite smart early rebuke of risks, examination of quick control after the occasion of threats worth uncommon centrality.

IX. CONCLUSION

Recently, the well site has a little bit at a time went to savvy change, and sensor contraptions are generally placed in the well site to assemble a great deal of checking data. This examination needs to process and analyze the data accumulated from the well site page reliant on the Internet of Things and enormous data correspondence. Directly off the bat, a twofold logarithmic curve slant breaking sand danger forewarning model is developed, and it couple time game plan time zone examination figuring and GRNN computation. Furthermore, the time game plan examination procedure is applied to anticipate the oil weight and bundling pressure. The time desire for the breaking sand square reprimand is ensured by the advancement estimate. The GRNN computation is used to improve the time course of action examination count for oil weight and set the serendipitous occasion pace of the foreseen results. Finally, the improved AP gathering estimation is used to improve the twofold logarithmic curve slant breaking sand chance caution model. From the data precision viewpoint that the exactness of breaking sand plug chance caution is improved. Gotten together with field application, the improved sand plug danger alerted model appears, apparently, to be logically definite and snappy, and has a respectable current application prospect. The early exhortation model proposed is embedded in the remote system improvement to engage the city office staff to remotely screen.

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Job satisfaction: Servers of Regional Hospital Gurupi — Tocantins

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Abstract—The investigative balance of this research comprised the macro theme of satisfaction in the work of employees who work directly in the health care team. The cozy locus was the Regional Hospital of Gurupi (RHG), located in the south of the state of the Tocantins, from which we seek to identify and analyze the level of work satisfaction of the professionals who make up the functional staff of the unit. Methodologically, it is configured in a case study of the exploratory-descriptive type, with a qualitative and quantitative approach, whose data collection was performed from March to June 2018 with 160 servers crowded in the referenced unit and selected by simple random sampling. A structured questionnaire was used as a data collection instrument, made available through the “FormSus” web platform, composed of 15 objective questions and 2 open questions, divided into 4 sections, namely: Section A - Data collection sociodemographic; Section B - Professional data; Section C - Work Satisfaction Scale; Section D - Interference of Satisfaction in the services provided. In the analytical stage of the collected data, the descriptive statistic (mean) method was used in sections A and B of the questionnaire, section C was analyzed following the guidance of Siqueira (2008) establishing the means of the scores in each dimension, and for section D qualitative analysis of the participants' statements in conjunction with the theories previously addressed was used. The results indicated that the servers surveyed are generally dissatisfied with the performance of their tasks, with existing relationships, with the salary received and with the policies of encouraging employees of the unit. With the constant movement in search of excellence in providing health care with quality and safety, it is necessary to keep servers satisfied, fulfilling the mission of the state and public management that is to meet with excellence to social demands.

Keywords—Job satisfaction, Public Service, Public policies, Quality of life at work, Tocantins

I. INTRODUCTION

The population requires the state for the public

health care service to work well. However, for this service to be provided satisfactorily, it is necessary for the

involvement and dedication of the servers. Providing a quality service to the community is essential and public hospital employees are of fundamental importance in this context, be considered agents of transformation of the public service, contributing significantly to growth and development of the municipality, state and country [1, 2].

Studies that address job satisfaction have gained relevance in recent years because work-related physical and emotional exhaustion can be considered an epidemic among workers from various professions [3].

There are numerous factors related to job dissatisfaction, such as the lack of growth opportunities in the organization, remuneration, poor working conditions, relation problems of the multidisciplinary team and the power of decision-making actions related to the activity carried out. It is noteworthy that the level of satisfaction can increase or decrease productivity, improve or worsen the quality of service, and can also generate greater or lower profit for organizations [2, 4].

In the area of public health, studies involving the perception of servers and professionals about the services provided to the community can offer evidence about facilities and/or difficulties of these services in achieving the expectations and needs of users. Analyzing the levels of satisfaction in the work of public servants is essential because surveys such as these can be used to base management decision-making, the well-being of people and also contribute to the enrichment of the literature, seeking to understand the factors that influence such perceptions [5]. The present research aimed to know the level of satisfaction at work of the servers of the Regional Hospital of Gurupi — Tocantins (RHG). In this sense, we understand the adherence of the theme proposed since studies in this context are not known, and the subject is still challenging in the organizational sphere, which can be perceived by the high number of workers still unmotivated and dissatisfied in their professional environments in various fields of activity.

II. MATERIALS AND METHODS

The research unfolded in a descriptive exploratory case study, with a qualitative and quantitative approach. The study was carried out at Regional Hospital Gurupi (RHG), in Gurupi — TO southern region of the

Tocantins, a unit of size III within the hospital classification of the unified health system, which performs high complexity care and is a reference center for 18 municipalities in the region.

Data collection took place between March and June 2018. The participating population consisted of 598 (five hundred and ninety-eight) employees directly linked to the health care area, distributed in the following positions/functions: Hospital Administrator, Social Development Analyst, Health Services Assistant, Social Worker, Nursing Assistant, Health Services Assistant, Dentist, Nurse, Work Nurse, Pharmacist, Physiotherapist, Speech Therapist, Physician, Nutritionist, Psychologist, Nursing Technician, Laboratory Technician, Radiology Technician, and Therapist Occupational.

The RHG servers that acted directly in the health care team with at least 12 months of work in the unit and who agreed to voluntary participation in the research and signed the TCLE were included; servers that refused to respond to the search or partially responded were excluded. By simple random sampling, the selected servers, among the universe of participants (598 servers), were the ones who first accepted the invitation, accessed the Datasus platform and agreed to the terms of the TCLE.

The sample size was calculated according to Barbetta's (2008) [6], reaching the number of 160 servers, obtaining a 7.9% sample error.

Data collection was performed through the FormSus web platform, with a questionnaire containing 15 objective questions and 2 open questions, divided into 4 sections, which was made available in physical and digital materials, in addition to access via QR Code.

Section A of the questionnaire traced the respondents' sociodemographic profile and Section B identified the professional profile of the server. To assess job satisfaction in Section C, the Work Satisfaction Scale was used, constructed and validated by Siqueira (2008) [7], which is a multidimensional measure that assesses the degree of worker contentment in front of five dimensions of his work, being: satisfaction with salary, satisfaction with co-workers, satisfaction with leadership, satisfaction with promotions, satisfaction with the nature of work according to Table 1 [7].

Table 01- Dimensions, definitions, items, and est accuracy indexes in its complete form with 25 items. Source: Siqueira (2008, p. 269)

Dimensions	Definitions	Items	Est accuracy indexes
Satisfaction with colleagues	Contentment with collaboration, friendship, trust and relationship with their co-workers.	1, 6, 14, 17, and 224	0,86
Satisfaction with salary	Contentment with what he receives as a salary compared to how much the individual works, with his professional capacity, with the cost of living and with the efforts made in carrying out work.	5, 8, 12, 15 and 21	0,92
Satisfaction with the leadership	Contentment with the organization and professional capacity of the boss, with his interest in the work of subordinates and understanding between them.	2, 9, 19, 22 and 25	0,90
Satisfaction with the nature of work	Contentment with the interest aroused by tasks, with the ability to absorb the worker and with the variety of them.	7, 11, 13, 18 and 23	0,82
Satisfaction with promotions	Contentment with the number of times you have received promotions, with the guarantees offered to those who are promoted, with the company's way of conducting promotions and waiting time for promotion.	3, 4, 10, 16 and 20	0,87

In the fourth and last part of the questionnaire, Section D was composed of two open questions, which aimed at the perception of the servers regarding the satisfaction and interference of the individual productivity of the worker and the quality of their services provided. The editing of the collected data was performed with the help of the Microsoft Excel program. The analysis of the data from sections A and B was - formed through descriptive statistics. In section C, because EST is a multidimensional measure with five dimensions, the score was initially calculated for each dimension and later calculated a multidimensional mean score. The calculation of each score was obtained by adding the values indicated by the respondents in each of the items that integrate each dimension and then this value was divided by the number of items in the dimension. Thus, for the complete form of EST, the sum has always been divided by five. For the interpretation of the results of the mean score, it is emphasized that the result should always remain between intervals 1 and 7. Thus, 5 and 7 tend to indicate satisfaction. On the other hand, values between 1 and 3.9 tend to signal dissatisfaction, while values between 4 and 4.9 report a state of indifference [7]. Therefore, the higher the value of the average score, the greater the degree of contentment or satisfaction of the employee with that dimension of his work.

Section D data were analyzed qualitatively from

"ordering, classification, and analysis", according to Minayo (2001) [8].

The impacts on the degree of satisfaction of the server and its influence on public health and society were analyzed through the reasons of the scientific literature on the subject, sought by descriptors in specialized journals indexed in the bases of data BVS, Bireme, Lilacs, Scielo, portal of Capes journals and textbooks, finally enabling the end to point out the main points that generate dissatisfaction at work, seeking as a consequence to support the improvement of public policies existing.

III. RESULTS AND DISCUSSION

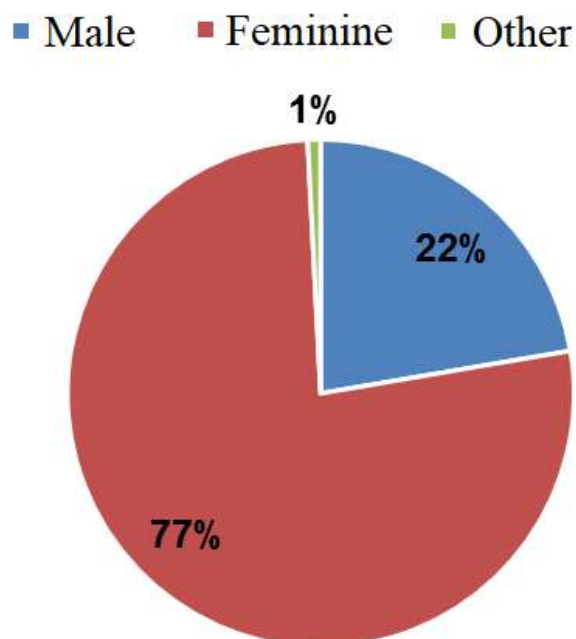
Of the 160 questionnaires answered, 30 servers did not agree with the objectives and conditions of participation in the survey and declined their free participation, 9 questionnaires were incomplete and 121 were completed correctly and with acceptance of the terms of the TCLE. The final number of participating servers linked to the care area account for 26% of the total servers crowded in the Unit that hosted this research.

1.1. Sociodemographic profile of servers crowded in Reginal Hospital Gurupi (RHG)

When considering the data regarding the gender, it was found that of the 121 of the respondents, 22% are

male, 77% are female, and 1% another, observing predominance of female professionals (Graph 1).

Graph 1 - Distribution, by gender, of the servers crowded at Regional Hospital Gurupi (RHG)



In surveys in the various regions of the country, it can be found that the population of health employees is composed mostly of female professionals [9–11]. Santos and Santos (2018) [12] conducted satisfaction survey with employees of a private hospital in the city of Campina Grande — PARAÍBA (PB) and observed the same characteristics as those found, in which, of the 34 employees, 91% were female and only 9% of the sex Male. These studies confirm the findings in this research regarding the gender of the participating servers.

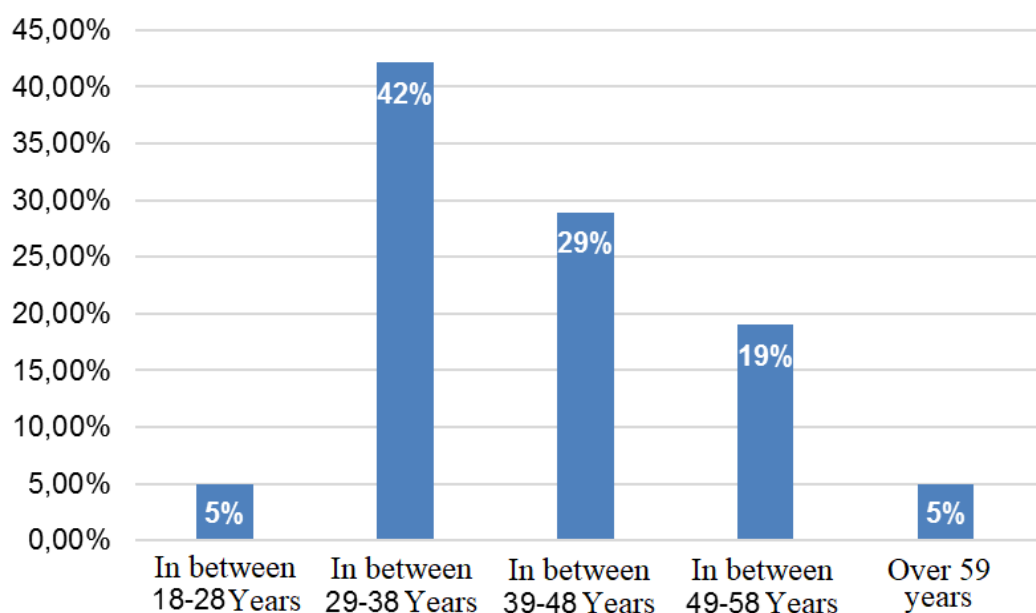
Historically, nursing is known to be an activity associated with the female universe, another point that can be highlighted is that although gender inequality is something very present in organizations, the findings portray the rise of women in the labor market, especially

in the area of health care.

Regarding the age of the interviewees (Graph 02), the majority are in the range of 29 to 38 years, representing 42% of the servers, 29% between 39 and 48 years, 19% between 49 and 58 years and with a lower proportion of 5% of servers aged between 18 and 28 years and aged 59 years or older.

The most frequent age group among respondents (between 29 and 38 years) indicate a young server staff operating in the unit, and when the frequencies between 18 and 38 years represent 47% of the total participants. This staff of professionals shown with youth profile shares experience with 53% of professionals between 39 and 59 years old.

Graph 2 - Distribution, by age, of the servers crowded at Regional Hospital Gurupi (RHG).



The married marital status (Table 2) was predominant (50.41%), followed by singles with 29.75%, divorced 15.70%, and stable union 3.31%.

Table 2. Marital status and number of children of health care employees stationed at Regional Hospital Gurupi (RHG).

Sociodemographic Characteristics	N	%
Marital status		
Married	61	50,41%
Single	36	29,75%
Divorced	19	15,70%
Widower	1	0,83%
Stable union	4	3,31%
Children		
Yes	79	65,29%
No	42	34,71%

The study by Santos and Santos (2018) [12] in a study that addressed servers of a private hospital identified that there is a predominance of singles that totaled 57% of the respondents, and only 43% of the interviewees were married. In the same sense, Tambasco et al. (2017) [10] observed in their survey that the number of single participants (40%) was close to the number of married (37.5%). Other authors cite in their studies that most of those interviewed in research with health professionals are married or maintain stable union [13, 14].

Regarding children, the results of the survey 79 (65.29%) answered yes and 42 (34.71%) answered not having children, which resembles other studies, such as Moreira et al. (2016) [15] and Ferreira et al. (2015) [16]

Silva et al. (2018) [17] report that of the servers participating in their research, 80.5% have children.

1.2. Professional profile of the servers crowded at Regional Hospital Gurupi (RHG)

Among the employees who answered the questionnaire, 7 were health service assistants (5.79%), 1 social worker (0.83%), 15 nursing assistants (12.40%), 1 health services assistant (0.83%), 36 nurses (29.75%), 3 pharmacists (2.48%), 7 physiotherapists (5.79%), 4 physicians (3.31%), 1 speech therapist (0.83%), 3 nutritionists (2.48%), 2 psychologists (1.65%), 38 nursing technicians (31.40%), 2 radiology technicians (1.65%), 1 occupational therapist (0.83%), thus totaling 14 areas professionals participating in the research.

Among the different areas that make up the body of hospital employees, there was greater participation of technical servants in Nursing, totaling 31% of the respondents.

This is an expected phenomenon since the largest number of health employees in the hospital unit is composed of these professionals. Nursing technicians and nurses are health professionals who deal directly with patients and know the problems they present because they perform most hospital actions and primary care.

Santos and Santos (2018) [12], in their research, had as most technical respondents in nursing (79%), data that resemble RHG data.

In observation the professional profile of the respondent servers, it is perceived that most have only technical course, totaling 47% of the professionals; then the experts, who add up to 32%; graduates with 14%, the masters with 6% and with doctorate only one professional (1%).

Table 3. Professional characteristics of health care servers crowded at Regional Hospital Gurupi (RHG).

Professional features	n	%
Degrees		
Technical	57	47,11%
Graduate	17	14,05%
Specialist	39	32,23%
Master	7	5,79%
Doctor	1	0,83%
How long has the specialty		
Less than 1 year ago	5	4,13%
Between 1 and 2 years	8	6,61%
Between 2 and 5 years	18	14,88%
More than 5 years	48	39,67%
I have no specialty	42	34,71%
Does it provide service essentially in the context of specialized care?		
Yes	97	80,17%
No	24	19,83%
Working Day		
40 Hours	17	14,05%
Exclusive Dedication	2	1,65%
Other	102	84,30%
How long have you been working in this institution		
1 to 2 years	9	7.44 %
2 to 5 years	28	23.14%
5 to 10 years	39	32.23%
More than 10 years	45	37.19%
Family Income		
1 to 3 minimum wages	47	38.84%
4 to 6 minimum wages	43	35.54%
7 to 10 minimum wages	16	13.22%

10 to 15 minimum wages	11	9.09%
Over 15 minimum wages	4	3.31%
Has Administrative Position		
Yes	14	11.57%
No	107	88.43%
Works elsewhere		
Yes	46	38.02%
No	75	61.98%

Santos et al. (2018) [18] observed in his research that approximately 41% of the 32 participating nurses had specialization and 38% master's degree, data that distance themselves from the reality observed in the RHG. The high number of professionals with training at the technical level can be explained by the fact that the positions of nursing technician and nursing assistants add up to the majority of the employees of the unit, because these are responsible for direct care to the patients, requiring a greater number of professionals to end in any health care unit. Regarding how long the specialty has been (Table 3), the majority, 39.67%, reported acting in the specialty for more than 5 years, 14.68% between 2 and 5 years, 6.61% between 1 and 2 years, 4.13% less than 1 year. 34.71% reported having no specialty, which can be directly linked to the fact that technical level servers do not have such training and have greater representatives in numbers in front of other servers.

Qualification is an important issue for the execution of the work because it can provide the professional with a new critical look, adding skills and values that enable him to interact and transform the environment in which he works, increasing the level of quality service and consequently satisfaction with the service provided. In addition to encouraging qualification is a way to value the knowledge of public servants.

The majority of respondents (n= 97, 80.17%), indicated in their response that they work exclusively in the field of specialized care, while only 24 (19.83%) reported having other non-specific activities of specialized health care.

Regarding working elsewhere, the majority of 61.98%, reported that they had no other activity, while 38.02% reported that, in addition to RHG, they perform their duties elsewhere.

When asked about the time of service to unit, most respondents, 37.19%, reported working for more than 10 years; followed by servers with service time between 5 and

10 years (32.23%); those between 2 and 5 years (23.14%) and those who have been in the Unit for less time, between 1 and 2 years.

The working day was also one of the questions evaluated in the identification of the professional profile. Table 3 shows that 14.05% of respondents reported working for 40 hours per week, 2 of them claim to have an exclusive dedication journey and 102 (84.30%) report having another workday.

The double working day significantly influences the quality of the service provided, because, with the exhaustive workload, the professional is exposed to sources of stress and is subject to greater physical and psychological fatigue. Most often, activities performed in hospital units require physical strength from professionals, which generates exposure to occupational diseases, directly influencing workers' health and the quality of patient care.

Workers with health problems, physical or mental, transfer their problems and concerns to their work activities, which leads to several difficulties ranging from delays and absences to work, carelessness with materials, decreased quality of work and a drop in the quality of care provided.

Also, in relation to the working day, the option "other" obtained an expressive number among those available, a fact that can be explained, because, since August 1, 2010, nurses, auxiliaries and nursing technicians at the Tocantins work only 30 hours per week. This workload was defined after the approval of Bill No. 42/2010, which changed Law No. 1,588, of June 30, 2005, reducing the workload from 40 to 30 hours per week.

The family income was divided into 5 categories, which 38.84% of respondents reported family income between 1 and 3 minimum wages; 35.54% between 4 and 6 minimum wages; 13.22% between 7 and 10 minimum wages; 9.09% between 10 and 15 minimum

wages and 3.31% reported higher income above 15 minimum wages.

In the diagnosis of motivation and satisfaction in the work performed by Santos and Santos in 2018 [12], it was found that most employees had lower remuneration or up to 3 (three) minimum wages, data that corroborate those found in this research.

Of the 121 questionnaires analyzed, 107 respondents reported not having an administrative office, while 14 performed administrative activities, whether in the management, leadership or direction of some department of the hospital unit.

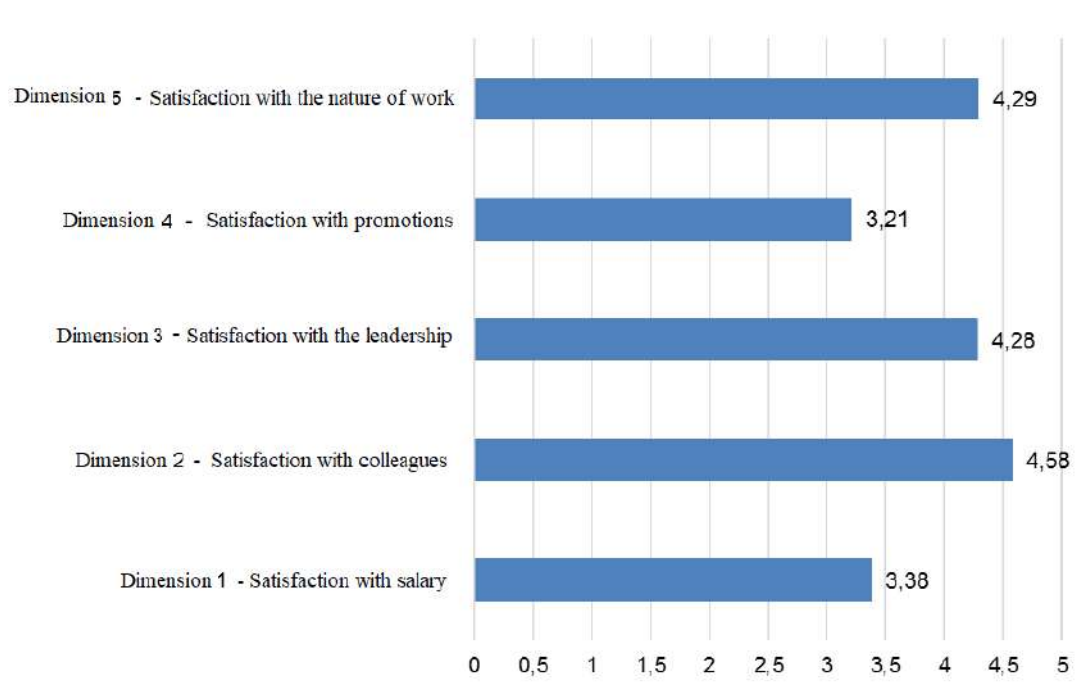
These servers hold positions known as "commissions or trust function", by which the server is removed from its origin activities and appointed to perform provisional

positions, intended for the assignments of management, leadership, and advice.

1.3. Level of satisfaction at work according to the dimensions of the Work Satisfaction Scale

Analyzing Graph 3 it can be observed that after obtaining the average of the scores of the five dimensions present in the Satisfaction Scale it is concluded that the dimension of satisfaction with the salary that has an average score of 3.38, while dimension 2 that deals with satisfaction with colleagues had an average score of 4.58, already the dimension that measures satisfaction with the leadership score of 4.28, while the dimension of satisfaction with promotions obtained the lowest score of 3.21, and dimension 5 that deals with the nature of the work with a score of 4.29.

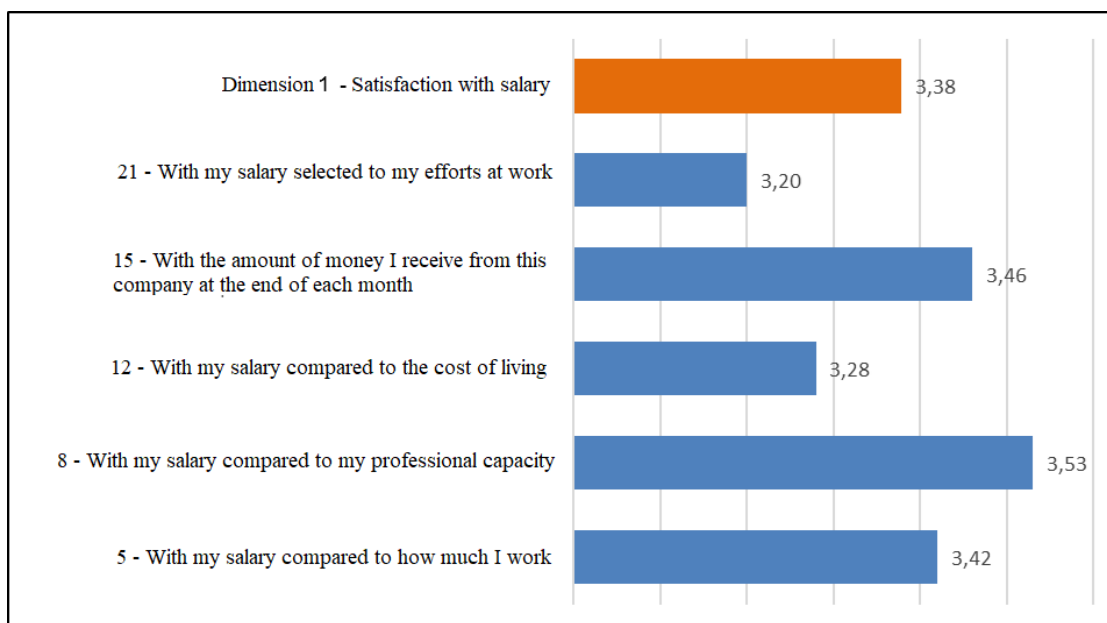
Graph 3 - Average scores - Dimensions of the Satisfaction Scale



1.4. Satisfaction with salary

As Graph 4 points out regarding salary satisfaction, a score of 3.38 can be observed, which indicates dissatisfaction on the part of the servers in relation to the amount of money they receive each month.

Graph 4 - Satisfaction with salary

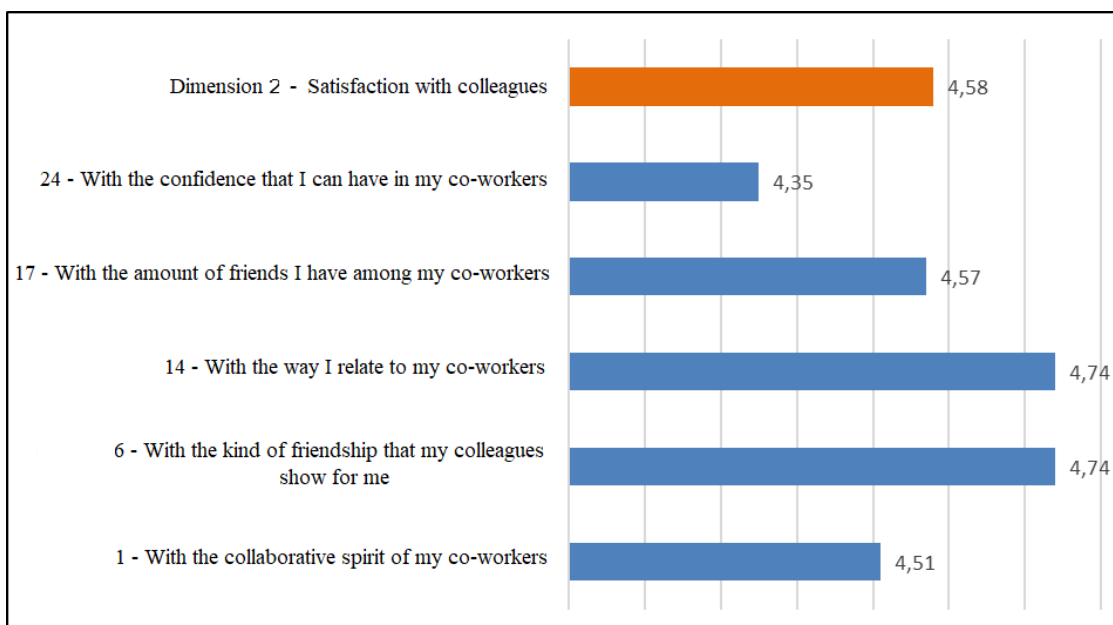


The issue of EST dealing with salary compared to work efforts presented the lowest satisfaction rate. During the approach and data collection, the servers reported this situation in which the number of calls is increasing and the number of servers has fallen constantly, generating overload and greater efforts in activities.

1.5. Satisfaction with co-workers

As far as dimension 2 is concerned, which deals with the relationship with co-workers, the servers are generally indifferent. With scores of 4.35 satisfaction in relation to trust in co-workers, then 4.74 with regard to the relationship with the type of friendship, 4.74 to the relationship with co-workers and 4.57 concerning the number of friends, and with 4.51 in relation to the spirit cooperation of co-workers.

Graph 5 - Satisfaction with co-workers



A good relationship between co-workers is a primary factor so that coexistence does not become exhausting, always maintaining a positive environment, since there are working regimes in the case of shifts where

professionals can work for up to 24 hours with the same team. Activities in hospital environments already become exhausting and, if there is no good conviviality between the team, these become even more exhaustive.

The organization must promote interaction activities so that such people who are not satisfied can relate to others, thus increasing their degree of satisfaction and contributing to maintaining the feeling of those who are already considered satisfied.

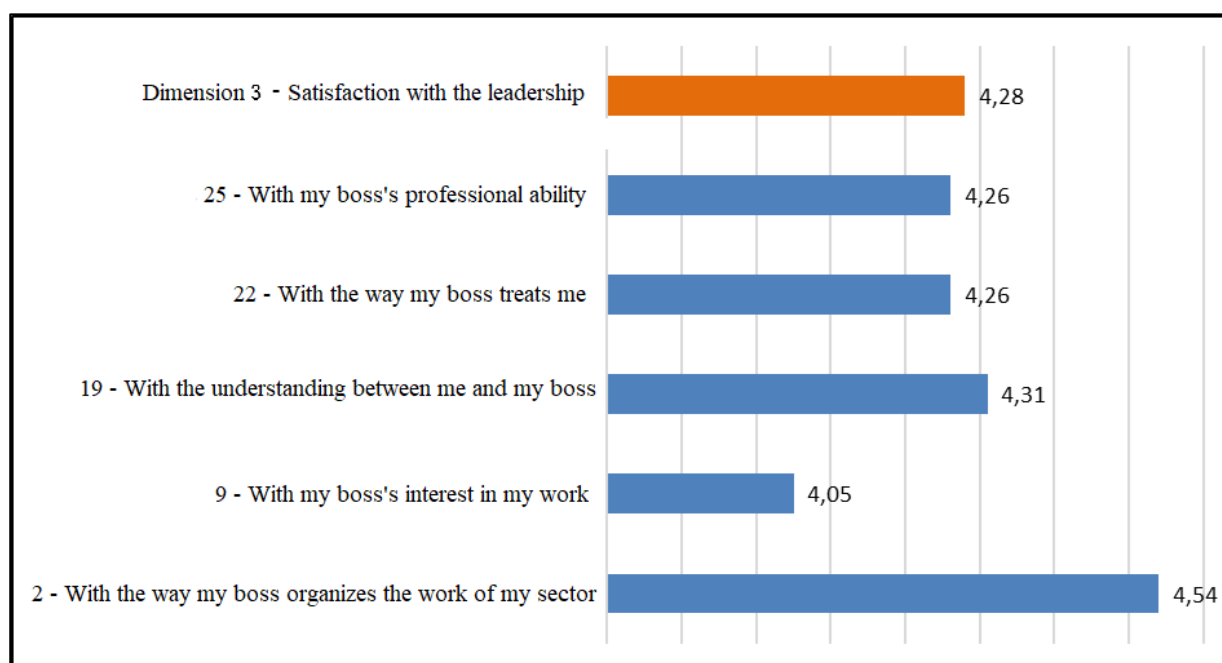
In the research by Affonso and Rocha (2010) [9] were found during the interviews some servers who reported that they assume a peaceful coexistence with other colleagues to avoid conflicts. That is, there is dissatisfaction with co-workers, but for the improvement

of the work environment, the servers hide or even ignore the differences.

1.6. Satisfaction with the leadership

Graph 06 shows the average of scores obtained in the questions raised in dimension 03, which are: the professional capacity of the boss 4.26, the way they are treated by the boss 4.26, regarding the understanding with the boss 4.31, the interest of the boss for his work 4.05 and the way the chief organizes the work of the sector 4.54, 4.31 and 4.26, respectively.

Graph 6 - Satisfaction with the leadership



It is possible to observe through the indexes the level of the indifference of the servers in relation to the head, where even if it does not present satisfaction index, the way in which the head organizes the work had the highest index among EST questions.

The manager of a hospital unit or department must act as a point of trust of the servers under their supervision because, in addition to organizing the activities, they must directly influence his team. Motivation is a primary factor for excellence in the execution of an activity, and it is up to it to set goals, plan the activities of the team, fairly and egalitarian.

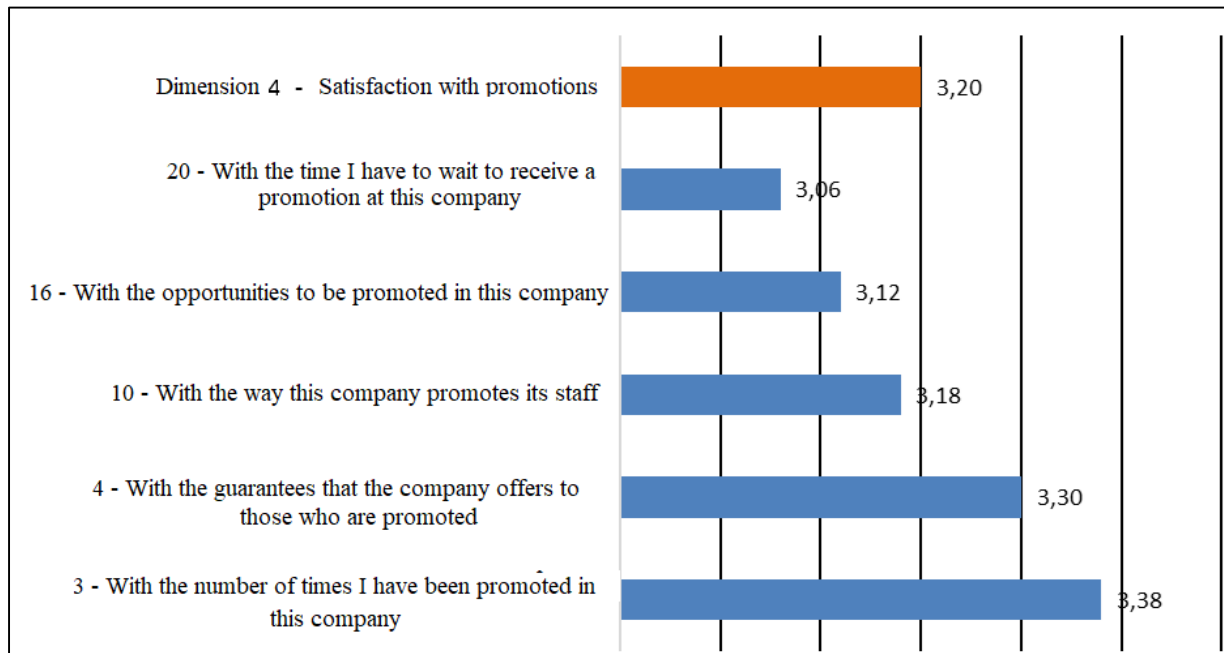
The hospital environment already has hostile characteristics, dealing with pain, sufferings of others is a constant challenge for health professionals, a qualified

manager, with strategic thinking, able to identify and solve problems, using the creativity, awareness and ethical posture in the face of everyday situations contributes significantly to the best performance and increased quality of services provided.

1.7. Satisfaction with promotions

When we observe issues that encompass this dimension in Graph 07, it appears that in the issue that deals with the number of times it has already been promoted, the score is 3.38, with the guarantees that the company offers to those who are promoted 3.30, with the way the company conducts promotion 3.18 with opportunities to be promoted 3.12 as waiting time to be promoted 3.06.

Graph 7 - Satisfaction with promotions



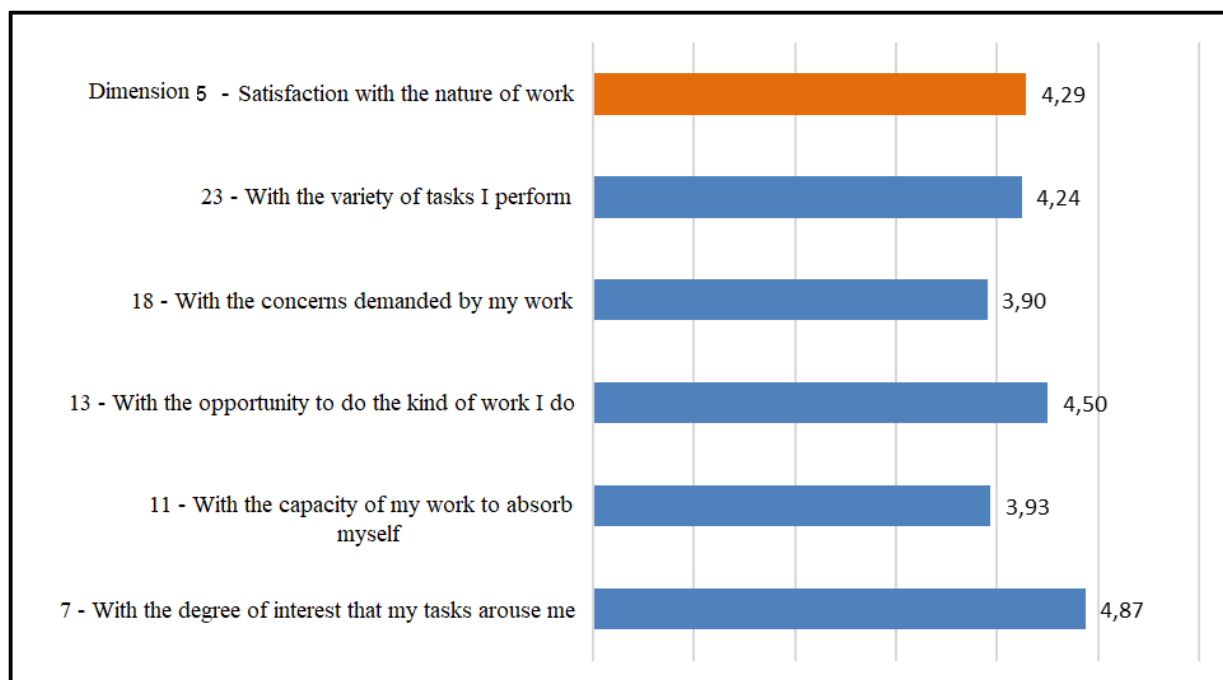
Perhaps these indices can be explained by the fact that in the Hospital unit there is no promotion policy by deserving, promotions are carried out by indication of superiors.

1.8. Satisfaction with the nature of work

In the last dimension of the scale deals with server satisfaction with the nature of its work, Graph 08 shows a score of 4.29, which according to Siqueira (2008) [7] indicates indifference. When answering the questions that

deal with this dimension, the scores presented were 4.24 in relation to varieties of tasks, 3.90 with the concerns required by the work and 4.87 with interest in tasks. It is also observed that when asked if they are satisfied with the ability that the work absorbs, with the opportunity to do the type of work they do, they have scores of 3.93 and 4.50 respectively.

Graph 8 - Satisfaction with the nature of the work



In the question that deals with the degree of interest that the activities arouse, the servers presented the highest scores of all 25 questions raised by EST, although this index presents indifference, presupposes that even with all the limitations raised by the servers (lack of materials, inadequate working conditions, poor pay and non-compliance with the Office, Careers and Salaries Plan) they still have a certain degree of interest in work.

This interest in the activities developed can be considered with the motivation factor of the server, and can be the starting point for actions that seek motivation strategies generating benefits not only for the organization also bad for the server. The interpretation of the results considered that the higher the value of the mean score, the greater the degree of contentment or satisfaction of the

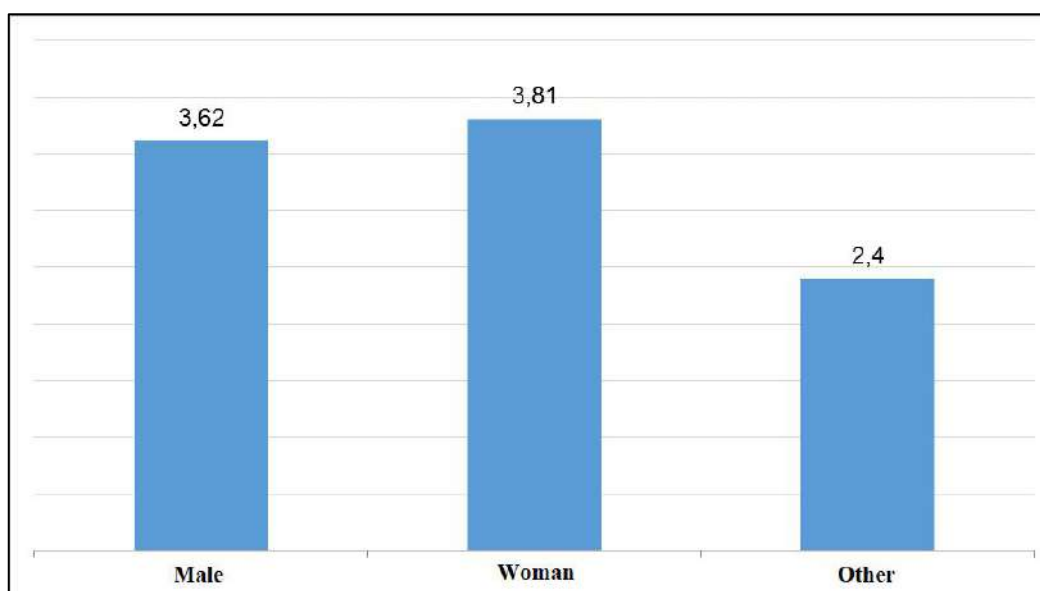
employee with that dimension of his work.

Thus, in none of the dimensions, an average score was obtained from 5 to 7, which indicates that there is no satisfaction of the servers in any of the questions. In dimensions 03 and 04, which deal respectively with the relationship with the head and promotions, a score was obtained between 4 and 4.9 which indicates that RHG servers show indifference to these points. In the dimensions related to salary and the nature of the work, an average score was obtained between 1 and 3.9 which indicates dissatisfaction.

1.9. Satisfaction in the work evaluated by gender

Among the interviewees, women were more satisfied with the work, as shown in Graph 9.

Graph 9 - Level of satisfaction at work according to gender



In the study by Carrillo-García (2013) [19] the relationship between the gender of the participants and the level of satisfaction at work was observed, and women expressed being more satisfied, which coincides with the data observed in this study.

In other studies, the authors observed that women constituted two-thirds of the study participants and were more dissatisfied. The most likely hypothesis for this result is the "double journey" assumed by women who, being the majority in the group, contributed to this result [20,21].

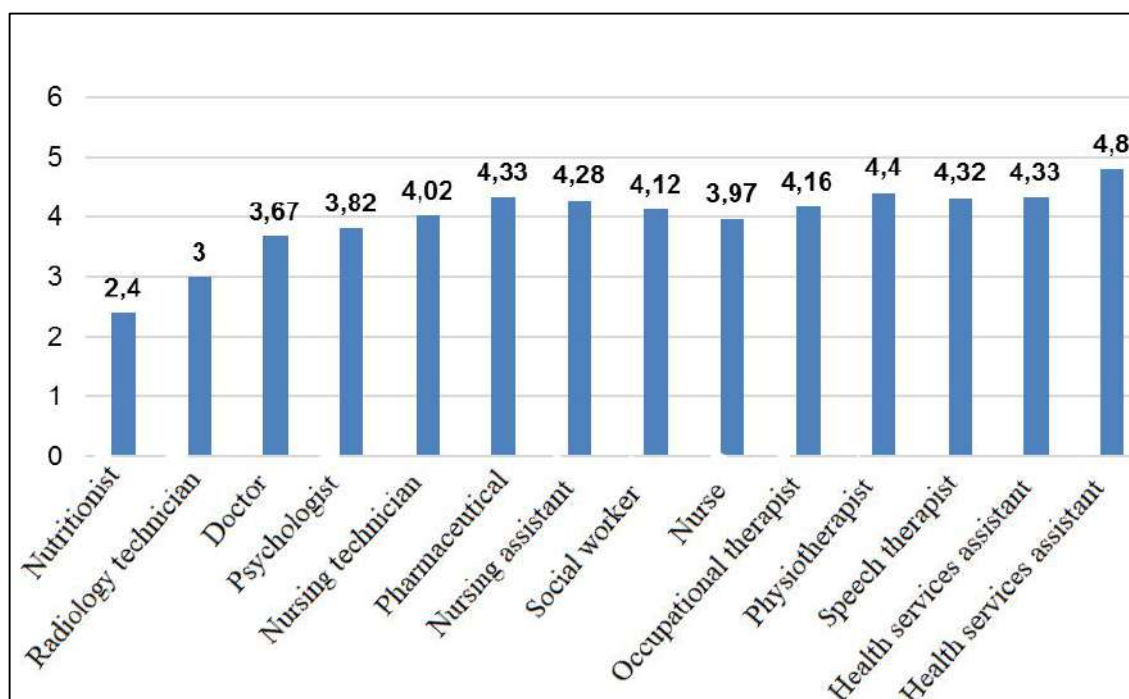
Even when women are employed in the same

occupations as men, as is the case with this study, one might think that they still have a perception of less appreciation or feel pressured by the double working hours, which may imply a feeling of greater effort spent at work.

1.10. Job satisfaction assessed by profession

When it comes to the level of satisfaction evaluated by profession/position, it is perceived that most professionals present indifference, scores between 4.0 and 4.8. While nutritionists, radiology technicians, and physicians are dissatisfied with scores between 2.4 and 3.6.

Graph 10 - Level of satisfaction at work according to the general perception of each profession



A study conducted by Albuquerque et al. (2018) [22], which specifically addressed the satisfaction of medical professionals, she reports that in general, the physicians interviewed are still satisfied with the work, they affirm that they can take care of the population that needs the most, the feeling of doing the best for these people, the doctor-patient bond and stability in employment are causes of satisfaction.

1.11. Global Satisfaction

In summary, it was found that RHG does not offer a level of satisfaction in the dimensions analyzed and evaluated according to the perception of its servers. When calculating the overall arithmetic mean of the results obtained in each dimension, an overall index of 3.94 was observed, which indicates that the level of server satisfaction is low, evidencing dissatisfaction.

Table 4 - Overall satisfaction of the servers of the Regional Hospital of Gurupi - Tocantins

Dimension	Average Score
Dimension 01 - Satisfaction with salary	3,38
Dimension 02 - Satisfaction with colleagues	4,59
Dimension 03 - Satisfaction with the leadership	4,28
Dimension 04 - Satisfaction with promotions	3,20
Dimension 05 - Satisfaction with the nature of work	4,28
Global Score	3,94

As observed, RHG servers are dissatisfied with the way promotions are carried out, as criteria such as deserving and qualification are not respected to perform certain functions.

1.12. Server satisfaction and its interference to the productivity and quality of the services provided

Society in general, regardless of social class, color, age, gender, and other factors, lives in search of

satisfaction, satisfaction is understood as a feeling inherent to each person and considered as a starting point of motivational behavior. When asked about satisfaction with the services provided, it was possible to learn that the servers evoke a dissatisfaction with actions related to management and remuneration. The following statements demonstrate this dissatisfaction:

Suj. 96: Not because you should make better.

Suj. 61: Not because every day changes the rules of the industry coordinator. It does not accept the employee's opinion.

Suj. 6: No! Because here management is not committed to the servers.

Suj. 21: "No, because unfortunately our rulers never continue the services that are working"

It is perceived that the servers evaluate that managers are fundamental parts for the efficiency, productivity, and quality of the services provided, because they are responsible for the actions developed in the work environment, and these should be chosen not by indication, but by capacity and merit for the skills and skills demonstrated for the exercise of positions.

Generally, a dissatisfied employee is more often absent and may present diseases such as stress, disrupt the work of other employees and become a burden for the organization [23].

When asked if satisfaction interferes with the quality of the services provided, servers report situations such as large quantity and poor division of work, lack of materials. Situations such as lack of resources and poor working conditions contribute significantly to server dissatisfaction and the quality of service provided because the good performance of activities depends on the availability, conditions, and offering of materials necessary for the execution of the services.

Suj. 19: "There are no investments on the part of the employer in the training of the server, working conditions, in the improvement of the work environment (physical structure and Human Recourse) and the replacement of inputs and materials essential for the performance of my functions".

Suj. 16: "Resources are lacking so that I can perform my work in a resolution."

Improve the organization's infrastructure, create wellness environments for rest and rest, create the week of Quality of Life at Work (QLW), to give individual attention to the server, as well as a channel to listen to their needs and promote integration organization, collaborate for a positive environment [24].

Suj. 77: "No, we always work on improvisation"

Suj. 45: "No! Because we're always working on improvisation."

Suj. 13: "No, working conditions are bad"

Servers also report the lack of appreciation, from the recognition of the service provided to the progressions that are not met within the stipulated period, and also the lack of incentive and appreciation for the search for qualification:

Suj. 83: No, the government's instability is lacking greatly hinders. Suj. 35: "No, I promotion here only with politics."

Suj. 60: "No. We are not valued".

Suj. 22: "No. There is no recognition of the work by the Hospital Board. People are discarded when they are not part of the political summit."

This deficient organizational climate can negatively influence work performance, destabilizing the environment and impairing the development and production of the individual.

According to Pontes (2007) [25], organizations are increasingly lacking qualified staff and motivated to meet their objectives. One of the strategies in this sense is the generation of opportunities for professional development, through a plan of professional progression.

Suj.88: "Here you never get a promotion; the rights of progression and benefits are always behind".

Suj.118: "Here alone and valued who has a political friend, promotion only in politics".

The influencing factors in motivation and quality of life are personal and professional appreciation, so there should be respected and possibilities for the server to expand its knowledge; ascending position and career plan; have autonomy and integration with the work team; develop good interpersonal relationships; have unity; communication; democratic leadership and participatory management [26, 27].

The factors presented in the literature that affect QLW and cause dissatisfaction of workers is the stress caused by overwork due to reduced teams; low-wage and few benefits; excessive pressure and supervision charges; poor infrastructure, such as lack of equipment and inputs; inhuman working conditions and poor quality of hygiene and cleaning of the environment [5, 28].

Human performance depends on the complexity of factors that act by interacting with each other in an extremely dynamic way. It is a consequence of

motivational state and individual effort to accomplish the task and achieve the objectives, it is believed that when the company has a good organizational climate its productivity can be higher [23, 29].

When an employee feels satisfied and recognized within the organization tends to have less need to look for another job.

The majority, which corresponds to 83% (n= 100), said that satisfaction significantly interferes in the quality and productivity of services:

Suj.81: "I believe that working satisfied is much better"

Suj.46: "Of course, satisfied professional performs with pleasure and motivation his work activities."

Suj.2: "Surely the work leaves to be desired. The hungry server does not yield."

Another point to highlight concerns about food. Some servers complained about the supply and poor quality of food served to the unit's employees. Several authors report that the quality of nutrition offered to servers is a factor that contributes to well-being and strengthens the feeling of its importance to the organization [24, 30].

The structure of the place, materials, and working conditions were also heard in the manifestations of the servers:

Suj. 03: "Generally lacks support from our rulers in managing and structuring our hospitals better"

Suj.25: "Lack of support for carrying out the work. Both the physical and personal structure"

It is known that for the good performance of any activity and necessary assistance of equipment, in the case of the health service in addition to equipment is necessary materials and medicines. The lack of any of these items already generates a loss of productivity and efficiency of the service provided, consequently, a poor-quality service.

For the server, this lack of structure generates dissatisfaction, where even with technical capacity and availability to develop a good job, it cannot do so, because it does not have support from the organization.

IV. CONCLUSION

The present research described the sociodemographic, professional characteristics and level of satisfaction of RHG servers.

RHG servers do not have a level of satisfaction in the dimensions analyzed and evaluated in this study. When calculating the overall arithmetic mean of the results obtained in each dimension, it was observed that the level of server satisfaction is low, evidencing general dissatisfaction among the population sample participating in the research, thus it is concluded that the RHG servers are dissatisfied in their work.

Thus, the results demonstrate that there is a need to review the management of the unit, with the addition of measures that object to the motivation of the servers in the organizational environment.

The need for attention on the part of the organization's management was made clear, especially with regard to the expansion of human resources and compliance with acquired benefits, because these were indicated by the servers as factors that contribute to the satisfaction at work and the high impact on productivity.

The server is the pillar of public administration, and its satisfaction is a great challenge for public policies. With the constant movement in search of excellence in providing quality and safety health care, it is necessary to keep servers satisfied, making them able to increase their productivity, their self-esteem, their willingness to work and consequently an increase in the quality of service provided, fulfilling the mission of the State and public management that is to meet with excellence the social demands.

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Cases of Chronic Chagas Disease in the State of Piauí according to the Public reference Laboratory in Health in the Period of 2013-2017

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Abstract— Chagas Disease (CD) or American trypanosomiasis is a serious infectious disease that presents acute and chronic phases. In Brazil, acute cases of CD are compulsory notification to epidemiological surveillance. Between the years 2013 and 2017, in Piauí state, 350 cases were confirmed in chronic phase, which represent 26.8% of the acute cases registered in Brazil (1304 cases). Therefore, screening of Chagas disease in the chronic phase is of paramount importance for controlling the pathology.

Keywords— Cases Notification, Chagas Disease, Public Health.

I. INTRODUCTION

Chagas disease (CD) is serious infection caused mainly by the flagellate protozoan *Trypanosoma cruzi*, transmitted mostly by Triatomine bugs. Oral contact, organ transplantation, blood transfusion, work accidents and vertical transmission may be other ways to contract the disease¹⁻².

The acute and chronic phases manifest asymptomatically or symptomatically³⁻⁴. Acute phase takes

around 4 to 12 weeks, when the parasite might be found in the blood. The parasite multiply inside macrophages in spleen, liver, lymph node, myocardium and tissues, and may cause inflammatory reactions⁵. Chronic phase emerges after acute phase with decrease of IgM and increase of IgG antibody levels. In that moment the body already suffers great damage and treatment is compromised, what means less chance of cure⁶.

The World Health Organization⁷, estimates between 6 and 7 million people with CD worldwide,

highlighting 21 countries in Latin-America, mainly Argentina and Brazil. In the latter, epidemiological surveillance acts through the compulsory notification of cases of acute CD, however researchers have brought discussions on improvements in the reporting process, with the inclusion of chronic cases⁸⁻⁹. In regard to the vector, the natural infections rate of triatomines by flagellates morphologically like *Trypanosoma cruzi* was around 183 out of the 22,896 triatomines in captured inside houses in Piauí state in 2008¹⁰. A research about main transmissible infectious diseases in serological screening at Blood Centers from Piauí in 2012, showed that out of 49,829 donations, 1,818 were blocked after serological tests and 177 had positive results to CD¹¹.

According to the described above, it is important to keep control of CD in the state. This study aims to report cases of chronic CD in Piauí state among the years 2013 to 2017, which do not require reporting, based on positive cases detected in a reference laboratory of public health.

II. MATERIAL AND METHODS

For this retrospective study, with a qualitative-quantitative approach, secondary data on the chronic form of CD from the reference laboratory in Public Health of Piauí, Brazil, dating from the years of 2013 to 2017, were used. The data were grouped by year and by the city where the patients were living. To define the distribution of

people infected by CD per city in Piauí state, the software ArcGis was used.

The data were obtained through the records of the laboratory system, after careful analysis and proper authorization.

The ethical and legal aspects related to the phases of the research were respected according to the National Health Council under resolution 466/2012 and its complementary rules with Ethics Presentation Certificate number 2.962.707.

III. RESULTS

Over the years 2013 to 2017 there were 4029 suspected cases of CD in the reference laboratory of Public Health of Piauí, Brazil, and 350 of those were tested positive to the disease. The laboratory received and processed suspected samples of chronic CD, which were analyzed, and the diagnosis was confirmed by methods including ELISA, IFI and Chemiluminescence. The age range that showed the highest frequency of positive cases for both females (40.76%) and males (32.80%) was between 41 and 61 years old. However, among males the frequency was higher between 25-41 years old (25.40%) and above 61 years old (28.57%) compared to female (Table 1). In this study, it was not possible to identify gender and age of 4 patients (data not shown in the table).

Table 1- Frequency of chronic CD according to age and sex in population from Piauí state, Brazil

Age Range	Female	Relative frequency (%)	Male	Relative frequency (%)	Female + Male frequency/(%)
00 --- 11	4	44.4	5	55.6	9/ (100)
11 --- 18	14	82.3	3	17.7	17/ (100)
18 --- 25	14	45.2	17	54.8	31/ (100)
25 --- 41	28	36.8	48	63.2	76/ (100)
41 --- 61	64	50.8	62	49.2	126/100)
61 --- 98	33	37.9	54	62.1	87/(100)
95% CI	3.8 to 48.5		3.9 to 59		
Σ	157	-	189	-	346

Source: produced by the authors

There are 224 cities in Piauí state, in which 49 (21.87%) had positive cases in this study (Fig 1 B).

The Figure 1 (A and B) shows the distribution of CD cases in all state of Piauí with highlight to the cities of Teresina (n= 186; 53.14%) and Riacho Frio (n= 53; 15.14%) with the most of positive tests.

In the Figure 1C it is possible to see the number of cases per year decreasing over time, with the following occurrences: 2013 with 37.71% of cases (132 to 350), 17.71% in 2014 (62 to 350), 14.57% in 2015 (51 to 350), and 2016 10.86% (38 to 350). However, there was a short increase in 2017 with 19.14% of cases (67 to 350).

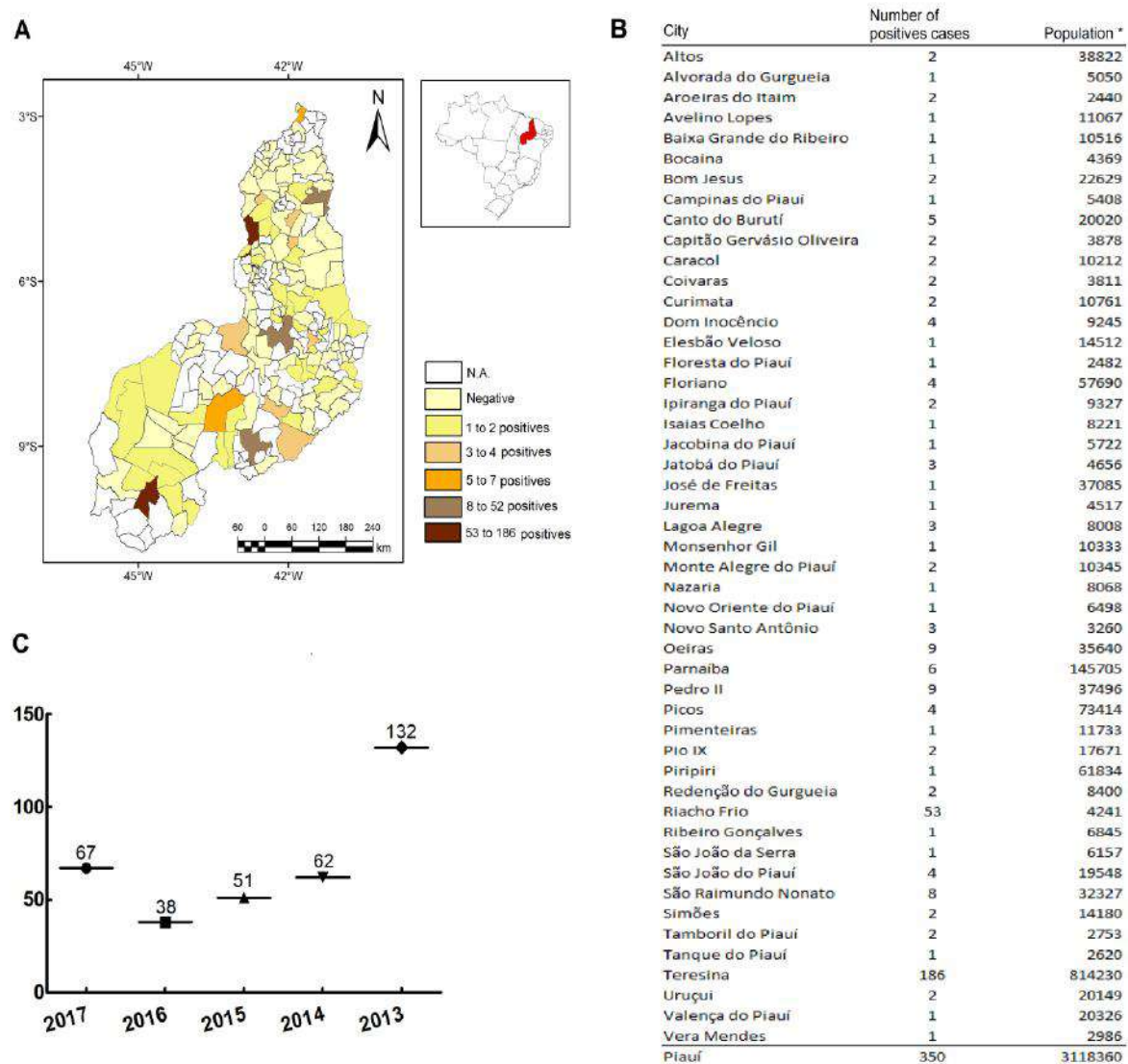


Fig.1: Distribution of CD cases in Piauí state

Source: produced by the authors

IV. DISCUSSION

According to SINAN (Information System of Injury Notification)¹², in the period of this study, 1304 cases of acute DC were notified in Brazil, whereas in Piauí no case was reported. Despite this, the present work shows 350 positive chronic CD cases in 49 cities in Piauí state with the major frequency between 41 and 61 years old, and no significant difference in frequency between female and male. In addition, it is possible to observe that 2.6% of positive cases are of children among 0 and 11 years old. The maternal anti-*T. cruzi* of the IgG fraction can cross the placenta and so all newborns of chronic CD mothers are seropositive until approximately the sixth month of life¹³.

It has been reported that chronic patients (average age of 54 years old; 34% female and 31% male) arising from different geographical regions from Brazil, assisted between 2011 to 2014 at the Chagas disease ambulatory from the Evandro Chagas Infectology National Institute (INI—Fundação Oswaldo Cruz, Rio de Janeiro, Brazil), are mainly immigrants from the northeast region, where Piauí is located¹⁴.

The socioeconomic inequities and the access to the healthcare systems provided to Brazilian population are characteristics that define the differences of mortality rates from CD. In regard to age, the mortality rates increased in patients over 30 years old, with higher occurrence among individuals between 50 and 64 years old; in addition, men

died five years younger than women⁶⁾. CD cases have been reported in various regions of Brazil with a high prevalence of comorbidities. However, there is a tendency to increase the mortality rate in the northern and northeastern regions of Brazil¹⁵⁻¹⁶.

Due to the short duration of the acute phase, chronic cases of CD are more sensitive to epidemiological research. Additionally, reference laboratories apply immunological tests to find only IgG, an antibody characteristically reactive in chronic phase of this disease. There is no specific kit to define the acute phase⁷ in the standards determined by the ANVISA (Brazilian National Health Surveillance Agency).

The acute phase of CD presents high parasite count, Romanã sign or inoculation chagoma in the skin are main clinical manifestations. However, is possible to see systemic symptoms as moderate fever, headache, malaise, anorexia and diarrhea. The diagnostic methods used are direct parasitological study via microscopic examination of fresh anti coagulated blood, thin and thick blood smears, or preferably through the identification of motile trypomastigotes in samples following Strout concentration technique. Also a feasible diagnostic method as Polymerase chain reaction (PCR) with host's peripheral blood or cerebrospinal fluid (CSF) samples. However, is possible to find high incidence of false positives because this method is not fully standardized¹⁷⁻¹⁸.

Generally, chronic CD presents low parasitic load and the patients can manifest digestive form of the disease resulting in the formation of mega viscera, which involves mainly esophagus and colon¹⁹⁻¹⁸. The standards for diagnosis are serological tests, and the strategy recommended by WHO⁷ is to combine epidemiologic information with two different serologic assays since commercial ELISA based tests present heterogenic sensitivity and specificity¹⁸⁻²⁰.

If there is disagreement between the tests, it is recommended to repeat the testing and, persisting the disagreement, a third test with PCR or western blot is recommended¹⁸⁻²¹. Since CD has been a largely neglected disease it is important to report both acute and chronic manifestations. The diagnosis to chronic CD is complex due to low parasitic load, but notifications of the cases are required to monitor disease incidence throughout the country²².

V. CONCLUSION

In this work, we show high frequency of DC in Piauí, mostly in the cities of Teresina and Riacho Frio, in

the period of 2013 to 2017, with a short increase in the latter. The screening of Chagas disease in the chronic phase is of paramount importance for the control of the pathology and the case reports help to keep attention on health education of the population.

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Construction and Legal aspects of a Solar Farm in Brazil

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Abstract— The objective of this article was to show all the necessary steps for the construction of a Solar Farm and the legal procedures that involve this new area, so promising and sustainable, with zero impact on the environment compared to traditional forms. The Solar Farm is not necessarily created on rural properties, contrary to what many people think. In fact, it is a large-scale Photovoltaic Solar Plant, installed in a region with ideal conditions for the generation of photovoltaic solar energy in optimal transmission conditions. The Solar Farm is connected to the energy grid, and starts to generate electricity that can be used by several customers. This is because the energy executed is transformed into credits, which can be practiced anywhere. From then on, it is possible to earn quotas of supply produced by Fazenda Solar, which allows profits to be used to reduce the huge energy bill that takes the sleep of all Brazilians.

Keywords— Solar farm; Photovoltaic; Machining; Electrical network.

I. INTRODUCTION

The photovoltaic system has different capacities for different audiences, in relation to a business or a house, only a few plates will be needed so that the energy generated in the environment is consumed right there, but a solar farm requires thousands of plates, because the energy generated is for consumers.

The solar farm had its prelude in the 90s, in Germany, and it was there that farmers coined the term “solar farm” (in English: “solar farms”).

These “crops” of solar energy had a great growth in Germany due to the incentives that the government promoted around the technology, with that the solar farmers began to use their own land and the generation of photovoltaic energy to earn income.

What differentiates the solar plant from a solar farm is only where it is installed. By definition a solar plant that is in agricultural territory is a solar farm.

A farm or solar plant can be characterized as projects developed to provide lower cost electricity to yourself or others.



Fig. 1: Nova Olinda solar farm.

Source: conexaoplaneta,2020

Brazil Bank, by the end of 2019, will be able to exceed 10% of the agreed partners that supply solar energy. In this way, there will be solar energy agencies in the Federal District (30 units), and Goiás (plus 39) and Pará (39). The period of 120 days for the sanction will only be counted from the stage of legal procedures. To date, there are 296 agencies responsible for supplying solar energy, taking into account the Minas Gerais agencies in the first phase.

II. THEORETICAL REFERENCE

Taking advantage of the resources provided by the Sun, the photovoltaic energy system would benefit from

light and heat to create energy. The conversion of light into electricity was due to photovoltaic cells. The system consists of a set of photovoltaic panels and devices that perform the conversion.

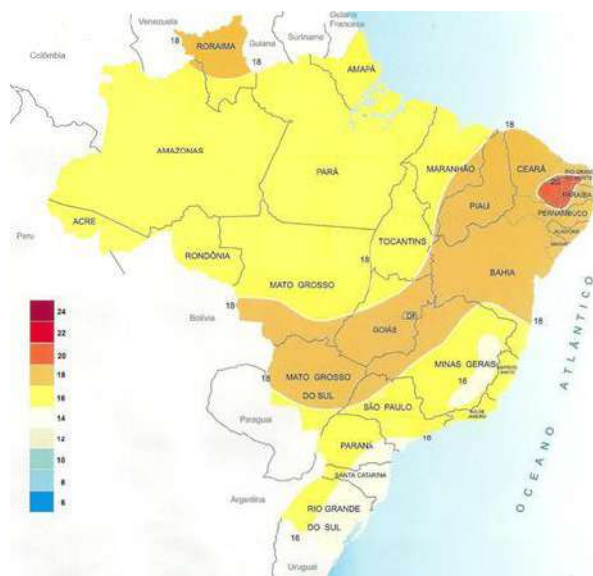


Fig. 2: Solarimetric Atlas of Brazil.

Source: Obeabadosertao, 2020

2.1 Current situation of photovoltaic energy

In the 90s the German government started to encourage renewable energy sources, especially solar energy. Thus, solar farms (set of panels installed in large areas) emerged. It is currently in India that the largest solar farm in the world resides in Kamuthi and has a capacity of 648MW. Another country has also invested in solar farms, such as Egypt, which in 2018 created its first plant and employed 4,000 people and further, in 2019, it will inaugurate a solar farm composed of 30 plants and will have the capacity to generate up to 1.8 giga watts. Even with the excess of territory available for the creation of solar farms, only registered companies are allowed to sell energy to the distributors. However, the law allows licensed companies to negotiate with distributors to remove land, with the aim of developing from solar farms.

In 2012, more specifically in April, ANEEL declared Normative Resolution No. 482/2012, which defined how energy creation would be standardized. With this, an agreement was made through determinations of the compensation system that made the active energy injected into the network with the distribution unit and finally given to the distributor, which was previously compensated.

This process has encouraged numerous countries in Latin America to develop PV systems.

III. MATERIALS AND METHODS

3.1 Construction processes for a Solar Farm.

1 - Process

Prior to the beginning of the development of the solar farm, it is essential to identify the place where it will be generated.

However, the location alone is not enough, legal approval is also essential for the project design.

The environment that must preside over solar photovoltaic plants has to be vast. Since the photovoltaic panels are huge and need sunlight. In addition, the project, belonging to the Solar Farm, requires an authorization requirement before the environmental, health and safety bodies, among others.

2 – Process

The other fundamental procedure for the development of a solar farm is the indication of the connection point to the grid.

Local authorities usually provide the connection point. However, some important issues must be negotiated. This situation occurs due to the high cost of the project, due to the connection points, and billing.

First, the network must have the capacity to absorb the maximum result of the photovoltaic solar station.

After that, the person responsible for the project has to meet the conditions for the cost of delivering power lines to the connection point. It still has the extra expenses that can occur in advances in the network for better energy absorption.

However, with efficient preparation and defined partnerships with the network agents in the regions, these expenses can be reduced or eliminated.

3 – Process

To advance this phase, some relevant achievements are necessary, such as:

- The production of documents, related to the project;
- Obtaining rights to the territory;
- Construction authorization.

It is also during this period that the Energy Purchase Agreement is signed. Thus, the extensive time for the development of the Solar Farm is ensured. In relation to laws 482/12 and 687/15 of the National Electric Energy Agency (ANEEL), responsible for regulating the connection to the grid of photovoltaic systems, it is essential that you have full knowledge about these laws.

Soon after bureaucratic and contractual issues are resolved, infrastructure development begins. When the work is finished and working, there is the need to obtain machinery and logistical assistance.

4 – Process

The real development method, for solar photovoltaic farms, implies the fundamental methods used, normally, for projects of this size.

In the farms, solar panels on the ground, devices that allow a quick installation, are used.

In addition to the floor mounting systems, the device's ease and effectiveness is naturally perceived.

Consisting of stainless steel and aluminum fasteners, the solar panels are built on support made from these elements, thus ensuring greater resistance.

To mitigate development and execution costs, it is common to use stable equipment with a fixed installation angle for photovoltaic panels.

The photovoltaic modules are attached to transverse beams, on which they have aluminum support.

With the addition of "trackers", the panels enable the improvement of solar irradiation, having the ability to supply, on average, up to 45% more energy than a stable system of similar dimensions.

5 – Process

At this stage, according to the contract with the local authorities established during the pre-construction, it is already possible to connect the Solar farm to the grid

Monitoring systems are also used, being placed and ready for remote monitoring, in relation to the power plant. In addition, there is still an opportunity for you to implement behavior indicators, so that the photovoltaic doing can have its performance monitored.

Solar panels are satisfactory systems, in terms of durability and resistance, so the need for more complex maintenance is unusual. A solar farm has, on average, 25 to 30 years of useful life and 10 to 15 years is the average time that solar inverters last.

3.2 Energy Productions in Brazil.

In August 2019 the company Absolar made a bibliographic study in which it determined that there are 93,597 distributed generation facilities in Brazil, capable of generating a total of 1 gigawatt (GW). In this study, the field represents 5.5% of the systems connected to the network in Brazil, lagging behind sectors of commerce, services and residences. And with 9.8% of the installed

capacity, the field is still behind services, homes, shops and industries.

Among one of the main pretexts for the sector to promote this type of energy source, it should thanks to the reduction of the environmental impact, reduction of expenses, variation of the energy matrix and the credit available. According to the study by Absolver, there are more than 70 possibilities for financial contributions from agents, public or private, to numerous areas of the economy in Brazil.

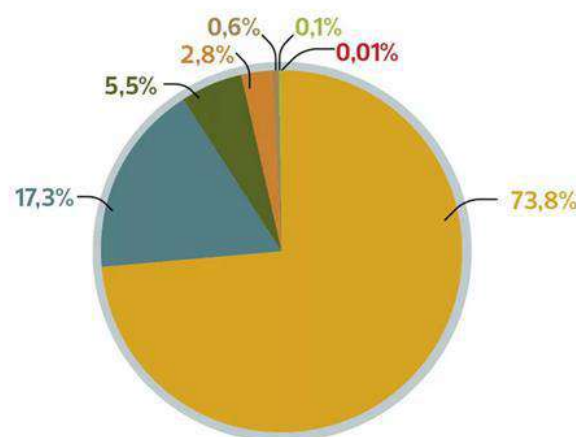


Fig. 3: Number of Systems.

Source: Absolar.

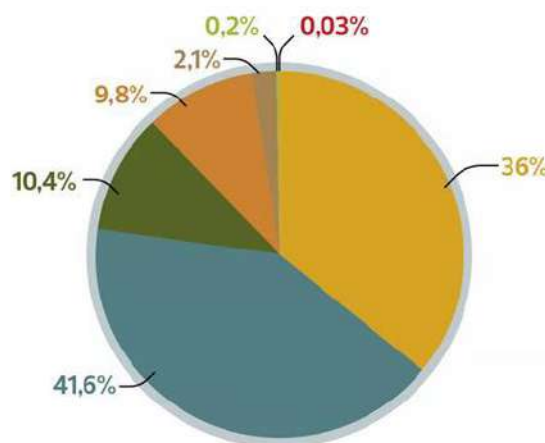


Fig. 4: Installed power.

Source: Absolar.

IV. RESULTS AND DISCUSSION

Being an exceptional choice for the creation of electric energy, photovoltaic solar energy also brings with it clean and sustainable energy, as it does not have CO₂ emissions. And the cleaner energies have been popularized and used, the less will be our need to use sources that can harm our ecosystem. Nowadays, energy

sources such as thermoelectric power plants, which pour CO₂ into the atmosphere, and hydroelectric power plants, which destroy the local ecosystem, are quite common, which in general are anti-ecological practices. With that said, photovoltaic solar energy becomes attractive because it is clean energy and uses one of the most abundant resources in Brazil, the solar wave, especially in the state of Minas Gerais, where the plant that is a reference in Brazil is located. Solar plant waves.

Regarding the regulation on GD - "Generation Distribution" Normative Resolution n° 482/2012, or known as RN 482, of ANEEL - "National Electric Energy Agency" determines the circumstances for the admission of microgeneration and mini-generation to the Electric Energy Compensation, in addition to electric energy distribution. In this way, allowing the consumer to apply the spare energy of their production to the local energy distribution network, producing future credits.

The National Electric Energy Agency (ANEEL) examined and reconsidered the GD rules, using Normative Resolution No. 687/2015 as a justification. Among the novelties it is worth mentioning:

- The permission for the development of generator condominiums, where owners of individual consumer cells share the credits among the various electricity operations. This premise is called: Enterprise with Multiple Consumer Units;
- The adoption of the Shared Generation standard for consumers, which allows a single generation installation to have its credits, of energy, shared by several users;
- The increase in power that allows generators to reach up to 5 Megawatts (MW);
- Credits generated by self-production are valid for up to 5 years (or 60 months);

The innovations determined by RN 687/2015 had a good reception, but undeniably the one that stood out the most was the creation of Shared Generation, since the possibility of distributing a large generating unit and enjoying the school economy has several benefits.

In addition, the norm that determines the generation model in which a group of people (Individuals or Legal entities) joins through a Consortium or Cooperative in order to produce energy is in the fourth paragraph of article 2 of RN 482:

- Art. 2°
- VII - shared generation: characterized by the gathering of consumers, within the same concession or

permission area, through a consortium or cooperative, composed of an individual or legal entity, which has a consumer unit with microgeneration or mini-generation distributed in a different location from the consumer units in which the surplus energy will be offset; (Included by REN ANEEL 687, dated 11/24/2015).

The solar energy farm is characterized by its photovoltaic panels placed in a rural area or field, thus allowing energy users to save energy without having to purchase a particular system. Therefore, in Brazil, it is necessary that the solar energy farm is built in an appropriate area for multiple properties to enjoy.

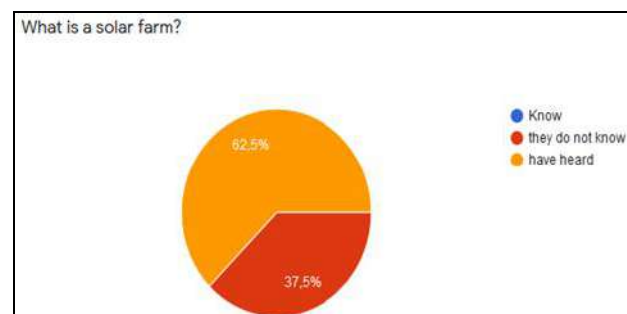


Fig. 5: What is Solar Farm?

Source: Authorship.

First, the area in which it will be determined to build the solar farm must comply with the level of sunshine in the area, as this way the effectiveness of the solar farm will be higher, thereby producing a lot of energy for the dependent units.

In this way, the energy conceived by sunlight will be sent to the public distribution network, where it will start to recapacitate the energy generated so that it can be transformed into credits, valid for 60 months.

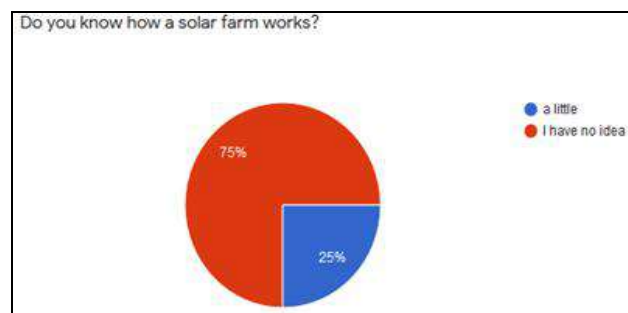


Fig. 6: Knowledge about the operation.

Source: Authorship.

Consuming the energy produced with only part of the solar farm, using solar photovoltaic energy, there will already be a discount on the electricity bill, by your

distributor, due to the energy credits capable of restoring the electricity consumption, which was used.

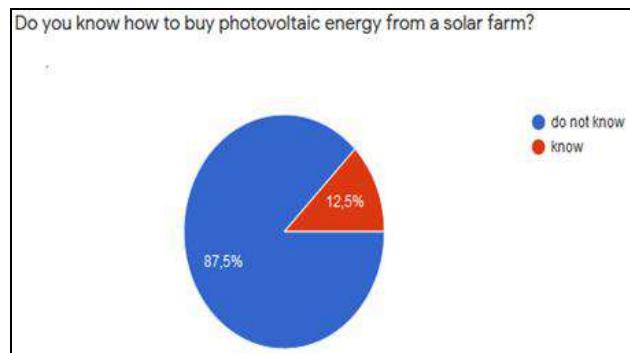


Fig. 7: Knowledge about purchasing energy.

Source: Authorship..

V. CONCLUSION

It can be concluded from this article that clean energy sources, especially solar energy, have become more and more popular, as the demand for sustainable energy has to be becoming a necessity for several nations. In Brazil, the development of photovoltaic energy is still maturing, in other countries. Even if there is a visible capacity for growth. This article also exposes the need to prioritize laws that protect the environment, even if at the expense of large businessmen.

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Maternal Death in the Metropolitan Region of Belém, Pará – Brazil, between 2013 and 2017

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Abstract—Objective: The present study aims to identify maternal deaths in the Metropolitan Region of Belém do Pará, Brazil, between the years 2013 to 2017 and to analyze the clinical-epidemiological profile of these women with maternal death. **Method:** This is a retrospective epidemiological, descriptive study with a quantitative approach, conducted in February 2020, with information from secondary data from the Mortality Information System (SIM). **Results:** Between 2013 and 2017, 142 maternal deaths were found in the metropolitan region of Belém, with the highest number of cases occurring in 2013, with a total of 38 maternal deaths. As for the clinical-epidemiological profile, there was a predominance of the age group between 20 to 29 years old, brown race and single marital status. Most deaths occurred during the puerperium, in a hospital setting and cause of death from pregnancy, childbirth or the puerperium. **Conclusion:** In view of this, actions are needed to promote the improvement of living conditions and assistance to women of reproductive age, both in preventing unwanted pregnancies and in preventing complications during the period of pregnancy and the puerperium.

Keywords—Maternal deaths, women's health, pregnancy.

I. INTRODUCTION

Maternal mortality (MM) is defined by the World Health Organization as the death of a woman during pregnancy or within 42 days after the end of pregnancy, regardless of duration or location, due to any probable cause with or aggravated by pregnancy or by measures in relation to it, but not by accidental or incidental causes (WHO, 2012).

Currently, the global maternal mortality rate is about 210 deaths per 100,000 live births. According to the Epidemiological Surveillance Guide for Maternal Death, the reduction in the maternal mortality rate in the world and, especially in Brazil, still represents a major challenge for health and society. Despite advances in decreasing rates, high mortality rates from preventable causes have been observed that affect Brazilian regions in different ways (WHO, 2015; Ministry of Health Brazil, 2009).

In Brazil, there was a reduction of approximately 56% in the maternal mortality ratio, between 1990 and 2015. In 2016, 1.463 cases were recorded, which represented a 16% decrease in relation to the previous year, but it still remains high when compared to developed countries (Ministry of Health Brazil, 2018).

The causes of maternal mortality can be direct, such as: obstetric complications in the pregnancy-puerperal period resulting from injuries, omissions, incorrect treatment or sequence of events in any of these situations and indirect, resulting from pre-existing diseases or during treatment during pregnancy and that were aggravated by their physiological effects (PAHO, 2018).

Maternal death is a strong indicator of a country's socioeconomic conditions and the quality of life of the population, expressing a devaluation and disrespect for life, or that can be translated as a provision of low quality humanitarian assistance. In addition, it indicates a country's "political determination" to carry out "collective and socialized actions" in this segment, constituting an indicator of social inequities (Souza, 2015).

Given this reality, the new Sustainable Development Objetivos which followed the Millennium Development Goals, emerged with the goal of eliminating maternal mortality from preventable causes, between the years 2016 and 2030. In Brazil, the target is reduced to approximately 20 deaths for every 100,000 live births (United Nations, 2015).

Based on the above, the present study aims to identify maternal deaths in the Metropolitan Region of Belém

Pará, Brazil, between the years 2013 to 2017 and to analyze the clinical and epidemiological profile of these women with maternal death.

II. METHOD

This is an epidemiological, descriptive retrospective study, with a quantitative approach, carried out in February 2020 with secondary data information from the Mortality Information System (SIM), referring to maternal mortality in the metropolitan region of Belém in the State of Pará, between the years 2013 to 2017. The data collected are available for public consultation at DATASUS - Information Technology at the Service of SUS, at the electronic address <http://tabnet.datasus.gov.br/cgi/defthtm.exe?sim/cnv/obt10uf.def>.

SIM is a system of regular data search on mortality in Brazil. From it, it is possible to capture data on mortality, in a comprehensive and reliable way, to subsidize different scales of public health management. Based on this information, it is possible to carry out situation analysis, planning and evaluation of actions and programs in the area.

For this study, data were collected on 142 cases of maternal deaths in the metropolitan region of Belém do Pará, on the SIM website. The metropolitan region covers the municipalities of Ananindeua, Belém, Benevides, Castanhal, Marituba and Santa Izabel, between 2000 and 2017. The following sociodemographic variables (total number of cases; age group; race and marital status) and Epidemiological variables (death during pregnancy or puerperium; place of death; investigated death and cause of death (CID-10).

From the collected data, a descriptive analysis of the studied population was performed, the data are arranged in tables, using statistics related to the median and standard deviation of the selected variables. The use of open data is available to the public and is available for consultation on the DATASUS - SUS Service Information Technology website, without the need for an estimate by the Research Ethics Committee.

III. RESULTS

Between 2013 and 2017, 142 maternal deaths were found in the metropolitan region of Belém, with the highest number of cases occurring in 2013, with a total of 38

maternal deaths. As for the location with the highest number of cases, the municipality of Belém stands out with 92 deaths, which corresponds to 65% of the total deaths.

Table 1 shows the total number of maternal deaths in the metropolitan region of Belém between the years 2013 to 2017.

Table 1: Distribution of the number of maternal deaths in the metropolitan region of Belém, Pará, Brazil, between the years 2013 to 2017.

COUNTIES	n= 142					TOTAL	%
	2013	2014	2015	2016	2017		
Ananindeua	5	5	7	3	5	25	18%
Belém	27	17	16	13	19	92	65%
Benevides	1	1	1	1	1	5	4%
Castanhal	3	3	2	0	0	8	6%
Marituba	1	1	1	1	3	7	5%
Santa Izabel	1	2	0	1	1	5	4%
Total	38	29	27	19	29	142	100%

Source: MS / SVS / Mortality Information System – SIM, 2020.

As for the clinical-epidemiological profile of women with maternal death in the metropolitan area, there was a predominance of the age group between 20 and 29 years old, with 63 cases (44%), 107 were of brown race (75%) and were single (39%). Regarding death during pregnancy or the puerperium, 101 cases (71%) occurred

during the puerperium, 138 cases (98%) were in the hospital, 132 (93%) with an informed summary form and in 132 cases (93%) the cause of death (ICD-10) is related to CAP XV - Pregnancy, childbirth or the puerperium. Table 2 expresses the characterization of the clinical-epidemiological profile.

Table 2: Clinical-epidemiological profile of women with maternal death in the metropolitan region of Belém, Pará, between the years 2013 to 2017.

VARIABLES	Total n = 142	
	Nº	%
Age		
15-19	18	13%
20-29	63	44%
30-39	52	37%
40-49	9	6%
Breed		
White	25	18%
Black	10	7%
Brown	107	75%
Marital status		
Single	56	39%
Married	39	27%
Other	42	30%
Unknown	5	4%
Death During Pregnancy and Puerperium		

During the pregnancy	41	29%
During the postpartum period	101	71%
Place of Death		
Hospital	138	97%
Residence	3	2%
Others	1	1%
Death Investigated		
With informed summary sheet	132	93%
Without plug informed synthesis	1	1%
Death not investigated	9	6%
Cause of Death - CID - 10		
CAP I - Infectious and parasitic diseases	10	7%
CAP XV - Pregnancy, childbirth or the postpartum period	132	93%

Source: MS / SVS / Mortality Information System – SIM, 2020.

IV. DISCUSSION

When analyzing the data of this study, it was found that between 2013 and 2017 142 maternal deaths were reported in the metropolitan region of Belém. It was found that the largest number of cases occurred in 2013 with 38 deaths, showing a decrease in following years, reaching a total of 19 deaths in 2016. However, in 2017 the number of deaths increased, reaching 29 deaths.

The municipality of Belém has the highest number of deaths, with 92 cases (65%), the result is similar to a study that evaluated the epidemiological profile and causes of maternal mortality in the State of Pará between the years 2012 to 2016, stating that among 18 municipalities in Pará, the city of Belém suffered 99 deaths. In addition, it showed that among the regions of the State of Pará, deaths are concentrated mainly in the Metropolitan Region, with a total of 254 cases (Miranda, Botelho, Tsuchiyama, Luz, & Veras, 2019).

Despite the significant drop in the number of cases, the state of Pará still faces the high number of maternal deaths. Pará went from 173 deaths in 2015 to 92 in 2016, however, it increased to 119 cases in 2017, which means one death every 3 days. In view of this, the State Secretariat of Public Health (SESPA), with the support of the Pan American Health Organization, signed the Pact for the Reduction of Maternal Mortality, with the aim of reducing maternal deaths by 30% only in first year (SESPA, 2019).

The mortality rate was predominant in the age group between 20 and 29 years, as in a study that characterized

the epidemiological profile of maternal deaths in the reference hospital for high-risk pregnancies, without qualifying the total of 47.3% of maternal deaths in the same age group (Menezes, Bezerra, & Bezerra, 2015). This fact can be explained by the fact that it is the peak of reproductive age and represents the period in which women become pregnant due to greater fertility, thus increasing the number of maternal deaths in this age group considered young (Szwarcwald, Escalante, Rabello Neto, Souza Junior, & Victora, 2014).

Other aggravating factors for cases of mortality in this age group may be the higher frequency of family rejection due to pregnancy, the presence of social and economic restrictions, low schooling and absence of previous gynecological consultations, when comparing the older age groups, or those who can increase maternal morbidity and mortality (Passos et al., 2016).

As for race, the highest maternal mortality rate occurred in women of the brown race. This finding is similar to the study carried out by Carvalho et al (2016), who, when characterizing maternal deaths in a northeastern Brazilian municipality, found that 46% of maternal deaths occurred in women of brown race.

Brown women, as well as black women, are more vulnerable to maternal death, due to factors related to biological predisposition to diseases such as hypertension / pre-eclampsia. In addition to the genetic factor, they are the most prevalent breeds in Brazil, mainly in the state of Pará, which has great indigenous and African influence, being

several times related to social inequalities that influence the difficulties that affect women with access to quality health (Botelho, Silva, Tavares, & Lima, 2013; Santos et al., 2017).

When analyzing marital status, it was found that 39% of maternal deaths occurred in single women. The study by Martins & Silva (2018) in Juiz de Fora - MG, also showed a prevalence of deaths in single women with 57.66%. Note that the presence of a partner can bring safety, speed and access to the most effective and efficient health services, avoiding serious complications that can cause death. Thus, the presence of the partner in the pregnancy-puerperal period can be considered a protective factor in reducing maternal morbidity and mortality (Vega, Soares, & Lourenço, 2017).

As in a study conducted in Bahia (43.1%), deaths in the puerperium prevailed, with a total of 101 cases, totaling 71% (Coelho, Andrade, Sena, Costa, & Bittencourt, 2016). The puerperal period is a phase that requires attention from professionals, with primary care being held two postpartum consultations, in which these professionals must check and guide women as to the appearance of signs and symptoms that may indicate complications, such as fever, pain or infection in episiotomy or cesarean section, intense vaginal bleeding, among others (Brasil, 2012).

The place of death, as in the study by Carvalho et al (2016) (78%), was in the hospital environment with 97% of cases of maternal deaths. This study corroborates that the hospital stay of most women occurred less than 24 hours, which indicates a delay in seeking care. Factors such as the precarious functioning of services, together with the presence of incapacity for a correct diagnosis, upon admission, can lead to the evolution of the case to death (Miranda, Botelho, Tsuchiyama, Luz, & Veras, 2019).

Among the main causes of maternal deaths is the Specific Hypertensive Syndrome of Pregnancy (SHEG), which is highly prominent throughout Brazil. A study by Camacho (2017) found greater emphasis on hypertension, a result that contributed to a percentage of 56.60% of maternal deaths from direct obstetric causes (in 2013, 57.78% in 2014 and 60% in 2015). Data from the Ministry of Health also show hemorrhages, infections, complications of hypertensive syndromes and abortion, in addition to thromboembolic problems and anesthetic accidents, comorbidities in maternal deaths (Brazil, 2009).

V. CONCLUSION

In this study it was possible to identify that maternal deaths in the metropolitan region of Belém showed a decrease in cases, however it still has high rates. Most of

the pregnant women who died were between 20 and 29 years old, brown race and single. Most deaths occurred in the hospital during the puerperium, and the cause was related to pregnancy.

The decrease in maternal deaths is directly related to the improvement in living conditions and assistance to women of reproductive age, both in terms of preventing unwanted pregnancies and preventing complications during the period of pregnancy and the puerperium. For this, procedures are needed to reduce cases of maternal deaths based on preventive measures, comprehensive family planning, which causes the occurrence of unwanted pregnancies, adequate prenatal care, qualified staff to assist in obstetric emergencies and with frequent use puerperal.

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Share price Valuation model of Automotive Company in Indonesia

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Abstract— Stock price valuation is a common thing done by a public company that sells its shares on the Stock Exchange or a company that will conduct mergers and acquisitions. This study aims to build a valuation model for automotive companies in Indonesia that trade their shares on the Indonesia Stock Exchange. The design of this study uses proposed sampling data of automotive companies on the Indonesia Stock Exchange. The results of the multivariate price to earnings ratio model showed that return on assets ($P = 0.0081 < 0.5\%$) had a significant effect on price to earnings ratio while the other four variables dividend pay out ratio, cost of debt, debt to equity ratio, and risk (beta) the effect on the price to earnings ratio for automotive companies is less significant. The result of the determination test shows the R-square value = 0.1603 or around 16.03% the stock price is determined by the independent variable used in the study and the rest (83.97%) is determined by other factors this is because the variable used in this study is still purposed sampling of the financial historical data, so that researchers can then do valuations using variables other than those used in this study.

Keywords— Valuation, Free Cash Flow, Price to Earning, undervalued.

I. INTRODUCTION

The automotive market in Indonesia still has a growing potential because motorization rate is still low at level 82 compared to the global average condition which has

reached 187 car units per 1,000 population (OICA: Organization Internationale des Consturctuerus d 'Automobiles, 2015).

Table 1. Growth of Automotive Market (OICA, 2017)

		Rata-Rata Pertumbuhan								2016 vs 2006 (10 years)			
Global		3.4%								1.4 x			
Indonesia		10.0%								3.3 x			
No	Negara	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2016 vs 2006
1	China	7,215,972	8,791,528	9,380,502	13,644,794	18,061,936	18,505,114	19,306,435	21,984,079	23,499,001	24,661,602	28,028,175	388.4%
2	Jepan	5,739,520	5,309,200	5,082,233	4,609,333	4,956,148	4,210,224	5,369,721	5,375,513	5,562,888	5,046,510	4,970,260	86.6%
3	India	1,750,892	1,993,721	1,983,071	2,266,269	3,040,390	3,287,737	3,595,508	3,241,302	3,177,005	3,424,836	3,669,277	209.6%
4	Korea Selatan	1,176,919	1,278,624	1,246,086	1,461,865	1,511,373	1,586,405	1,532,087	1,543,564	1,661,868	1,833,786	1,823,041	154.9%
5	Iran	971,000	1,037,900	1,190,000	1,320,000	1,642,843	1,688,194	1,044,430	804,750	1,287,600	1,222,000	1,448,500	149.2%
6	Australia	962,666	1,049,982	1,012,165	937,328	1,035,574	1,008,437	1,112,032	1,136,227	1,113,230	1,155,408	1,178,133	122.4%
7	Indonesia	318,904	433,341	603,774	486,088	764,710	894,164	1,116,230	1,229,811	1,195,409	1,031,422	1,048,135	328.7%
8	Thailand	674,953	631,181	615,270	548,870	800,357	794,081	1,423,580	1,330,672	881,832	799,632	768,788	113.9%
9	Sudi Arabia	556,100	554,400	540,000	520,000	600,000	590,000	705,000	740,000	828,200	830,100	655,500	117.9%
10	Malaysia	490,748	487,176	548,115	536,905	605,156	600,123	627,753	655,793	666,487	666,677	580,124	118.2%
11	Global	68,347,350	71,557,035	68,308,254	65,562,665	74,958,974	78,157,371	82,116,462	85,594,307	88,325,620	89,707,322	93,905,634	137.4%

This condition makes many brands of vehicles enter to Indonesia market to get the opportunity to enjoy the growth of the automotive market in Indonesia. According to (Joyce

Dargay, Dermot Gately and Martin Sommer, 2015) who examined data based on 1960-2002 in 45 countries projected that vehicles in the world would increase from

800 million units in 2002 to 2 billion units in 2030. GDP per capita also has a relationship with an increase in the number of vehicles (Joyce Dargay, 2015) when income the per capita income is between \$ 3,000, - - \$ 10,000, - the growth of vehicles is almost 2 times the growth of income while income per capita is \$ 10,000 - \$ 20,000 - growth is relatively the same as GDP growth.

Most of the companies on the Indonesia Stock Exchange (around 72%) offer their shares in a condition that is undervalued or lower than its intrinsic value (Paramitha et al., 2014) but other studies (Daljono, 2000), consider that company owners to avoid undervalued because of this will result in the transfer of wealth from the owner to the investor. This research will be interesting because it builds a model that will be used to assess the

stock prices of automotive companies both those already on the Indonesia Stock Exchange and those that will make an initial public offering.

II. MATERIALS AND METHODS

Location and Research Design

This research was conducted in companies listed on the Indonesia Stock Exchange. For this study begins with an analysis of the financial statements of 10 selected companies which are used as samples to determine the variables that will be used in the company's analysis to determine the intrinsic value of shares of automotive companies in the Indonesia Stock Exchange.

Table 2. Automotive Company in Indonesia Stock Exchange

No	Kode Saham	Nama Perusahaan	IPO Date
1	ASII	Astra International Tbk	04-Apr-90
2	AUTO	Astra Otoparts Tbk	15-Jun-98
3	IMAS	Indomobil Sukses Internasional Tbk	19-Sep-93
4	TURI	Tunas Redian Tbk	06-May-95
5	GDYR	Goodyear Indonesia Tbk	01-Dec-80
6	GJTL	Gajah Tunggal Tbk	08-May-90
7	INDS	Indospring Tbk	10-Aug-90
8	MASA	Multistrada Arah Sarana Tbk	09-Jun-05
9	NIPS	Nipress Tbk	24-Jul-91
10	SMSM	Selamat Sempurna Tbk	09-Sep-96

The valuation model used is the valuation of the multivariate regression model of price to earnings ratio (PE) by using 5 independent variables calculated from the financial ratios of 10 automotive companies on the Indonesia Stock Exchange namely proxy risk (BETA), debt to equity ratio, cost of debt, dividend pay-out ratio and operation-return on assets.

Population and Sample

The population is 10 automotive sector companies (Table 2) which are already on the Indonesia Stock Exchange which have automotive related business units both manufacturing, distribution and dealers. The method used

is purposive sampling / non probability sampling method, which means that the selection of 10 companies is done by ignoring the principles of probability, and only looking at the desired elements of existing data and with specific intentions. The selected company is a company that has made an initial offer (IPO) before December 31, 2005 to obtain sample adequacy on valuation using a multivariate regression model.

Data collection for fundamental top down approach analysis is done by retrieving the data of the website of the institution and department related to the automotive industry.

Table 3. Agency Websites and related research departments

Lembaga	Website
Bank Indonesia	www.bi.go.id
Badan Pusat Statistik	www.bps.go.id
Bursa Efek Indonesia	www.idx.co.id
Yahoo Finance	https://finance.yahoo.com

Data on economic growth and projections used are economic growth data issued by the International Monetary Fund (IMF, 2017) and automotive market growth data is taken based on data released by the Organization

Internationale des Constructeurs d'Automobiles (OICA). The collection of sample data of financial statements was taken from the official website of the related company for the period 2006-2016.

Table 4. Website sources of financial statements of automotive companies

Nama Perusahaan	Website
Astra International Tbk	www.astra.co.id
Astra Otoparts Tbk	www.astra-otoparts.com
Indomobil Sukses Internasional Tbk	www.indomobil.com
Tunas Redian Tbk	www.tunasgroup.com
Goodyear Indonesia Tbk	www.goodyear-Indonesia.com
Gajah Tunggal Tbk	www.gt-tires.com
Indospring Tbk	www.indospring.co.id
Multistrada Arah Sarana Tbk	www.multistrada.co.id
Nipress Tbk	www.nipress.com
Selamat Sempurna Tbk	www.smsm.co.id
Bintraco Dharma, Tbk	www.bintracodharma.com

In addition to the financial statements of the related companies researchers also took stock price data at the end of each month from December 2005 to December 2016 (133 data) for each company from <https://finance.yahoo.com>. Financial report data and stock prices that have been collected are then processed using Microsoft excels software to obtain financial ratios used for multivariate regression analysis, namely price to earnings ratio (PE), risk proxy (BETA), debt to equity ratio (DER), interest rate (I_R), dividend pay-out ratio (POR) and operation return on assets (ROA). Characteristics of samples and to assess the relationship of independent variables with PE were processed using Microsoft excels and EViews® 10+. As a comparison, the application of the model was chosen by two automotive companies in the Indonesia Stock Exchange that conducted IPOs in 2015 for the manufacturing sector, namely PT. Garuda Metalindo, Tbk (BOLT) and PT. Bintraco Dharma, Tbk (CARS) for the trade sector.

III. RESULTS

Sample Characteristics

The sample data period from 2006-2016 passed several economic conditions including the global financial crisis in 2008, commodity price boom between 2010-2012 and the decline in commodity prices in 2014. Conditions resulted in some stock returns and earnings being negative during the global financial crisis and when a significant decline in commodity prices. In this condition the researcher eliminated all that resulted in negative price to earnings ratio (PE) from the sample, so that out of 110 samples (10 companies x 11 years) were reduced to 70 samples.

Proxy Risk (BETA) is calculated based on the slope of the value of market return on stock returns of each company based on monthly data in a particular year (Table 9), debt to equity is obtained based on debt and equity data in the year-end balance sheet, the interest rate is calculated based on the interest rate on loans paid in a certain year (in the income statement) to the value of the debt at the end of the year, dividend pay out ratio is obtained from the dividend value paid for a given year (cash flow statement) to the value of earnings (income statement) and operation return on assets is calculated from EBIT value compare to total assets based on the annual report of each company.

Table 5. Variable of Multivariate Regression

No	PE	BETA	DER	D_Int	Pay Out	ROA	No	PE	BETA	DER	D_Int	Pay Out	ROA
1	1,24	1,87	0,98	3,5%	53,4%	8,6%	36	24,21	1,59	0,14	12,0%	87,8%	2,6%
2	1,70	1,79	0,74	3,4%	27,9%	13,4%	37	23,63	1,61	0,10	12,4%	30,0%	3,1%
3	0,46	1,69	0,71	2,2%	34,5%	14,7%	38	0,60	1,49	0,45	6,1%	13,3%	7,6%
4	1,40	2,13	0,54	2,2%	34,7%	14,3%	39	2,58	0,74	0,28	6,5%	55,9%	2,8%
5	1,54	1,54	0,64	1,5%	44,5%	13,0%	40	2,69	0,79	0,07	6,0%	47,9%	3,3%
6	1,68	0,81	0,59	1,6%	46,1%	11,6%	41	28,01	1,51	0,10	15,9%	0,0%	3,4%
7	15,84	1,69	0,63	1,8%	50,3%	10,9%	42	1,77	0,45	1,51	10,4%	0,0%	12,9%
8	14,18	0,67	0,61	1,7%	51,6%	8,7%	43	9,54	1,51	1,10	9,8%	6,3%	12,4%
9	15,67	1,93	0,58	2,0%	53,2%	8,5%	44	14,78	1,36	0,86	9,1%	6,1%	8,7%
10	16,79	1,88	0,56	1,9%	73,2%	7,0%	45	54,59	2,32	1,08	9,3%	78,2%	8,9%
11	22,10	2,11	0,51	2,5%	53,7%	6,7%	46	17,98	2,39	1,13	9,7%	12,3%	7,3%
12	11,18	0,83	2,76	0,5%	119,3%	1,9%	47	6,40	5,84	1,27	10,0%	0,0%	8,4%
13	2,28	1,05	2,55	0,4%	3,9%	5,7%	48	2,83	2,14	0,71	7,9%	0,0%	16,7%
14	1,07	0,81	2,21	0,3%	31,3%	7,3%	49	5,88	1,13	0,33	9,2%	27,0%	12,8%
15	1,96	3,08	0,43	0,4%	75,5%	6,7%	50	7,16	1,13	0,15	11,3%	102,3%	9,3%
16	12,03	2,03	0,37	8,4%	8,3%	12,4%	51	7,20	0,98	0,15	10,0%	41,4%	8,0%
17	10,39	0,69	0,35	6,9%	8,7%	12,6%	52	10,95	2,16	0,13	11,2%	0,0%	3,6%
18	12,35	0,31	0,46	4,7%	9,3%	11,8%	53	6,85	0,15	0,44	8,8%	0,0%	9,1%
19	9,63	1,91	0,43	8,1%	25,8%	5,1%	54	9,67	2,29	0,56	3,7%	3,5%	8,5%
20	13,34	2,04	0,51	6,3%	22,0%	2,2%	55	21,39	0,37	1,32	4,2%	4,3%	6,0%
21	11,50	1,36	0,54	8,0%	23,0%	3,3%	56	0,50	2,51	0,98	4,3%	0,0%	4,2%
22	13,15	0,06	0,39	7,7%	20,2%	9,2%	57	0,29	1,90	1,31	5,4%	0,0%	6,6%
23	8,73	2,82	3,39	4,3%	0,0%	4,1%	58	0,11	0,22	1,12	9,5%	0,0%	9,6%
24	10,88	2,31	0,93	4,5%	4,4%	7,9%	59	6,66	3,37	1,98	6,7%	0,0%	9,6%
25	18,28	0,23	1,51	3,8%	20,3%	6,0%	60	20,60	0,56	1,49	4,7%	0,0%	5,4%
26	25,45	0,51	1,88	4,1%	15,1%	4,3%	61	9,71	0,51	0,71	7,7%	0,0%	6,7%
27	1,53	0,33	0,20	10,1%	31,4%	5,2%	62	1,69	0,60	0,26	9,7%	0,0%	16,1%
28	1,08	1,07	0,15	9,3%	15,3%	10,8%	63	1,38	0,39	0,35	31,2%	31,5%	22,9%
29	0,91	1,22	0,13	6,9%	43,6%	11,3%	64	2,30	2,28	0,33	5,6%	65,0%	20,2%
30	1,11	0,68	0,07	6,4%	30,0%	9,0%	65	2,54	2,18	0,54	8,5%	27,2%	21,4%
31	9,04	2,17	0,08	8,1%	43,0%	10,3%	66	2,87	0,22	0,39	10,3%	24,0%	24,7%
32	12,49	1,76	0,19	6,3%	44,7%	7,5%	67	3,70	0,62	0,44	8,1%	32,3%	25,2%
33	12,99	0,75	0,30	6,0%	27,5%	5,4%	68	4,29	1,41	0,23	11,0%	20,3%	32,4%
34	18,56	0,74	0,03	26,8%	55,4%	4,9%	69	3,60	0,05	0,22	8,1%	16,8%	27,2%
35	23,22	1,56	0,15	6,6%	47,3%	2,5%	70	11,25	0,71	0,10	9,8%	12,7%	29,6%

Source : Calculated by researcher based on financial statement and published share price

Table 6. Return rate to calculate beta

No	Tingkat Pengembalian berdasarkan IHSG dan harga saham 10 perusahaan										No	Tingkat Pengembalian berdasarkan IHSG dan harga saham 10 perusahaan											
	IHSG	ASII	TURI	IMAS	AUTO	GJTL	GDYR	SMSM	MASA	NIPS		INDS	IHSG	ASII	TURI	IMAS	AUTO	GJTL	GDYR	SMSM	MASA	NIPS	INDS
1	-0.00	-0.06	-0.06	0.32	0.04	-	-0.01	0.27	-	-	-	71	0.03	0.04	-0.02	-0.02	0.06	-0.08	0.06	0.14	0.02	0.14	-0.10
2	0.08	0.17	-	-0.40	0.02	0.03	0.02	-0.13	-	-	-0.43	72	0.03	0.07	0.18	0.17	0.05	-0.03	0.29	0.24	-	-0.14	0.03
3	0.11	0.04	0.16	0.25	0.03	0.08	-0.02	0.15	0.09	0.25	0.40	73	0.01	-0.10	-	-0.04	-0.06	-0.05	-	0.02	0.18	-0.01	-0.03
4	-0.09	-0.18	-0.05	-0.12	-0.03	-0.23	-	-0.03	-0.11	-0.07	0.12	74	0.03	0.04	0.04	0.05	-0.01	-0.03	-0.02	0.03	0.05	0.13	0.18
5	-0.01	-0.01	-0.01	-	-0.03	-0.04	-0.16	-	0.06	-	0.13	75	0.01	-0.04	0.05	0.18	0.08	-0.04	-0.08	0.16	-0.08	-0.09	0.39
6	0.03	0.58	0.02	-	0.19	0.04	0.67	0.02	-0.01	-	-	76	-0.08	-0.09	0.04	-0.10	-0.06	-0.05	0.07	-0.04	-0.12	0.10	0.01
7	0.06	0.16	-	0.06	-0.03	-0.01	-	-	-	-0.14	-	77	0.03	0.33	-0.05	-0.11	0.05	-0.07	-0.07	0.03	0.04	0.06	-0.02
8	0.07	0.12	0.03	-	0.04	0.13	0.01	0.29	-	0.24	-	78	0.05	0.02	0.06	-0.13	0.06	0.03	-	-0.01	-0.08	-0.02	0.20
9	0.03	0.08	0.02	-	-0.03	-	-0.02	0.08	0.14	-	-	79	-0.02	-0.04	-0.03	-0.07	0.03	0.04	0.20	0.15	-0.15	-0.08	-0.09
10	0.09	0.34	0.11	-	-0.03	-0.07	-0.21	0.04	0.10	-0.23	-0.02	80	0.05	0.10	0.08	-	0.04	-0.06	0.06	0.20	-0.02	0.05	-0.01
11	0.05	-0.02	-0.03	-	0.16	0.04	0.02	-0.01	-0.02	0.09	-	81	0.02	0.09	0.07	-0.11	-0.01	-0.04	-0.11	0.08	-0.06	0.35	0.07
12	-0.03	-0.05	-0.03	0.09	-0.03	-0.02	-0.03	-0.11	0.02	0.07	-	82	-0.02	-0.09	-0.06	0.03	-0.01	0.01	-0.05	0.05	-0.11	-0.06	-0.07
13	-0.01	-0.05	-0.07	-	-0.04	-0.05	0.13	-	0.02	0.85	0.20	83	0.01	0.04	0.07	-	-0.07	-	0.03	-0.06	0.28	-0.15	0.04
14	0.05	-0.06	0.05	-	-0.04	-0.06	0.19	-	0.07	-0.08	-	84	0.03	-0.03	-	-0.02	0.05	0.02	-0.02	0.04	-0.14	-0.01	0.01
15	0.09	0.09	0.15	-	0.07	0.06	0.14	-0.03	-0.06	-0.13	-0.22	85	0.08	0.08	0.01	0.05	0.06	-0.02	0.14	0.05	0.03	0.57	0.12
16	0.04	0.14	0.18	-0.20	0.07	0.06	-0.03	0.02	0.09	-0.20	0.81	86	0.03	-0.01	0.02	0.02	0.03	0.14	-	0.01	-	-0.09	-0.05
17	0.03	0.03	-0.04	-	-0.02	0.05	0.03	0.02	-0.04	0.09	-	87	0.02	-0.07	0.09	-0.04	-0.02	0.16	0.23	0.07	0.11	0.35	0.04
18	0.10	0.35	0.03	-	0.24	-0.02	0.05	-	0.00	0.09	0.07	88	0.01	-0.04	-0.05	-0.01	0.13	0.11	0.42	-0.06	-0.11	0.11	-0.10
19	-0.07	-0.05	0.02	0.16	-0.08	-0.11	-0.05	0.18	-0.15	-0.16	-0.27	89	-0.05	0.01	-0.07	0.01	-0.03	-0.01	-0.06	0.04	0.07	-0.04	0.19
20	0.08	0.08	0.14	0.27	0.06	0.02	-0.07	0.28	0.12	-0.06	1.56	90	-0.04	-0.07	-0.15	0.01	-0.02	-0.18	0.05	-0.08	-	0.02	-0.13
21	0.12	0.33	0.09	0.67	0.05	0.04	0.09	0.12	0.02	0.17	-0.17	91	-0.09	-0.07	-0.32	-0.09	-0.04	-0.28	-0.08	0.05	0.04	-0.01	-0.16
22	0.02	0.04	0.14	-0.22	0.03	-0.10	0.03	-0.03	-0.15	-0.14	0.04	92	0.03	0.07	0.08	0.16	0.14	0.24	-0.10	0.17	-0.14	0.28	0.15
23	0.02	0.09	-0.03	0.20	0.02	-0.01	0.32	0.05	0.10	0.23	0.17	93	0.05	0.03	0.04	-0.09	-0.01	-0.01	-0.04	-0.07	0.04	0.51	0.11
24	-0.04	-0.00	-0.15	-0.16	-0.04	-0.14	0.12	0.15	0.09	-0.35	-0.12	94	-0.06	-0.05	-0.02	-0.03	-0.12	-0.22	-	0.42	-0.05	-0.22	-0.07
25	0.04	0.02	-0.01	-0.02	0.05	-	0.38	-	0.11	0.17	0.13	95	0.00	0.09	-0.04	-0.01	-0.05	-0.07	-	-0.04	0.11	-0.11	0.05
26	-0.10	-0.13	-0.02	-	0.01	-0.11	-0.06	0.02	-0.06	-	0.12	96	0.03	-0.06	0.14	-0.00	-0.08	0.12	-	-0.10	-0.13	-0.08	-0.07
27	-0.06	-0.18	-0.08	-	0.07	-0.16	-0.15	0.01	-0.02	-	-0.11	97	0.05	0.08	0.07	0.07	0.07	0.16	-0.03	0.16	-0.04	0.04	0.08
28	0.06	0.05	0.16	-	0.05	0.54	-0.09	0.16	-0.02	-0.22	-0.23	98	0.03	0.06	0.04	-0.00	0.11	-0.03	0.03	0.11	-0.04	-0.10	-
29	-0.04	-0.08	-0.08	0.02	-0.02	-0.13	-0.12	0.11	-0.04	0.98	-0.16	99	0.02	0.01	-	-0.05	-	-0.10	-0.03	-0.10	-0.01	-0.03	0.01
30	-0.02	0.55	0.27	-	0.64	0.02	0.14	0.71	0.09	0.22	0.43	100	0.01	-0.05	-0.02	-0.01	-0.06	-0.08	-0.03	0.15	0.01	-0.09	0.05
31	-0.06	-0.08	-0.01	-	0.02	-0.08	-0.00	0.07	-0.10	-0.14	0.09	101	-0.00	0.05	0.05	0.03	0.04	0.04	0.03	0.07	-0.01	-0.02	0.04
32	-0.15	-0.18	-	-0.06	-0.12	-0.23	-0.05	0.02	-0.11	-0.24	-0.32	102	0.04	0.06	0.07	-0.10	0.01	-0.01	-0.10	0.08	-0.04	0.07	-0.00
33	-0.31	-0.45	-0.30	0.06	-0.36	-0.32	-0.20	-0.20	-0.28	-0.23	0.52	103	0.01	-0.02	-0.04	-0.03	0.03	-0.02	-0.01	-0.14	-	0.11	0.00
34	-0.01	0.85	0.03	-	0.69	-0.12	-	0.23	-0.04	0.10	-0.19	104	0.00	-0.07	-	0.05	0.08	-0.12	0.02	0.15	0.10	-0.10	-0.11
35	0.09	0.03	0.04	0.02	-0.03	0.23	-0.55	-0.24	0.04	-	0.33	105	-0.01	-0.04	-0.11	-0.16	-0.08	-0.07	-0.02	0.03	0.26	0.05	0.05
36	-0.02	0.23	-0.29	0.01	-0.09	-0.11	-0.11	-0.46	0.04	-	-0.17	106	0.01	0.06	-0.02	-0.11	-0.00	-0.09	-0.03	0.03	0.02	0.79	-0.21
37	-0.04	-0.13	0.15	-	-0.09	-0.03	0.24	-	-0.06	0.01	-	107	0.01	0.04	-0.00	0.17	0.08	0.09	-	0.08	-0.01	-	-0.03
38	0.12	0.26	0.62	-0.25	-0.01	0.14	-0.09	-0.14	0.17	-	-	108	0.01	0.06	0.11	-0.01	-0.11	0.02	0.01	0.02	-0.12	0.04	-0.13
39	0.20	0.26	0.06	-0.32	0.09	0.02	-0.05	-0.17	-0.06	-0.04	0.42	109	0.03	-	0.04	0.01	-0.01	-0.04	0.01	-0.04	-0.04	0.13	-0.13
40	0.11	0.16	0.30	0.20	0.10	0.27	0.03	1.72	0.05	-0.31	-0.21	110	0.01	0.09	0.04	0.03	-0.03	-0.05	-0.01	-0.05	-0.05	0.06	0.08
41	0.06	0.14	-0.02	0.25	-0.09	0.04	0.53	-0.28	0.04	0.75	-	111	-0.08	-0.20	-0.01	0.02	-0.14	-0.17	0.01	0.06	-0.04	-0.01	0.04
42	0.15	0.63	1.55	-0.05	0.52	0.05	0.20	1.12	0.04	-	0.30	112	0.03	0.07	0.01	-0.05	-0.05	-0.08	0.05	-0.02	-0.05	0.02	-0.22
43	0.01	0.03	-0.10	-	0.41	0.05	0.02	0.11	0.11	0.03	-0.07	113	-0.06	-0.01	-0.06	-0.05	-0.14	-0.15	-	0.00	-0.13	-0.01	-0.17
44	0.05	0.11	-0.03	-	-0.01	0.31	0.02	0.17	0.43	-	0.17	114	-0.02	-0.06	-0.05	-	-0.04	-0.12	0.15	0.05	0.03	-0.01	-0.10
45	-0.04	-0.06	-0.01	-	-0.01	-0.02	-0.02	0.13	-0.06	-0.06	-	115	-0.06	-0.11	-0.20	-0.18	-0.39	-0.33	0.09	0.02	-0.12	-0.32	-0.26
46	0.02	0.14	0.03	-	0.20	0.06	0.12	-	-0.13	-	0.07	116	-0.06	-0.12	-0.01	-	0.06	0.05	-0.10	-0.08	-0.06	0.05	-0.33
47	0.05	0.07	0.36	-	-	-0.02	0.01	0.09	-	-0.15	-0.13	117	0.05	0.14	0.07	-0.03	0.09	0.12	0.01	0.10	-	-0.20	0.05
48	0.03	0.04	0.09	-	0.13	0.08	-	0.13	-0.04	0.17	-0.15	118	-0.00	0.00	0.01	-0.15	-0.02	-0.09	0.69	0.03	0.00	0.17	-0.13
49	-0.02	0.01	-	-	-0.02	0.24	-	0.28	0.01	-0.15	-0.23	119	0.03	0.01	0.10	-0.08	-0.03	-0.01	-0.01	0.03	0.53	0.06	0.04
50	0.09	0.16	0.14	-	0.11	0.40	0.33	0.18	0.34	0.17	2.29	120											

Valuation of multivariate regression models

Model estimation results (Table 7) show that 16.03% (coefficient of determination R-square = 0.16028) PE value is affected by proxy risk (BETA), debt to equity ratio, cost of debt, dividend pay-out ratio and operation-return on assets. Those five variables that have a significant effect on

price to earnings ratio are return on assets (P = 0.0081 < 0.05) while the other independent variables have less significant effect (P > 0.05). Regression done with EViews® 10+ with the estimation equation as follows:

$$PE = 13.03 - 1.19 (BETA) - 0.58 (DER) + 1.00 (L_R) + 6.53 (POR) - 45.55 ROA$$

Table 7. Equation estimateion based on multivariate regression of price to earnings ratio (PE)

View	Proc	Object	Print	Name	Freeze	Estimate	Forecast	Stats	Resids
Dependent Variable: PE									
Method: Least Squares									
Date: 06/05/18 Time: 12:52									
Sample: 1 70									
Included observations: 70									
Variable	Coefficient	Std. Error	t-Statistic	Prob.					
C	13.02778	3.974722	3.277657	0.0017					
BETA	-1.186908	2.118936	-0.560143	0.5773					
DER	-0.578620	1.655983	-0.349412	0.7279					
L_R	1.003394	1.031135	0.973097	0.3342					
POR	6.527026	4.347696	1.501261	0.1389					
ROA	-45.54631	16.65038	-2.735452	0.0081					
R-squared	0.160128	Mean dependent var		9.513661					
Adjusted R-squared	0.094513	S.D. dependent var		9.290629					
S.E. of regression	8.840693	Akaike info criterion		7.278424					
Sum squared resid	5002.103	Schwarz criterion		7.471152					
Log likelihood	-248.7448	Hannan-Quinn criter.		7.354978					
F-statistic	2.440413	Durbin-Watson stat		1.425248					
Prob(F-statistic)	0.043592								

IV. DISCUSSION

The results of this study are in line with previous studies which stated that most of the companies on the Indonesia Stock Exchange (around 72%) offered their shares in an undervalued or lower than their intrinsic value (Paramitha et al. 2014). According to the efficient market hypothesis that a valuation can effectively explain the stock price on the exchange if the stock is included in an efficient market. This was explained by Fama (1970) that an efficient exchange is if the value of an asset or stock has reflected all available information, including information that is private.

Valuation of multivariate regression models

The valuation model with multivariate regression is estimated using data from 10 automotive sector public companies on the Indonesia Stock Exchange (Table 1) and the resulting equation must be tested for classical assumptions before being declared feasible to be used as a model for the stock price valuation of automotive companies on the Indonesia Stock Exchange. The results of classical assumptions (linearity, multicollinearity, autocorrelation, normalization, heteroscedasticity) are all fulfilled.

Table 8 shows the results of the linearity-Ramsay Reset Test test showing that the Prob F value (0.1389) is greater than the 0.05 alpha level (5%) so the regression model meets linearity assumptions.

Table 12. Heteroscedasticity Test

View	Proc	Object	Print	Name	Freeze	Estimate	Forecast	Stats	Resids
Heteroskedasticity Test: Breusch-Pagan-Godfrey									
Null hypothesis: Homoskedasticity									
				F-statistic	1.458029	Prob. F(5,64)		0.2160	
				Obs*R-squared	7.158216	Prob. Chi-Square(5)		0.2091	
				Scaled explained SS	22.42609	Prob. Chi-Square(5)		0.0004	
Test Equation:									
Dependent Variable: RESID^2									
Method: Least Squares									
Date: 06/05/18 Time: 13:11									
Sample: 1 70									
Included observations: 70									
Variable		Coefficient		Std. Error		t-Statistic		Prob.	
C		-6.675951		87.15988		-0.076594		0.9392	
BETA		-19.25126		46.46518		-0.414316		0.6800	
DER		22.30419		36.31331		0.614215		0.5413	
I_R		35.12732		22.61128		1.553531		0.1252	
POR		215.3796		95.33866		2.259100		0.0273	
ROA		-103.5506		365.1187		-0.283608		0.7776	
R-squared		0.102260		Mean dependent var				71.45861	
Adjusted R-squared		0.032124		S.D. dependent var				197.0545	
S.E. of regression		193.8636		Akaike info criterion				13.45400	
Sum squared resid		2405318.		Schwarz criterion				13.64673	
Log likelihood		-464.8901		Hannan-Quinn criter.				13.53056	
F-statistic		1.458029		Durbin-Watson stat				1.954329	
Prob(F-statistic)		0.216003							

After the five classical assumptions of this equation are fulfilled, the next test is the model feasibility test, in this case there are three tests to be carried out. First, the F test or model feasibility test (Table 7) shows the prob value. (F-statistic) 0.043592 is smaller than the error rate / error (alpha) 0.05 it can be said that the estimated regression model is feasible. Second, the t test in multiple linear regression is intended to test whether the parameters (regression coefficients and constants) that are supposed to estimate the equation / multiple linear regression model have been the right parameters or not. Right here is the parameter capable of explaining the behavior of independent variables in influencing the dependent variable. The results of the t test are seen in the prob value. t count for ROA 0.0081 < 0.05 means that ROA has a significant effect on the PE value of the automotive industry at 95% confidence level while for other variables prob. t counts greater than 0.05 means that the effect is less significant. Finally, the coefficient of determination explains the variation in the effect of independent variables on the dependent variable. Or it can also be said as a proportion of the influence of all independent variables on the dependent variable. In this study because it uses R-

Squared and Adjusted R-Squared to determine the coefficient of determination, it can be seen that the values of R-Square = 0.16028 and Adjusted R-Squared = 0.094513 means the independent variable [risk (BETA) free variable, Debt to Equity Ratio (DER), Interest Rate (I_R), Dividend Payout Ratio (POR) and Operation-Return on Assets (ROA)] affect the price to earnings ratio of 16.03% and the remaining 84.97% is influenced by other variables not in the regression variable.

Based on the classical assumption testing and also the reliability test of the multivariate regression valuation model, PE estimation equations obtained can be applied to the valuation of automotive companies in the Indonesia Stock Exchange. For this reason, researchers applied the model obtained to assess the initial stock price of two automotive companies that were IPOs in 2015 and 2017. The selected companies represented automotive companies from the manufacturing and trading sectors, namely PT. Garuda Metalindo, Tbk for the manufacturing sector which conducted IPOs on July 7, 2015 and PT. Bintraco Dharma, Tbk for the trade sector which conducted an IPO on April 10, 2017.

Table 13. Calculation of Beta in PT. Garuda Metalindo and PT. Bintraco Dharma

	ASII	TURI	IMAS	AUTO	GJTL	GDYR	SMSM	MASA	NIPS	INDS	Total
Beta	1,51	1,54	0,59	1,12	1,38	0,41	0,92	0,64	0,83	1,53	
Equity (Industri)	139.906	2.823	6.710	10.537	5.848	760	1.581	4.576	843	2.068	175.651
Beta x Equity	211.071	4.345	3.964	11.762	8.057	312	1.454	2.926	702	3.170	247.762
Leverage Beta	1,41										
Debt (Industri)	70.910	1.097	16.538	1.005	7.444	75	157	2.724	595	274	100.819
D/E	0,51	0,39	2,46	0,10	1,27	0,10	0,10	0,60	0,71	0,13	
Unleverage Beta	0,99	D/E (BOLT)		0,08	==>	Leverage Beta (BOLT) =				1,04	
D/E Industri	0,57										
Tax Rate	25,0%	D/E (CARS)		0,51	==>	Leverage Beta (CARS) =				1,36	

Source : Calculated by researcher based on financial statement

PE value for PT. Garuda Metalindo, Tbk obtained by the valuation model obtained in the study 8.5 times the earnings value of 192.3 billion rupiahs and the number of shares of 1.87 billion shares obtained the value of the stock price of Rp 870, -, while the initial stock price

of Rp 750, - For PT. Bintraco Dharma, Tbk PE value obtained from the above model is 10.9 times (Table 5) with an earning value of 245.2 billion rupiah and the number of shares of 1.35 billion shares, the share value of Rp. 1,980, -, while the initial share price of Rp. 1,750, -.

Table 14. Price to Earning Ratio (PE) Variable Calculation

SAHAM	BETA	DER	I_R	POR	ROA	PE
BOLT	1,36	0,51	10,8%	30,0%	5,1%	10,9
CARS	1,04	0,08	13,2%	67,6%	17,1%	8,5

Source : Calculated by researcher based on financial statement

The implementation of the model in the valuation of stock prices in two automotive companies both in the manufacturing and trading sectors showed that both were undervalued, in line with previous studies (Paramitha et al., 2014). Empirical data also shows that stock prices have an

increasing trend compared to the value of their initial share price when hold in the long term (Figure 1 and Figure 2) in accordance with efficient market theory where share prices will follow the information available on the market.

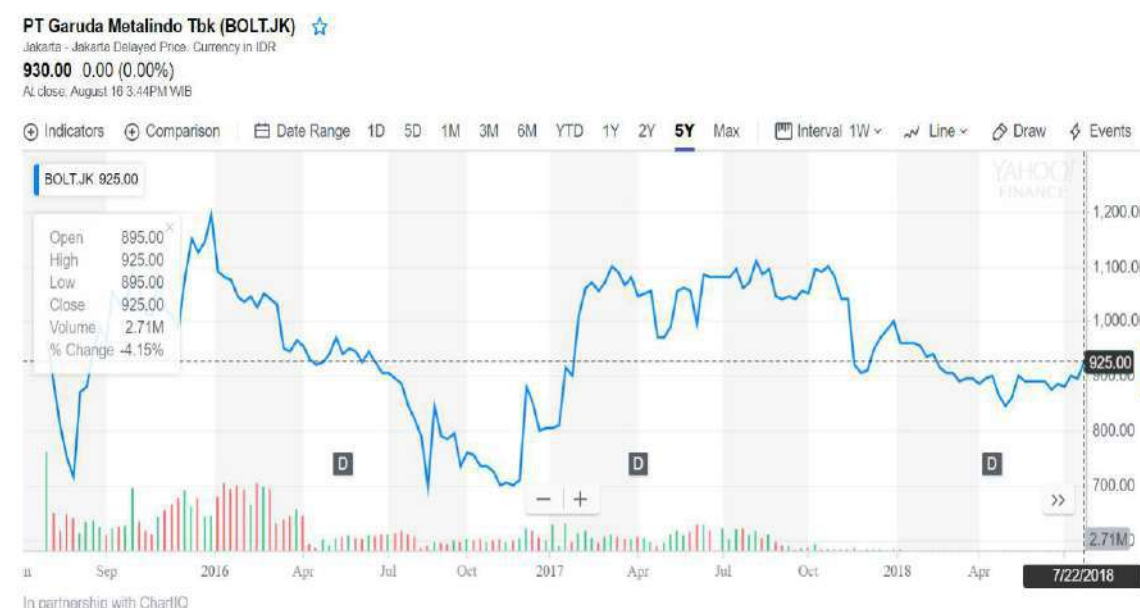


Fig.1: Share Price of PT. Garuda Metalindo, Tbk since IPO

(<https://finance.yahoo.com>)

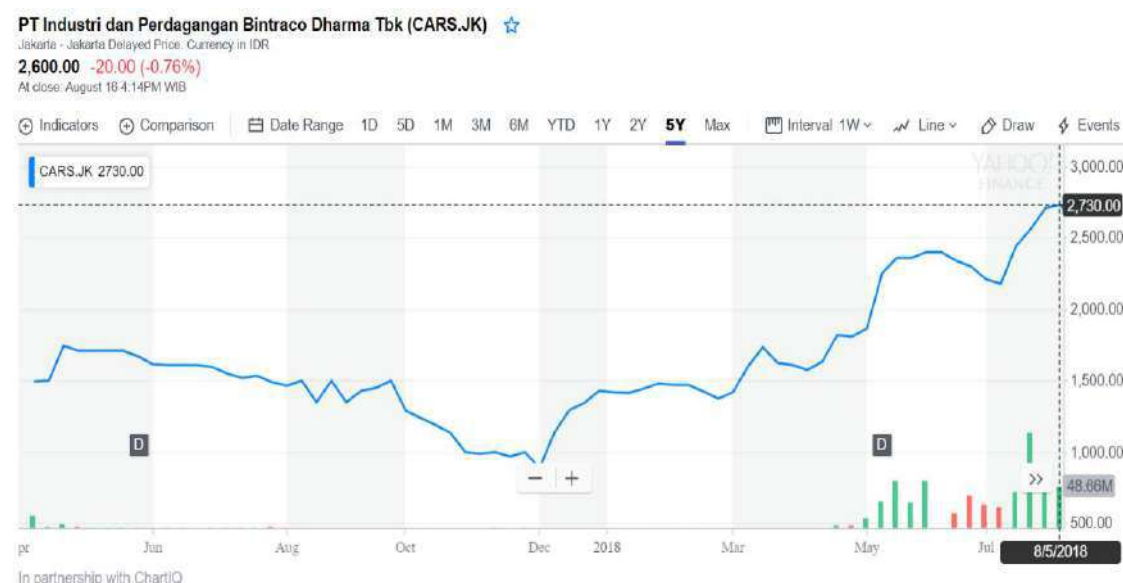


Fig.2: Share Price of PT. Bintraco Dharma, Tbk Since IPO

(<https://finance.yahoo.com>)

V. CONCLUSIONS AND RECOMMENDATIONS

Researchers concluded that the model obtained in this study could be applied in the valuation of automotive companies in the Indonesia Stock Exchange, both automotive company in the manufacturing sector and also the trade sector, because they had met the classical assumption test and the determination test. Based on the independent variables that the researcher uses in this research shows that the level of influence on the estimated value is still relatively low, because the variables used in this study focus on financial statement variables that are influenced by various past factors, so that further researchers can develop using different variables not only variables obtained from financial statements but also external factors that can affect stock prices.

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Indigenous Intercultural Physics Teaching Based on David Ausubel's meaningful Learning theory

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Abstract— This work presents a proposal for implementation of Physics teaching that interacts with culture and the natural phenomena studied by it, based on David Ausubel's Cognitive Theory to aggregate substantial factors to pedagogical facilitation. Therefore, through an educational practice using contextualized material and teaching, whose subjects interact with environment and apply knowledge from daily life, it is possible to understand and interpret from interdisciplinarity and actions not fragmented or mechanic. In other words, developing an accessible and intercultural learning it becomes effective (meaningful).

Keywords— Cognitive theory, Contextualized learning, David Ausubel, Interculturality, Physics teaching.

I. INTRODUCTION

In the state of Bahia, both Physics teaching and indigenous school education are object of research, however the methodology applied at classroom and beyond it lack further deepening. The educational practices developed in indigenous schools of Bahia continue fostering the mechanical learning. This is portrayed by the classical model whose teacher presents the content on the chalk board and the student, in its turn, just copy, in the common attempt to merely memorize to answer a test, memorizing content without any meaning and applying it mechanically to familiar situations and repeated several times, without questions to its relation with the community day-to-day or even on the labour market (practical use).

In indigenous school education of Bahia the most part of Physics Teaching is configured by fragmented actions and out of the daily context and indigenous culture. Unfortunately, it turns to the reproduction of knowledge and expertise imposed by contemporary society through textbooks rooted in cultural or ideological values that do not represent them,

In other words, reproductions that reflect the dominant culture desire of spread knowledge conveniently to a certain reality. They are books that do not show to indigenous students that the Physics studied

by them is derived from an historical building emerged of various cultures. They do not show that, many times, it occurs paradigm break on the science and that evolution of knowledge do not require a culture more important than the other, but that complete each other, because the cultural and social contextualization is relevant to the knowledge development. [1]

It is worth mentioning that it is unquestionable the importance of the textbook on the historical process of school education. However, according to our perspective, its value in the development of indigenous school education request some modification, including with regards to the textbook of Physics, and it is worrisome the lack of contextualization in the indigenous culture in the themes covered. In other words, they do not bring an intercultural perspective of teaching.

[...] Physics teaching in indigenous schools is still characterized by excess of attention given to repeated exercises, problems solved mechanically by a series of formulas, often decorated literally and arbitrary to the detriment of a deeper analysis aiming the comprehension of the involved physical phenomena. [1]

Other major factor observed in the classroom is the lack of context and meaning of Physics Teaching in the student daily, because Physics is being presented just as a mathematical formalism or, many times, through examples that occur only on the big cities. In addition, the language not accessible to the student is a concerning and essential factor, bearing in mind that language has a facilitating role on a meaningful learning.

It is fact that the indigenous teachers claim the elaboration of new curricular proposals applicable to their schools to replace the general model of current educational system. The reason, according to register from RCNEI/MEC (1998), is that “such models never corresponded to their politics interests and pedagogies of their cultures” (p. 11). [2]

Other concerning in Physics Teaching in indigenous schools of Bahia is the lack of proper training of the teacher. It is very common to find teachers teaching Physics in indigenous schools but with degree in Biology, Mathematics, Pedagogy or only Magisterium. [1]

In this context, we bring as issue the possibility of a meaningful learning in Physics by the indigenous student from Bahia. From that issue it is derived specific goals that unfold in analysis of the high school Physics textbook prevailing approach, with regard to the guidelines recommended by RCNEI and its interdisciplinary or intercultural perspective about Physics teaching.

II. CONCEPTIONS ABOUT MEANINGFUL LEARNING

The meaningful learning was influenced by Jean Piaget's Genetic Epistemology Theory which is based on the idea that the knowledge occurs based on an interactive process between the subject and the medium. Piaget searched to understand the capability of knowing and learning of the child, treating the subject as a systematic being always on the search for knowledge, studying the child's thinking and how it is developed still achieve the mature reasoning. [1]

Nonetheless, although Piaget's Theory dwell on the child development and have information about the adult functional learning, when we deal with the learning without any age restriction of the student, we glimpse the theory of Meaningful Learning by David Ausubel as the most suitable to this work.

According to Moreira (2001) [3], Ausubel concentrated himself on a question that any researcher had worried about until that moment: the learning that occurred in the

classroom, valuing the learning by discovery, which incited the lecture as the big focus of his research.

In our conception, Ausubel achieves a fundamental point on the teaching-learning process, on which the individual is the subject of its learning, that depends of its previous knowledge and interactivity with the medium, what cause new meaningful knowledge.

The distinction between Rote Learning and Meaningful Learning is one legacy from the Cognitive Theory of David Ausubel whose application in teaching practice aggregate considerations about the traditional and the focus class, through the search for effective learning. The meaningful learning depends of three essential elements: the new logical structured knowledge and the previous knowledge that can be associated and the comprehension design of the intended knowledge. [3]

The individual's cognitive structure, to Ausubel, is the organized content of ideas that in terms of learning of particular themes and issues, refers to the content organization of that area the individual wants to learn. In other words, the emphasis is given to the ideas acquisition, storage and coordination in the individual's brain. Based on this, we think that the cognitive structure is the set of cultural references that the subject has, since the culture guides the individual's perception and cognition codes, favoring acquisition, organization and anchoring of new knowledge. [1]

In this perception, the individual's cognitive structure to Ausubel (2003) is structured and organized, and the new ideas are articulated according to the relations established between them. Furthermore, it is in the individual's cognitive structure that new ideas and concepts are being fixed and organized gradually, in other words, learned. [4]

According to his theory, the continuous incorporating of new ideas in the individual's cognitive structure provides the learning due to modifications that occurs in that. The apprenticeship can be mechanical or meaningful, in which the meaning factor is the relation that the individual will make with the new proposed idea and the previous knowledge existing in its cognitive structure. In other words, if the new idea is meaningful to the individual, it will occur the meaningful learning, otherwise, it will be a mechanical learning. [3]

However, it is not possible to discuss about meaningful learning without expatiate on comments about rote learning – opposite sides and, unfortunately, it is the most common learning in the indigenous schools, in other words, that one practically without meaning, merely memorial, that serves to a particular purpose, normally a test, that after some time will be deleted, forgotten from the student's cognitive

structure. In this case, the new ideas are not logically and clearly related to the previous knowledge on the student cognitive structure, but they are merely memorized and reproduced, what do not ensure flexibility even longevity on its use. It impairs the learning of Physics by the indigenous student, because on our conception it is so much used by the students because it is still encouraged by the school.

The negative consequence of the rote learning in Physics teaching in indigenous schools of Bahia is that there is not substantivity, so the student is not able to express the new content with a different language from that with which the material was first presented. Therefore, the indigenous student will not be able to connect his culture and community reality with the content presented in the classroom and beyond it. It is worth mentioning that the rote and the meaningful learning are not separated, because they are along a fine. [5]

According to Moreira (2001) [3], the transition from the rote learning to the meaningful learning is not natural or automatic. It is an illusion to think that the student can learn initially on a rote way because at the end of the process the learning will be meaningful. It can occur but it depends of proper subsunctors, student predisposition to learn, potentially meaningful material and teacher's mediation.

III. INTERCULTURAL FACTORS TO PEDAGOGICAL FACILITATION

The substantive factors of pedagogical facilitation, as the name says, are that that promote the action of learning and they are related to selection of the most relevant themes that will be worked with the students. Hence, it is important to select basic ideas not to overburden the students with unnecessary information, hampering the acquisition of a proper cognitive structure. [3]

With regards to intercultural factors associated to Physics Teaching and the Meaningful Learning Theory as a process to pedagogical facilitation, the teacher must associate daily cultural processes of the community as a trigger to the indigenous student. In other words, through their previous knowledge (rituals, cosmology, religious ideas, art and other aspects of life) they will be able to formulate ideas and conceptions to new knowledge through these subsunctors, predisposing them to a meaningful learning. [1]

We believe that human thinking is developed through the lived cultural background. In other words, culture is what characterizes man, and not the man that characterizes

the culture. This conception inserted in school context, production of didactic material and in the community is fundamental to develop the indigenous student thinking and to a meaningful learning.

To David Ausubel (2003) [4], the concepts should be preferably presented to students in a wide format, in other words, from more general ideas to specific ones, because learning by subordination is easier to the individual than by superordination. Therefore, when the concepts are being worked, they will be able to be connected on a subordinated way – when apprenticeship occurs by subordination, the key concepts that are necessary to allow a meaningful learning are denominated subsunctors.

In this respect, when the teacher select general ideas/concepts about certain content linked to the students' cultural context, they will serve as an anchor to future apprenticeships. Otherwise, if the teacher's choice is for unique ideas/concepts, in other words, concepts not associated to their culture, probably it will not be meaningful to them, because it would be missing previous concepts on the cognitive structure of the student. [1]

It is possible to remark that the big and common difficulty presented on the Physics apprenticeship by High School indigenous students is that the teachers link the content taught to examples only from the textbook, that do not bring the indigenous context, in other words, do not portray their culture. Other factor is that there is a lack of proper information of the indigenous and not indigenous teacher at school, as we previously quoted.

IV. MATERIAL AND METHODS

This work was a theoretical-exploratory research that aimed to construct strategies to implementation of an intercultural Physics teaching at Indigenous School of Coroa Vermelha (Escola Indígena de Coroa Vermelha), as well to create proposals of alternative intercultural didactic material buoyed on David Ausubel's Meaningful Learning Theory.

Bibliographic studies were made to characterize the fundamental concepts of Meaningful Learning in diverse contexts of an intercultural epistemological approach, as well as a detailed study of their main characteristics in the indigenous reality.

Next, the studies were centered around a conceptual exploration and use of interculturality to organize the concepts studied in Physics within an alternative model of intercultural education.

V. CONCLUSION

The study brings as a great didactic-conceptual advantage the use of cultural knowledge of indigenous students, in other words, their previous knowledge as subsunits to represent and model the main Physics concepts. This is mostly due to the existent capacity for dialogue between indigenous culture and the natural phenomena studied in Physics. The relation of cultural valorization in indigenous context is fundamental to pedagogical practices of the teacher in the classroom as well to the possibility of an alternative intercultural didactic material of Physics.

We believe that the local conceptions, pedagogical practices of the teachers and the process comprehension are crucial to obtain a significant answer from the indigenous students in the classroom and beyond it. Therefore, it is crucial to a meaningful learning of physical processes to High School students the compatibility between didactic material and local context, having as proposal the cultural enhancement of indigenous people in Physics study. At the same time, the relationship between teacher, student and community presented itself as a differential of an intercultural education in the indigenous education process.

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A Review on Stability Improvement with Wall Belt Supported Dual Structural System Using Different Grades of Concrete

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Abstract— In today's modern world tall structures like high-rise buildings, skyscrapers, towers are needed to be safe and stable. To provide stability to tall structures when shear wall is not enough to provide lateral support, therefore wall belt supported system is the one of the best technique to increase the stability of the same. Wall belt supported system is provided at the periphery of the tall structures throughout its height to increase the stability. The current work shows the literature survey of various researchers who have been contributing in this field. Conclusions with the outline of the proposed work are provided at the end of the work.

Keywords— Concrete Grades, Dual System, Stability Improvement, Tall Structures, Wall Belt.

I. INTRODUCTION

The new and the recent techniques with inventions of construction methods are currently in trend and Wall belt supported system is one of them. To increase the stability against lateral loads like wind and seismic loads wall belt supported system is used now a days. It is necessary to used modern construction techniques to improve construction quality and stability of the structure. In modern high rise building construction wall belt supported system is used to improve building stability against lateral loads. There are some examples of lateral loads they are:-

1. Seismic load
2. Wind load

Gravity loads on building:-

1. Snow load
2. Dead load
3. Imposed load

Special loads:-

1. Thermal load
2. Blast load
3. Impact load
4. Settlement load

II. BELT SUPPORTED SYSTEM

The lateral load resisting system is known as the belt supported system in which shear wall belt or truss belt is used. It resists the lateral loads on structure since in this system, the external columns are tied to the shear wall belt at one or more levels. It is the new lateral load resisting method of building construction.

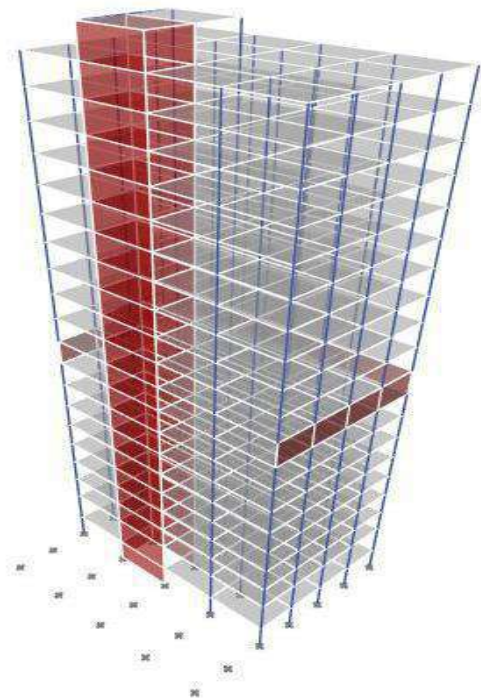


Fig. 1: 3D Sectional View of Belt Supported System

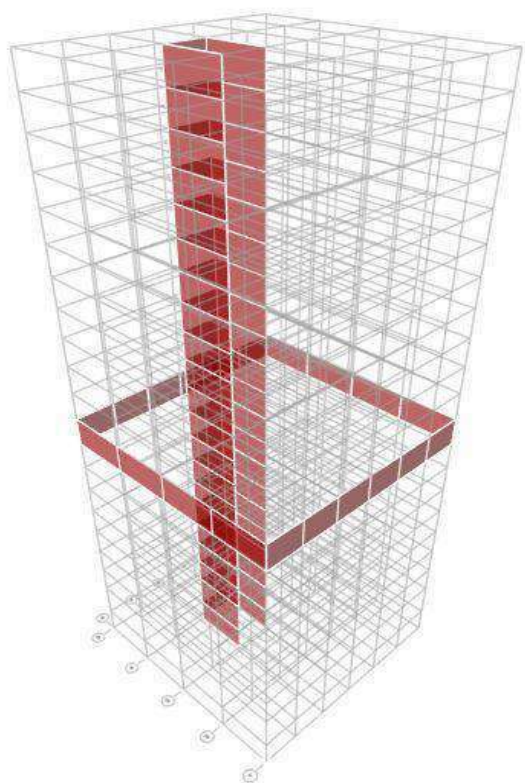


Fig.2: Dual System with Shear Belt

Advantages of belt supported system-

1. It provides more strength to the structure.
2. It provides stability to structure against lateral loads.

III. LITERATURE REVIEW

Due to the increase in the demand of high rise and fascinating structure with vertical & horizontal irregularity, different themes, and increasing height day by day leads to new challenges and requirement of new safety measures. To resist from earthquake and expressly wind effect due to increasing stature as the stiffness of the building is increases with increasing height we need to adopt some preventing structural system. Some of them are bracings, shear wall, outrigger system etc. In this study outrigger system is taken for analysis due the fact that is found the most optimal system for high rise buildings and skyscrapers. In this system the external columns are connected to main inner or outer core by means of outrigger beams at different floors to resist against story drift and rotating action of core due seismic and wind forces. In this study various papers allied to this topic are reviewed in which an enormous work is done in this field earlier. With the help of review of research paper we came to know about the conclusive outcome which forms the

research objectives of our further study (Neeraj Patel et. al.).

The infrastructure building is increasing day by day all over the world and the main material is used in building construction is concrete therefore to reduce the amount of cement in concrete supplementary material are used. These supplementary materials are cheaper than cement. Silica fume is most popular material used in the concrete to improve its compressive, strength. For this purpose silica fume is replaced by 0%, 5%, 7.5%, 12.5%, 15%, 20% & 25% by the weight of cement. Water binder ratio is taken 0.42 for M-25 grade of concrete. Various tests were conducted in the research which showed the results of the same percentage at the different of 0% 5%, 7.5%, 12.5%, 15%, 20% & 25% for the time period of 7, 14, and 28 days curing as a substitution of cement by micro silica on compressive behavior. (Prabhulal Chouhan et. al.)

The use of fly ash in concrete is increasing day by day as a partial replacement of cement. There are mainly three grades of (OPC) cement used in concrete namely 33, 43 and 53.it is commonly used grades of cement in construction industry. It is the comparative study of effects on concrete properties when cement is replaced by fly ash and concrete strength against compressibility, shrinkage and durability were also studied. The results of the test shows that fly ash improve the properties of concrete in all grade of ordinary Portland cement (C. Marthong et. al.).

To reduce the bad effect of lateral loads shear wall is used as structural member and also it provides stability to the structure. This system is made up of R.C.C, timber, masonry, reinforced masonry. This paper shows the study and analysis on shear wall system behavior against lateral loads. Shear wall resist the lateral load on high rise buildings therefore it supports and provide stability to high rise structures (Ms. Priyanka Soni et. al.).

In this present era of high rise buildings and skyscrapers it is obligatory to work on overall shape, plan and structure of building. The building performance under seismic loading is a constraint of various factors comprises of geometry, location and the way of earthquake forces transferred to the ground. The affected zones of higher chances of occurrence of seismic effects with respect to other part of the country may leads to collapse of building under seismic load if they are not provided with and structural strengthening arrangement. However, safety has to be the main criteria when seismic hazard has taken into account in multistoried buildings. In the current study the solution for aforementioned problem is suggested by providing shear wall in a specified ratio with respect to wall area in plan irregularity which helps in resisting lateral

load generated by seismic forces. This paper provides the review of research work previously presented by various researchers which shows the further research option (Prafoolla Thakre et. al.).

The waste materials which can be used as additional cementitious material like fly ash, steel slag, blast furnace, silica fume etc. Silica fume improves the strength of concrete. Now days the good strength and good performance concrete is extensively used in much civil engineering structure. To reduce the amount of cement in concrete supplementary material are used. Silica fume is most popular material used in the concrete to improve its flexural, split tensile strength. For this purpose silica fume is replaced by 0%, 5%, 7.5%, 12.5%, 15%, 20% & 25% by the weight of cement. Water binder ratio is taken 0.42 for M-25 grade of concrete. Various tests were conducted in the research which showed the results of the same percentage at the different of 0% 5%, 7.5%, 12.5%, 15%, 20% & 25% for the time period of 7, 14, and 28 days curing as a substitution of cement by micro silica on Split Tensile Strength and Flexural Strength (Prabhulal Chouhan et. al.).

The concrete is the most used material in infrastructure development around the world. There are many varieties and grades of concrete is researched and developed in laboratories according to the need of specific fields. In this paper an experimental investigation has been done in the area of strength and durability of concrete by replacing fine aggregates by fire bricks and glass powder. And it recommends that fire brick and glass powder can be used in the place of fine aggregate (Tiwari Darshita et. al.).

It is observed that stability of the structure depends upon its structural members because they transfer and carry loads and they also connected to each other. In the case of high rise buildings structure height is more therefore they are less stable against lateral loads. Therefore belt supported system and shear core outrigger system is used in G+10 buildings located under seismic zone IV. The Taranath method is used in this paper and total seven numbers of cases has used and compared with each other (Archit Dangi et. al.).

To reduce the overall cost of the project, it is highly recommend reducing the cost in different manner. To make economic structure, the cost cutting should be done in every construction stages. The dual systems in building structure consist of structural walls and moment resisting frames. The walls are made up of RCC, which is a costly material used. The purpose of current study is to explore the reduction in shear wall area in multistorey building to reduce cost. Total 5 buildings framed in Staad pro software

abbreviated as SA, SB, SC, SD, SE supposed to be situated at Seismic Zone III. Post parametric analysis results shows that, the reduction in shear wall area should be adapted to a certain limit up to 20 % for cost cutting (Prafoolla Thakre et. al.).

IV. CONCLUSIONS AND OUTLINE OF THE PROPOSED WORK

To conclude the above literature review, it is found out that it is necessary to introduce stiffness increasing members in tall structures to increase the lateral load handling capacity. Various researches already done till now in terms of stability improvement. Since one side of the current theme is to increase overall stiffness to resist lateral load but the other side is; that it increases overall construction cost. To maintain these two things, wall belt supported system plays a major role. Hence wall belt supported system should be implemented in tall structures.

The upcoming proposed work shows various wall belt stability cases with different grades of concrete with different thickness. The optimum case of stability by comparing all the decided cases of different thickness will be implemented and shown in upcoming papers.

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First Report of *Eriosoma lanigerum* (Hausmann, 1802) (Hemiptera: Aphididae) on the Apple tree Crop in Espirito Santo State, Brazil

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Abstract— The apple tree is affected by a large variety of phytophagous plants. Woolly apple aphid in apple trees, *Eriosoma lanigerum* (Hausmann) (Hemiptera: Aphididae) are from North America. The main host of this insect is the plant *Ulmus americana* L. and the secondary host is the apple tree, where it develops throughout the year. Collects were carried out in pioneer municipalities in the planting of apple trees in the state of Espírito Santo, being cultivated Eva, Gala and Fuji varieties. The collections took place in the municipality of Santa Teresa, Santa Maria de Jetiba and Mantenópolis. Samples were taken at the stages of vegetative development and apple production. In this study, the occurrence of this insect was recorded in apple orchards in the state of Espírito Santo, where the presence of *E. lanigerum* was observed in all the samples, attacking the trunk, new shoots, roots, shoots and fruits between the planting lines.

Keywords— Insect-pest; Introduced species; Aphid; *Ulmus americana* L.

I. INTRODUCTION

The apple (*Malus domestica* Borkh) is the second most produced fruit in the world (Pasa et al., 2012; Ganopoulos et al., 2018). In Brazil, thanks to the favorable climate found in the main fruit producing regions, the crop 2016/17 produced excellent quality fruits, with a production of 1.2 million tons (Kist, 2016).

The apple trees are attacked by various types of arthropod pests (Shoonhoven et al., 2005). The aphids are considered key pests in apple orchards around the world (Beers et al., 2003). Among these pests, stands out the *Eriosoma lanigerum* (Hausmann) (Hemiptera: Aphididae), native to north america and one of the major pests of culture worldwide (Khan et al., 2015; Singh, et al., 2018). The outbreaks of this insect are related to the drop in biological control use to the detriment indiscriminate use of insecticides (Gontijo et al., 2012).

The *E. lanigerum* infestations in apple plants may occur in the root system or in trunks and branches through

lesions, what damages the sprouts and reduces tree growth (Brown et al., 1995; Pringle; Heunis, 2001; Beers et al., 2010). It is an indirect pest when it only weakens the host by feeding on bark and roots, which reduces tree health and prevents the wounds from healing. It is also a direct pest when it infests the central fruit part of some cultivars and can also be a pest during harvest, when the waxy cover of the insect focuses on the clothes of the pickers (Khan et al., 2015).

The studies published so far do not mention the presence of *E. lanigerum* in apple orchards in the Espírito Santo state. Thus, the objective of this paper was to report the occurrence of *E. lanigerum* in apple orchards in the Espírito Santo state.

II. MATERIAL AND METHODS

The survey of the occurrence of outbreaks of populations of *Eriosoma lanigerum* in apple tree culture was carried out from December 2018 to September 2019.

The collections were carried out in pioneer municipalities in the apple tree plantation in the Espírito Santo state, where the varieties Eva, Gala and Fuji were grown. The collections took place in the following localities: municipality of Santa Teresa, (Alto Caldeirão, 19°56'48.50"S, 40°46'18.18" W); municipality of Santa Maria de Jetibá (19°59'25.33" S, 40°42'16.73" W); and municipality of Mantenedópolis (18°51'10.85"S, 41° 3'50.42" W) (Figure 1). Monthly Samples, in the stages of vegetative development and apple production, were realized.

Random collections were performed between the orchard planting lines. The presence of insects was notified by the striking characteristic of the colonies, which are coated with a downy wrap and white. The knots and swellings caused by insects feeding was also a feature used in notification. The collections were performed in all parts of the attacked plants as: trunk, new branches, roots, sprouts and fruits. All infested materials were placed in thermal boxes (44 cm x 25 cm x 37 cm) and sent to the Entomology department of the Núcleo de Desenvolvimento Científico e Tecnológico em Manejo de Pragas e Doenças (NUDEMAFI) of the Universidade Federal do Espírito Santo (UFES). In the laboratory, the materials were carefully placed in 70% alcohol for later identification.

III. RESULTS AND DISCUSSION

After analyzing the materials collected in the three municipalities, it was checked that all samples presented occurrence of *Eriosoma lanigerum*, which confirmed its presence in the Espírito Santo state (Figure 2).

The *E. lanigerum* is a hemimetable insect. Thus, it has the same eating habit for most of his life cycle. The feeding process of this insect induces gall formation along the root length. In the stem, the presence of galls and sap dripping creates attack opportunities of opportunistic fungi (Molinari, 1986; Brown et al., 1991; Heunis; Pringle, 2006). The *E. lanigerum*, for being a hemipter, has the potential to be a vector of some culture-damaging virus. However, it is noteworthy that so far none viruses that harm the apple tree are linked to *E. lanigerum* (Blackman; Eastop, 1994).

The *E. lanigerum* attacks various tree species in the Rosaceae family. It is observed that in the places where it was introduced this species plague, it has a preference for apple trees (Asante, 1994). However, attacks on some other plants in the family can be found.

One of the ways of management of *E. lanigerum*, is the biological control with *Aphelinus mali* (Hald.) (Hymenoptera: Encyrtidae), that parasitizes all development stages of the pest, with preference for third instar nymphs (Muller et al., 1992). The parasitism rate of *A. mali* in the host under study show results above 80%, even at low population density, which demonstrates the harm reduction caused by the plague with the use of the parasitoid (Thakur; Dorga, 1980; Tejada; Rumayor, 1986; Shaw et al., 1996).

In the Espírito Santo state, the introduction of exotic species as: *Duponchelia fovealis* Zeller, 1847 (Lepidoptera: Crambidae); *Helicoverpa armigera* Hübner (Lepidoptera: Noctuidae) and *Daktulosphaira vitifoliae* (Fitch, 1856) (Hemiptera: Phylloxeridae) - was reported by other works, who claimed that these pests have caused great damage to state of the Espírito Santo agriculture (Fornazier et al., 2011; Pratissoli et al., 2015; Madalon et al., 2018). Faced with such fact, the report of the finding of the *E. lanigerum* in capixaba territory is of paramount importance, since the farmers are aware of the negative impacts of the infestation on apple tree productivity by this species, just as farmers adopt management practices to minimize future losses.

IV. FIGURES AND TABLES

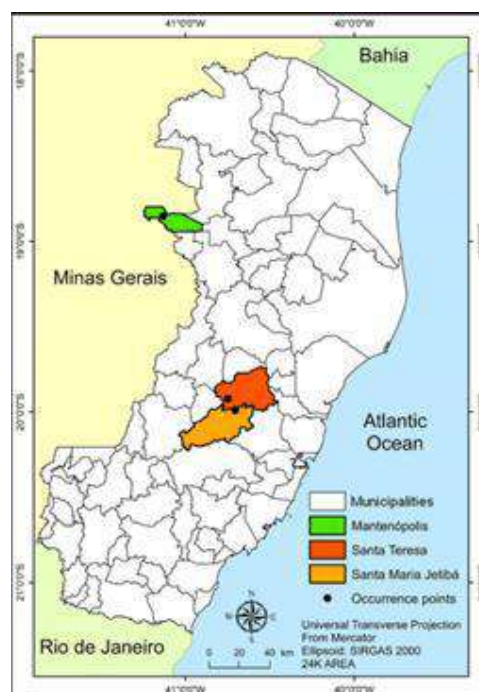


Fig. 1: Municipalities from the Espírito Santo state in which the survey of the occurrence of *Eriosoma lanigerum* was performed.

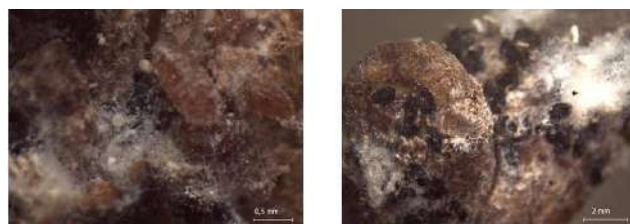


Fig.2. *Eriosoma lanigerum* in apple (left). Swelling caused by *Eriosoma lanigerum* (right).

V. CONCLUSION

All samples showed the occurrence of *Eriosoma lanigerum*, which confirmed its presence in Espírito Santo.

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Need or Altruism: A Study about Ticketing and Staying in the volunteering of the Child Cancer Institute

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Abstract— Volunteer work, in recent years, has been synonymous with citizenship and solidarity, receiving increasing prominence in organized society. Thus, in this article, motivational theories are raised to understand volunteering. This study focuses on volunteers who work at the Instituto do Câncer Infantil (ICI), a non-profit organization that serves children from all over the country. The study aims to identify the reasons for engagement, based on the following hypothesis: in critical situations, do people get involved in voluntary work out of necessity or altruism? The research is exploratory in nature, using the questionnaire technique and, through quantitative analysis, seeks to answer the hypothesis, identifying the reasons for volunteering at ICI. Among the most relevant results of the survey, it was shown that 75.00% of volunteers understand that voluntary work is not something that can be done for their own benefit. It can be seen that 95.00% of these feel the importance of their own volunteer work. It is also noted that 60.00% of the volunteers said that there are personal reasons for exercising voluntary work. And when asked, it is gratifying to see people's satisfaction with their voluntary work, 90.00% said yes.

Keywords— Volunteer work. Motivation. Childhood cancer.

I. INTRODUCTION

The study on voluntary work has been developing widely in recent decades. Living and coexisting with the world has always been challenging in any of the centuries, which is no different in the current context. Complexity and the age of uncertainty are indelible marks. On the one hand, it is possible to perceive daily changes that are imposed by the rapid and uncontrollable advances of scientific circles. On the other hand, due to the so-called spotlight society, organizations are more demanding in matters of ethics and transparency. Thus, child or semi-slave labor is openly discussed, the fight against drug trafficking, the increase in urban violence and many other ailments that, strictly speaking, reflect social inequalities. In this scenario, a new social actor seems to emerge with force: the volunteer.

According to Cimino *et al* (2018), volunteering apparently moves by several factors and has played an important role in building a society that aims at the well-being of all its members, especially those who are in a situation of social vulnerability. To the extent that social

responsibility is an imposition of the new times, it is worth questioning what motivations lead people to engage in voluntary work (CAVALCANTE, 2012).

Currently, volunteering is a necessity for socially responsible organizations and is part of the concept of corporate sustainability. Among the various voluntary institutions that operate in Brazil, one that benefits from this is the Instituto do Câncer Infantil (ICI), the object of the present study.

ICI is one of the largest Latin American institutions in the fight against childhood cancer. It is characterized as a non-profit organization that, since 1990, offers free treatment to hundreds of patients and acts as a research center for the cure of childhood cancer, surpassing the average of 70% of cases. The treatments are carried out at the Hospital de Clínicas de Porto Alegre (HCPA) and, since its foundation, have already exceeded the number of 20,000 services, including, in 2018, the institute provided 3,438 services (INSTITUTO DO CÂNCER INFANTIL, 2019).

This article, by its nature, according to Cervo, Bervian and Da Silva (2007), has in exploratory research, in general, the first step towards the development of the process of raising significant hypotheses. Therefore, this study seeks to answer what motivations are underlying in voluntary activity, based on the hypothesis that there are either particular needs or altruism of people.

Volunteering, in this article, deals with work in extreme situations, since it refers to the treatment of children with cancer - often in a terminal state - that is, situations that tend to cause great emotional weight. In order to achieve the objectives, this article was organized as follows: initially it will deal with the theoretical framework, addressing the origin of voluntary work and motivational theories. Soon after, the methodology will be presented, followed by data analysis and considerations taken from that study.

II. THEORETICAL FRAMEWORK

In this chapter the basic concepts of volunteering and the correlation with the theories that support this article will be presented, one of which is the psychoanalytic motivational theory and the other of the behavioral line.

It appears that, for various reasons, people are engaging with greater intensity in voluntary work. According to Cimino *et al* (2018) and Machado Filho (2011), the practice of volunteering is one of the alternatives for personal and professional development and training, in addition to making people citizens of solidarity and responsible for the common good. Particularly, it is noticed that young people tend to show greater enthusiasm and engagement in voluntary actions.

2.1 VOLUNTEER WORK

Volunteer is any individual who, in a free, disinterested and responsible manner, commits himself, according to his aptitudes and in his free time, to develop voluntary actions on behalf of individuals, families and the community, in need of help in various areas. areas of their lives (FLORES; DIAS, 2009). The volunteer is an idealist, someone who wants nothing concrete or material for himself. According to Cimino *et al* (2018), the aspirations of a volunteer are generally in relation to the next: the satisfaction of contributing to the reduction of suffering or injustice; the realization of bringing joy or contributing to the self-sufficiency of others; feel like an agent that builds your community and work to build a future that coincides with your personal vision and your individual values (CAVALCANTE, 2012).

To act as a volunteer is to have an ideal in doing good, which in a relationship of solidarity is translated into gratuity in the exercise of the activity, providing unpaid services for the benefit of the community. Voluntary action, as stated by Camargo (2002) can only be an informal help to the neighbor, a colleague, an effort to consolidate the community spirit, formal help (through organized social services) and or an opportunity for changes social. And, Flores and Dias (2009) state that the volunteer is an agent of transformation and does not conform to social exclusion, which encompasses many constraints, humiliations, deprivations, unemployment, hunger and homelessness.

However, Perez (2002, p. 47) states that "saying the relationship between volunteering and social changes supposes highlighting the place of civil society actions in a process of change that seeks to bring about social justice and citizenship for all". In Cavalcante's (2012) view, the role of volunteers in institutions needs to be analyzed the scenario, that is, it must be carefully prepared: it is necessary to realize that institutions have history, culture, dynamics and teams that already develop their work.

According to Cimino *et al* (2018), a volunteer is the person who donates his work, his potential and talents in a role that gratifies him in favor of carrying out an action of a social nature. For this reason, being a volunteer "is not just a hobby", or even the action of those who have no other occupation. But yes, "being a volunteer is an ideal of life and involves all dimensions of the human being" (MEISTER, 2003, p. 119).

These people who dedicate themselves to acting voluntarily are ordinary people who need to incorporate a profile focused on the social cause. According to Camargo (2002), "[...], they can work directly with the beneficiaries or work in the administrative areas of the entities, without relating to the target audience".

Availability, empathy, flexibility and responsibility are just a few issues that organizations look for in the volunteer. It is observed, then, that this also constitutes the expected profile of a volunteer candidate when defining competencies, skills and attitudes necessary to work in the Voluntary Service. Therefore, with a view to the future, volunteering must endeavor to keep its own specificity alive within the third sector, preserving ethics and essential goals (humanization, generosity, empathy, personalization, values, etc.) (FLORES; DIAS, 2009).

Many nonprofit organizations still say, "We don't pay volunteers, so we can't demand anything from them ..." Today, a change in attitude is necessary: "Volunteers need to obtain much more satisfaction from their achievements,

precisely because they receive no remuneration". The constant transformation of the volunteer - from well-intentioned amateur to unpaid team member, professional and trained - is the most significant progress in the non-profit sector (CAMARGO, 2002, p.121).

Many volunteers discover other potentials and develop new skills when working outside the company. From this perspective, the decision to work on a voluntary basis has had a decisive impact on the lives of many people, both as volunteers and those who live, especially in poor communities. Managing these people implies having the dimension that the management of human resources has the mission of selecting, training and retaining human talents necessary for the survival, growth and prosperity of organizations. Through these satisfied people who meet the requirements of competences, skills and attitudes necessary for each business, it is possible to guarantee competitiveness and continuity of activities with excellence.

2.1.1 VOLUNTEERING AND THE THIRD SECTOR

According to Binotto *et al* (2016) voluntary work has grown in Brazil and in other developing countries based on its solidarity, in the sense that this process goes through a personal initiative in favor of a community. The basis of the Third Sector's action is volunteering. The expression "volunteering" is often associated with the idea of altruism, solidarity, fraternity and selflessness.

Its execution is carried out not only by people who have better conditions and donate their time and resources to those who are not so favored, but also among equals. Thus, groups such as alcoholics anonymous, neighborhood communities, joint efforts, among others. In addition, together with the concept of volunteering, numerous initiatives originating from both organized civil society and the business field were built (TEODÓSIO; BRUM, 2006; BONFIM, 2010).

According to Dohme (2001) and Binotto *et al* (2016), the volunteer is well informed, participative, questioner, wants to perform his activities in the best possible way. As for the observance of the motivations of volunteering, the issue of donation needs a particular focus, in order to understand the process of exchanging this activity.

According to Bonfim (2010), volunteers are linked to the differential that the Third Sector offers in order to make possible the union of the need to work with the realization of a "citizen life project". The Third Sector also sought to improve itself, aiming at its insertion in this modernized market, becoming a reference with regard to issues related to social responsibility, through the

implementation of new forms of management (DIAS, 2012). The third sector has not become a fad, but has established itself as a new concept of relationship between organizations and society, which highlights the relevance of this sector within communities.

From the understanding of the concept of the third sector, it is possible to verify the importance of its segments and their development in the social context. The definition of the third sector emerged in the first half of the 20th century, in the United States. According to Bonfim (2010), the third sector "would be a mixture of the two classic economic sectors of society: the public, represented by the State, and the private, represented by the entrepreneur in general".

According to Dias (2012), the third sector is characterized by being a set of organizations and private initiatives that aim at the production of public non-profit goods and services. This statement does not mean that this sector does not work with funds and profits. However, their profits are not for the benefit of the founders and creators, but for the main objective of the organization to exist, which would, in the view of Meister (2003), patients, families and children.

Regarding their form of action, the authors Binotto *et al* (2016), say that the third sector integrates the continuity of the actions previously carried out by religious institutions and even today it is prolonged by the action of the different segments of the third sector: NGOs, foundations and non-profit associations (MEISTER, 2003).

2.2 MOTIVATIONAL THEORIES

For the purposes of this article, human motivation will be explained, first, through psychoanalysis, which had Freud as its precursor. When referring to Freud, Da Costa (2011) says that he was "the first to affirm that human nature is driven by a set of internal forces and that his actions are motivated by factors that are not always rational or accessible to consciousness". Therefore, he would have been the first to consider that human motivations are not necessarily conscious (DA COSTA, 2011, p. 22). Ferrari (2010), referring to these motivations, points out that one must think about the actions that lead people to work voluntarily for other human beings. He asks, in such actions, what unconscious motivations are at stake and whether they will be useful and appropriate to those who receive it.

Cavalcante (2012) also points out that voluntary work can occur through the search for something lost, defined in different ways by individuals and groups. It could be time wasted on organizations that have not given them space for something more rewarding; it could be the

desire to live and contribute to the community; or even, the return to forgotten values - hypotheses that require more in-depth analysis to prove them.

Ferrari (2010) says that Birman:

[...] when analyzing the malaise nowadays, he relates the helplessness produced by modernity as a consequence of the rupture with the references of traditional society, with the masochistic and perverse constructions, complementary subjective positions easily evident in our society. (FERRARI, 2010, p. 102).

In masochism, the subject blindly offers himself to the other because he cannot bear to live the anguish of helplessness. The other, although cruel, provides protection against pain and loneliness. Therefore, it can be understood that voluntary movements circulate in a society that has lost its references and has not yet found a substitute to deal with its helplessness. In this way, masochism and perversion can be found in a care relationship (FERRARI, 2010).

Anyway, the great challenge for the volunteer, in his caregiving role, is to break both omnipotence and narcissistic bonds. In addition, he needs to endure the helplessness that will confront him in that relationship, which will refer to his primordial helplessness, painful to be reissued. Such an experience, which is not easy to do, occurs because, in general, volunteers are people who do not have a personal analytical experience (FERRARI, 2010; CAVALCANTE, 2012).

From the perspective of humanism, emphasis will be placed on David McClelland's theory of needs. This, according to Costa (2011), identified that there are three needs that can be acquired socially: power, affiliation and fulfillment. It is through these that, in some way, the individual's behavior at work manifests itself, either negatively or positively, according to the requirements of the position, culture and organizational climate.

The need for power is one in which the individual seeks in some way to exert influence over other people. Affiliation is the imperative to belong and be accepted by the group and to establish social relationships. In people with this need, the perception of feelings, problems and motivations will be more acute. Therefore, they may find it easier to perform functions in which social contact occurs more frequently (CAVALCANTE, 2012).

Already need for achievement deals with the individual's precision in reaching certain goals. According to McClelland, analyzed by Costa (2011), this has its

origins in Protestant ethics, which emphasizes the performance of people in their work. The individual is accomplished in what he does and not for the possible rewards. The need for achievement starts from the hypothesis that people establish a standard of excellence for themselves and, in this sense, are voracious in their performance (COSTA, 2011).

Many volunteers discover other potentials and develop new skills when working outside the company. From this perspective, the decision to work on a voluntary basis has had a decisive impact on the lives of many people - whether volunteers or those who, in one way or another, use their services. In the case of the Instituto do Câncer Infantil, volunteering often occurs for two reasons: personal need (caring for and being close to a loved one) or altruism (love of neighbor).

III. METHODOLOGY

3.1 INTRODUCING THE OBJECT OF STUDY

The sample, in this work, was of non-probabilistic approach for convenience (MALHOTRA, 2012), being applied a questionnaire with dichotomous questions - also called answer between two options: yes and no. The data were quantified in order to obtain frequencies and percentages. The type of research is descriptive, as its purpose is to observe, record, analyze and correlate facts or phenomena. (CERVO, BERVIAN, DA SILVA, 2007). In this phase of the research, questionnaires were applied, which had a structured script, being applied in the months of August and September 2018. The questionnaires were sent by email to the interviewees. Of the 90 (ninety) questionnaires sent, there was a return of 40 (forty) questionnaires. These were applied only to the volunteer public who work at the Instituto do Câncer infantil. This group of chosen volunteers is directly involved with ICI's relatives and patients in various sectors, such as the family assistance center, visitations and festive and recreational activities.

IV. DATA ANALYSIS

In the analysis of the data, the statistical treatment of the data was performed with a computational resource of the *Statistical Package for the Social Sciences* (SPSS). Because the research has a quantitative approach, it facilitated and enabled the use of descriptive and inferential statistical techniques. According to Cooper and Schindler (2011), the quantitative approach allows the precise measurement of something, considered the most important in this regard. The quantitative analysis of the results made it possible to carry out some analyzes and

extract lessons. The results were presented in tables, which allowed an accurate descriptive statistical analysis of the results that were obtained.

4.1 SAMPLE PROFILE

Based on the responses to the questionnaires applied, the following characteristics were identified regarding the profile of the volunteers, as shown in tables one to five.

Table 1: Regarding the gender, gender.

Responses	Researched	Relative Frequency
Female	35	87.50%
Male	5	12.50%
Total	40	100.00%

Source: Prepared by the authors.

With regard to gender, it is observed that the respondents who responded to the survey are represented by 87.50% females and 12.5% males, as illustrated by (Table 1). According to the authors Cimino *et al* (2018), volunteer work begins to have more visibility in Brazil, after the 20th century, from the need for support to the most needy people, especially in relation to the epidemics of various diseases that affected the most vulnerable population. needy. And, at the beginning, this volunteer work was carried out by the female gender, who were mostly ladies of society, who had their participation linked to Catholic clubs and churches.

Table 2: Regarding marital status

Answers	Researched	Relative Frequency
Married	15	37.50%
Divorced	1	2.50%
Others	3	7.50%
Separated	3	7.50%
Single	18	45.00%
Total	40	100.00%

Source: Developed by the authors .

Table 2 shows that, regarding marital status, 45% are single, 37.5% are married, 7.5% are separated and 2.5% are divorced.

Table 3: Regarding the age group

Answers	Researched	Relative Frequency
From 18 to 25 years old	9	22.50%
From 26 to 35 years old	9	22.50%
From 36 to 50 years old	9	22.50%

Over 51 years old	13	32.50%
Total	40	100.00%

Source: Prepared by the authors.

With reference to the age group, it can be seen, in Table 3, that 32.50% of the volunteers are in the age group above 51 years. Followed by 22.50% representing the other age groups (Table 3). Stresses Nogueira-Martins *et al* (2010), through a study carried out in public hospitals, this factor of ages above 50 years is due to the maturity and experiences they have accumulated throughout their lives, a fact that would trigger greater importance voluntary service.

Table 4: Level of education

Answers	Researched	Relative Frequency
Fundamental	2	5.00%
Medium	15	37.50%
Higher	13	32.50%
Postgraduate	10	25.00%
Master's	0	0.00%
Doctoral	0	0.00%
Total	40	100, 00%

Source: Prepared by the authors.

As for the level of education, it is observed that 37.5% have completed high school, followed by higher education, with 32.50%, post-graduation, with 25% and elementary education, with 5% (Table 4).

Table 5: Volunteer time

Answers	Researched	Relative Frequency
Up to 1 year	16	40.00%
Between 2 to 3 years	9	22.50%
Between 4 to 6 years	5	12.50%
Over 7 years	10	25.00%
Total	40	100 , 00%

Source: Prepared by the authors.

With regard to volunteering time, it was found that 40% have up to one year, followed by 25% who have worked for more than seven years, 12.5% who work between four and six years and 22% who work between two to three years, according to (Table 5).

Ferrari (2010) in his studies points out that there is a tendency to abandon voluntary action after a period of involvement. In other words, this data is one of the most

relevant data for the research, because it speaks of the wear and tear, of the discredit of people with the ability to change things. What comes up against the speech of Cimino *et al* (2018), when he says that it is understandable, in voluntary work, especially in these areas of health, which interfere a lot with the emotional, tends to become heavy.

4.2 REASONS FOR ENGAGING IN VOLUNTEER WORK

Based on the responses to the questionnaires, the reasons for involvement / engagement in volunteer work were identified.

Table 6: Do I clearly feel the importance of my work as a volunteer?

Responses	Researched	Relative Frequency
Yes	38	95.00%
No	2	5.00%
Total	40	100.00%

Source: Prepared by the authors.

It is noticed that 95% of the interviewees feel the importance of their voluntary work (Table 6). According to Ferrari (2010), psychoanalysis helps us to think that these people expect to be involved emotionally by their object of care, to be loved and recognized for their dedication. If this does not occur or takes time to be demonstrated, the tendency is to emerge hostile feelings towards the latter, in a defensive psychic movement, which can lead to the abandonment of the volunteer.

Table 7: I am practically not evaluated for what I do in my volunteer work?

Responses	Researched	Relative Frequency
Yes	31	77.50%
No	7	17.50%
Total	40	100.00%

Source: Prepared by the authors.

Table 7 shows that voluntary work for 77.5% of respondents does not receive formal or even informal assessment.

Table 8: Is the integration among the volunteers satisfactory?

Responses	Researched	Relative Frequency
Yes	36	90.00%
No	4	10.00%
Total	40	100.00%

Source: Prepared by the authors.

In the integration factor, it appears that for 90% it occurs among volunteers, as shown in (Table 8). Language, communication and meanings are central to understanding the symbolic universe in which human beings are inserted and with which they have the potential to identify and engage (DA COSTA, 2011).

For Costa (2011), affiliation is a motivational factor that impacts individuals, which may explain the permanence in the work of many volunteers.

Table 9: Do I realize that many volunteers are not committed to the cause?

Responses	Researched	Relative Frequency
Yes	18	45.00%
No	22	55.00%
Total	40	100.00%

Source: Prepared by the authors.

As for commitment, table 9 reports that 55% of the interviewed volunteers perceive that the other volunteers are not committed to the cause and 45% say that there is commitment. Although there is a very small division of opinion, according to Ferrari (2010), the key to deciphering this perception may lie in the unconscious functioning of conflicts and ambiguities.

Table 10: Is the number of new friends that I can win important in volunteering?

Responses	Researched	Relative Frequency
Yes	4	10.00%
No	36	90.00%
Total	40	100.00%

Source: Prepared by the authors.

In the friendship factor, table 10 shows that 90% understand that voluntary work has another meaning in their lives.

Table 11: When volunteering, can I exercise leadership and command over people and work?

Responses	Researched	Relative Frequency
Yes	16	40.00%
No	24	60.00%
Total	40	100.00%

Source: Prepared by the authors.

Table 11 identifies that 60% of respondents say they do not exercise leadership and command.

Table 12: Do you feel the satisfaction of people and family members with your work?

Responses	Researched	Relative Frequency
Yes	36	90.00%
No	4	10.00%
Total	40	100.00%

Source: Prepared by the authors.

As for the satisfaction aspect, table 12 shows that 90% of the interviewees denote receiving recognition and satisfaction from family members. The desire to be recognized is inherent to human beings, since compliments tend to profoundly affect our unconscious (DA COSTA, 2011).

Table 13: Would you like to be more required in voluntary work?

Responses	Researched	Relative Frequency
Yes	23	57.50%
No	17	42.50%
Total	40	100.00%

Source: Prepared by the authors.

In terms of demand, 57.50% revealed that they would like to be able to better exploit their potential and 42.50% stated that they would not like to be demanded (Table 13). It can thus be inferred that there are volunteers who carry out the work within their time and / or skills limitations and others who seek greater responsibilities (CIMINO *et al*, 2018).

Table 14: Is it common to see volunteers who do the work routinely and mechanically?

Responses	Researched	Relative Frequency
Yes	19	47.50%
No	21	52.50%
Total	40	100.00%

Source: Prepared by the authors.

It can be seen in Table 14 that 47.50% of the interviewees said that it is common to see volunteers who do the work in a routine and mechanical way. While, 52.50% understand that they do not.

V. FINAL CONSIDERATIONS

This study aimed to identify the reasons why people get involved or engage in volunteering. According to motivational theories, it was realized that the nature of human motivation is complex and that narcissism is important in self-care. However, the exclusiveness of the

narcissistic axis tends to compromise civilized life. The motivations present in volunteering actions can be altruistic or selfish. Psychoanalysis could not go unnoticed in the face of a movement that grows every day, as is the voluntary movement (FERRARI, 2010).

In this research it was observed that there is no formula for motivation and commitment. Human motivation is a subject widely studied in several areas of knowledge, especially when related to monetary factors and the professional environment. Even so, little can be found about the motivation for voluntary work. The theoretical review allows us to suppose that several factors can be considered motivators of voluntary work, including recognition and love for others.

According to the research result, it was shown that the sample profile was 87.50% females and 12.50% males. Also, the marital status of these interviewees is as follows: 45.00% single, and, because they have no family, it is possible that they have more time to exercise volunteering. It is also observed that 37.50% of these interviewees are married. The predominant age was 32.50%, who said they were over 51 years old. Regarding the level of education, 37.50% of them have high school, 32.50% have higher education and 25.00% have a graduate degree.

Regarding the time of volunteering, 40% of the volunteers who responded to this survey are linked to the ICI for one year, over 7 years; a percentage of 25.00% is added and, between 2 to 3 years, totaled a percentage of 22.50%.

The reasons for engaging in voluntary work that appeared in the survey were as follows: it is clear that volunteers feel important and integrated in ICI and that the preference for the majority is to have the freedom to choose what to do. 95.00% of respondents feel the importance of their own volunteer work. Regarding the integration factor, it was found in the survey that for the vast majority, that is, 90,00% of the interviewees said that the integration is satisfactory. Repeating the same percentage, 90,00% of the interviewees show recognition and satisfaction on the part of family members.

It is also noted that in terms of requirements, the interviewees said, in a percentage of 57,50%, that they would like to be able to better exploit their potential and 42,50%, said that they would not like to be required in the voluntary actions they develop. And finally, the theme of this article was chosen because of its relevance in the current context, since like any organization, ICI needs to have talented, motivated and productive people and, above all, with a voluntary spirit. It is hoped that this study can be

complemented with new research and that it will contribute to ICI in attracting and retaining its volunteers.

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Geotechnical properties of soil reinforced with Shredded Plastic Bottle

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Abstract— The rate at which plastic waste is generated yearly is alarming and proper disposal poses a serious problem. Particularly, recycling ratio of the plastic wastes in life and industry is low and many of them have been reclaimed for the reason of unsuitable ones for incineration. It is necessary to utilize the wastes effectively with technical development in each field.

This study presents a simple way of recycling plastic waste in the field of civil engineering as reinforcing material. Reinforcing of soil in construction is an efficient and reliable technique for improving the strength and stability of soils. The technique is used in a variety of applications, ranging from retaining structures and embankments to subgrade stabilization beneath footings and pavements.

This research experimentally studied the influence of shredded plastic waste on two types of soil (clayey soil and sandy soil) at different mixing ratios (0, 5, 10 & 15)% by weight respectively. For the two types of soils, a series of compaction tests were performed on soil samples mixed with different percentages of waste pieces to determine the maximum dry density (MDD) and optimum moisture content (OMC). In addition, the reinforced samples were investigated by the CBR test to determine its strength, the CBR values at (0, 5, 10 and 15)% were (2.07, 3.08, 3.90 and 5.13)% for clay soil and (32.7, 41.4, 53.94 and 59.88)% for sandy soil respectively.

It was found that, there is significant improvement in the strength of soils due to increase in the percentage of the plastic waste. The percentage of increase in the strength for sandy soil is slightly more than that in clayey soil. Also, it was concluded that the plastic pieces decrease the maximum dry density of the soil due to their low specific gravity and decrease the optimum moisture content.

It can therefore be concluded that plastic waste is a promising soil reinforcement.

Keywords— soil reinforcement, plastic waste, compaction, CBR.

I. INTRODUCTION

The Properties of a soil are very uncertain when it is subjected to variable moisture. It shows huge volumetric change when exposed to dry and wet conditions. These changes create challenges for civil and geotechnical engineers doing work on site specially while constructing foundations either for structural or pavement designs. There are many available methods used to improve the volumetric changes, bearing capacity and reduce the settlement of such soils. One of these methods is using reinforcement. Reinforced soil is a construction material that consists of soil fill strengthened by a variety of tensile inclusions ranging from low-modulus, polymeric materials to relatively stiff, high-strength metallic inclusions. These tensile inclusions come in many forms ranging from strips and grids to discrete fibers and woven

and non-woven fabrics. The soil and reinforcing element will interact by means of frictional resistance. Appropriate selection of the type and location of the reinforcement material is necessary in order to achieve optimum improvement. (Maha Hatem Nsaif, 2013)

Synthetic fibres are made from synthesized polymers of small molecules. The compounds that are used to make these fibers come from raw materials such as petroleum based chemicals or petrochemicals. These materials are polymerized into a long, linear chemical that bond two adjacent carbon atoms. Differing chemical compounds will be used to produce different types of synthetic fibers.

Plastic waste classification

Plastics waste is of two types:

- Pre-use plastic (production scrap)

- Post-use plastic

pre-use plastic

That plastic which does not fulfil the desired requirement during casting and assembly i.e. material that has the mismatching colour, undesirable hardness, or wrong processing characteristics are called Pre-use plastic waste. This material is easy to use for other applications and has the property to get recycled. Pre-use plastic waste is the ultimate source of plastics which are suitable for reprocessing from manufacturers of plastic products. Processing of Pre-used plastic is less as compared to post-use hence Pre-use is more valuable than Post-use plastic.

post-use plastic

Post-use plastic waste suitable for recycling generally falls into one of five main categories:

- Plastic bottles, pots, tubs and trays
- Plastic film
- Rigid plastics, such as crates, pipes and moldings
- Plastic foams, such as expanded polystyrene (EPS)

Flexible plastics, such as strapping and cable sheathing

II. LITERATURE REVIEW

Dr. A.I. Dhatrik et al in 2015 after reviewing performance of plastic waste mixed soil as a geotechnical material observed that for construction of flexible pavement to improve the sub grade soil of pavement using waste plastic bottles chips is an alternative method. In his paper a series of experiments are done on soil mixed with different percentage of plastic (0.5%, 1%, 1.5%, 2 % & 2.5%) to calculate CBR. on the basis of experiments that he concluded using plastic waste strips will improve the soil strength and can be used as sub grade. It is economical and eco-friendly method to dispose waste plastic because there is scarcity of good quality soil for embankments and fills.

Akshat Malhotra and Hadi Ghasemian et al in 2014 studied the effect of HDPE plastic waste on the UCS of soil. In a proportion of 1.5%, 3%, 4.5% and 6% of the weight of dry soil, HDPE plastic (40 micron) waste was added. They concluded that the UCS of black cotton soil increased on addition of plastic waste. When 4.5 % plastic waste mixed with soil strength obtained was 287.32kN/m² which is maximum because for natural soil it was 71.35kN/m².

III. MATERIALS AND METHODS

3.1 Soil sample

1. **Expansive (clay) soil (sample A):** 35kg of representative soil sample was collected from a borrow pit at Fasola – Apapa Road, Moniya, Oyo State, Nigeria; with sample depth of above 1m; Sample was collected and carefully labeled for easy identification. The soil sample employed in this work was a disturbed sample due to mechanical actions.
2. **Loose (sandy) soil (sample B):** 35kg of soil was collected from at The Polytechnic Ibadan (South Campus), Oyo State, Nigeria; with sample depth of above 0.2m; Sample was collected and carefully labeled for easy identification. The soil sample employed in this work was a disturbed sample due to mechanical actions

3.2 Plastic waste material

3. Plastic waste bottles were collected within The Polytechnic, Ibadan vicinity and were shredded to smaller sizes for the purpose of this project.

3.3 Laboratory Tests

Preliminary/ Classification Test

The tests carried out includes:

Natural water content determination: Naturally occurring soils usually contain water as part of their structure. The water content in such soil is referred to as moisture content, moisture content of a soil is assumed to be the amount/quantity of water within the pore space between the soil grains that is removable by oven drying at 105°– 110°C, expressed as a percentage of the mass of dry soil. Measurement of moisture content, both in natural state and under certain defined test conditions, can provide an extremely useful method of classifying cohesive soils and of assessing their engineering properties. The results are referred to as the index properties, or consistency limits.

Grain Size Analysis: This was done to analyse the soil particles according to their aggregate. Soil sample was poured into the Riffle box with the intention of getting an appreciable sample that would contain all particles present in the soil (a small sample that would contain different sizes of particles present in the soil. A handful of sample was collected into the crucible and kept in the oven at a temperature of 105°C for 24 hours so as to remove moisture content in the soil sample. The sample was weighed with the aid of weighing balance (weight of sample before sieving). Consequently, wet sieving was carried out on the sample. The sample was poured/soaked in a tray filled with water and was stirred, washed, sieved with sieve No.200 (75µm) under tap until water became

clean. This was done to remove clay/silt particles finer than sieve No.200. The particles retained in the sieve were collected into the crucible and oven dried for 24 hours to expel moisture present in the sample in preparatory for dry sieving. Dry sieving was accomplished by passing/pouring the particles through assemblage of sieves of various sizes. These sieves were shaken for some time so that each sieve could retain particles not finer than the sieve and the weight of particles retained in each sieve is determined, from where percentage retained and percentage passing were deduced.

Atterberg's limit: This was done to determine the liquid limit, plastic limit, Plastic Index and Shrinkage limit of soil. An appreciable sample of clay soil was poured in a mortar and was grinded with a rubber-headed pestle and also sieved using sieve No.36 (425µm) to separate the pebbles from the fines (pulverization process). Water was added to the fines on a wide glass, mixed thoroughly with the aid of spatula to obtain a paste that was subsequently wrapped with/in polythene nylon, and kept in a crucible for 24 hours so as to allow the paste to swell to its maximum capacity. Consequent upon this, water was added to the paste and mixed thoroughly with spatula. The paste was now placed in a brass cup on the Liquid limit device and levelled to a maximum depth. A long narrow cut (groove) was made along symmetrical axis on the cup. The cup was made to fall on a hard rubber base by turning the handle on the device. The number of blows that closed the groove was first noted between the ranges of 40 – 50 blows. At this point, a small sample or paste was collected along the symmetrical axis on the cup and kept in a can from where weights of wet sample and dry sample were known to determine the moisture content. More water was added and the number of blows that closed the groove was noted at ranges of 30 – 40 blows, 25 – 30 blows, 15 – 25 blows and 10 – 15 blows respectively, and samples were collected to determine their moisture contents. The more the volume of water added, the lesser the number of blows that would close the groove. The sample for shrinkage limit was collected when 18 – 22 blows closed the groove. The sample was used to fill shrinkage limit mould of 12.7cm long and kept in the oven for 24 hours so as to determine linear shrinkage in percentage.

$$\text{Linear shrinkage} = \frac{(P - P')}{P'} \times 100$$

Where P = Original length of mould

P' = New length of sample after oven drying.

The remaining 1/4 of the original soil sample mixed was used for the plastic limit test. The soil sample was further mixed with distilled water until a consistency was reached whereby the soil can be rolled without sticking to the hands. The soil was formed into an ellipsoidal mass, and then rolled between the palm/fingers and the glass plate.

Sufficient pressure was applied to the soil sample to roll the mass into a thread of uniform diameter by using about 90 strokes per minute. (A stroke is one complete motion of the hand forward and back to the starting position.) The thread formed by rolling the soil sample becomes deformed so that its diameter reaches 3.2 mm (1/8 in.). The portions of the crumbled thread were then gathered together and placed into moisture cans, then weighed before they were placed in the oven and allowed to dry for at least twenty (24) hours. The water content from each of the plastic limit moisture cans was calculated. The average of the water contents was used to determine the plastic limit, PL.

Engineering Test

Engineering tests carried out on the samples includes;

Compaction Test: The compaction test used for this research was carried out in accordance with the Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort. This was carried out to determine the Optimum Moisture Content (OMC) and Maximum Dry Density (MDD). Weights of cylindrical moulds were determined using weighing balance. The soil samples was divided into four different portions of about 6kg each. 100ml of water was added to the first portion and mixed thoroughly. Some parts of it were kept in two separate cans to determine weight of wet sample and weight of dry sample after spending 24 hours in the oven in order to know its moisture content. The first layer of a 3- layer cylindrical mould was filled with the sample and rammed 27 times with the aid of 4.5kg rammer. The same was done on the rest layers and rammed 27 times each. The weight of compacted wet sample was determined using weighing balance and wet density calculated thereof as shown in below. The same procedures were followed for remaining four portions but with increment of 100ml of water on each portion from the first 100ml. That is, 200ml, 300ml, 400ml and 500ml of water respectively.

$$\% \text{ MOISTURE} = \frac{\text{WEIGHT OF MOISTURE}}{\text{WEIGHT OF DRY SAMPLE}} \times 100$$

$$\text{DRY DENSITY} = \frac{\text{WET DENSITY} * 100}{\% \text{ MOISTURE CONTENT} + 100}$$

California bearing ratio (CBR): This was carried out to estimate the bearing capacity of the soil using the California Bearing Ratio (CBR) Machine. The dry soil mixed with the shredded plastic waste, water was added based on the OMC and then placed into the mould and compacted in 3- layers with the 4.5kg rammer of 27 blows. The compacted sample was placed on the California Bearing Ratio (CBR) machine. The proofing ring gauge and plunger

penetration gauge were set at zero. Immediately the plunger penetration made a contact with the soil, the gauges started working simultaneously and, the readings were taken on the proofing ring gauge at every 25 division on the plunger penetration gauge. The first 10 readings were referred to as first pointer and the 10th reading being the correct reading was adopted and multiplied with a multiplication factor of 0.18 while the last 10 readings were referred to as second pointer, and so also, the 20th reading was adopted and multiplied with a multiplication factor of 0.12. The test was done on both

top and bottom of the compacted wet soil. The higher of the two values was chosen as actual CBR. The average of the top and bottom was however the actual final CBR value.

IV. RESULTS AND DISCUSSION

4.1 Natural Moisture Content

Sample A retains more water than sample B given by the values 26% and 6% respectively. This shows that sample A contains more silty clay than sample B.

4.2 Particle Size Analysis

The particle size distribution analysis shows not only the range of particle sizes present in a soil but also the type of distribution of various size particles.

According to clause 6201 of Federal Ministry of Works and Housing (F.M.W & H) Specification Requirement, for a sample to be used as both subgrade/fill and base, the percentage by weight passing the No.200 sieve (75µm) shall be less than but not greater than 35%.

Sequel to the above, the sample A is not a good sample because percentages by weight passing sieve No. 200 exceed 35% requirement, while sample B is good sample because it does not exceed 35% requirement.

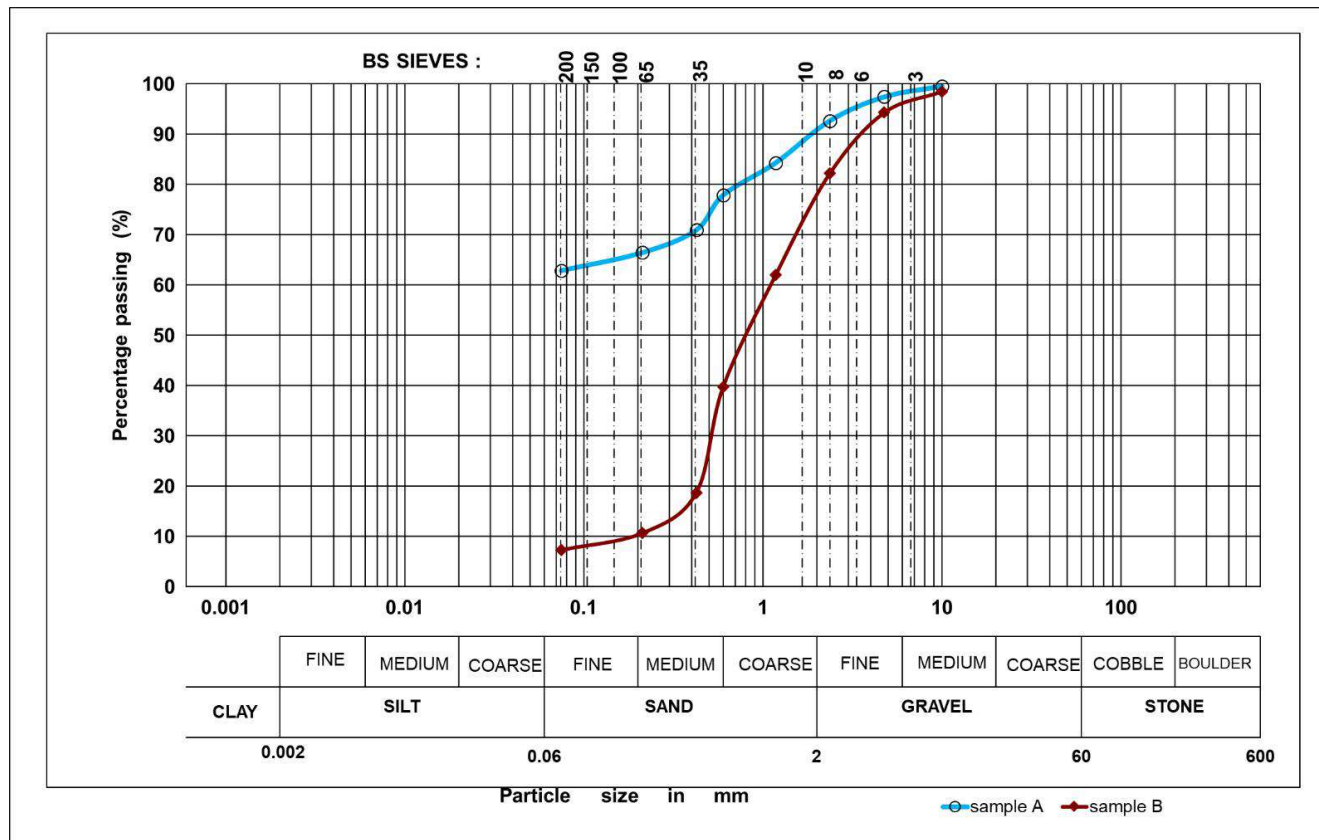


Fig 1: Particle size curve for sample A and B

4.3 Atterberg's limit

It is obvious from the results that sample A absorbs more water and swells on drying which is evident in the result of Linear Shrinkage and Plastic index. It can be said to be more clayey/plastic than subgrade samples.

According to Federal Ministry of Works and Housing (F.M.W & H) Specification Requirement in clauses 6201 and 6252, material passing the 425 μ m sieve shall have a liquid limit of not more than 35% and a Plastic Index (P.I) of not more than 12% as determined by American Society for Testing Materials Method.

In view of the above, subgrade samples are fit to be used in road construction since both their Liquid limits and

Plastic Index values do not exceed the stipulated values of 35% and 12% respectively. The base sample is not suitable for the purpose for which it was used, since it shows Liquid Limit and Plastic Index of 48% and 25% which do not fall within the stipulated values of 35% and 12% for Liquid Limit and Plastic Index respectively.

4.4 Compaction Test

The table and the figure below shows the result of the compaction test carried out in this project. The compact test helps in determining the Optimum Moisture Content (OMC) and the Maximum Dry Density (MDD).

Table 1: Compaction result for both soil samples

	1	2	3	4	5	6
CLAY SAMPLE						
Average moisture content %	9.81	14.33	15.83	19.28	23.18	25.43
Dry density (Mg/m ³)	1.34	1.36	1.46	1.58	1.58	1.50
SANDY SAMPLE						
Average moisture content %	6.57	10.40	13.22	16.36	19.84	22.36
Dry density (Mg/m ³)	1.75	1.79	1.83	1.85	1.83	1.76

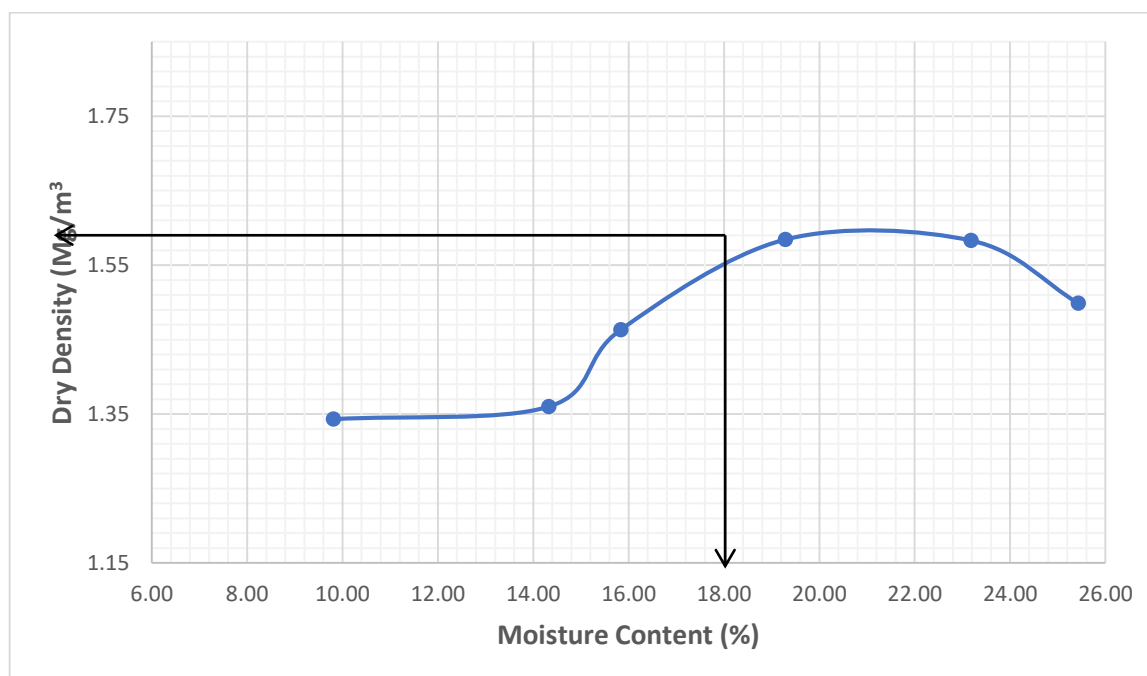


Fig.2: Graph of Dry density against Moisture Content for clayey Sample

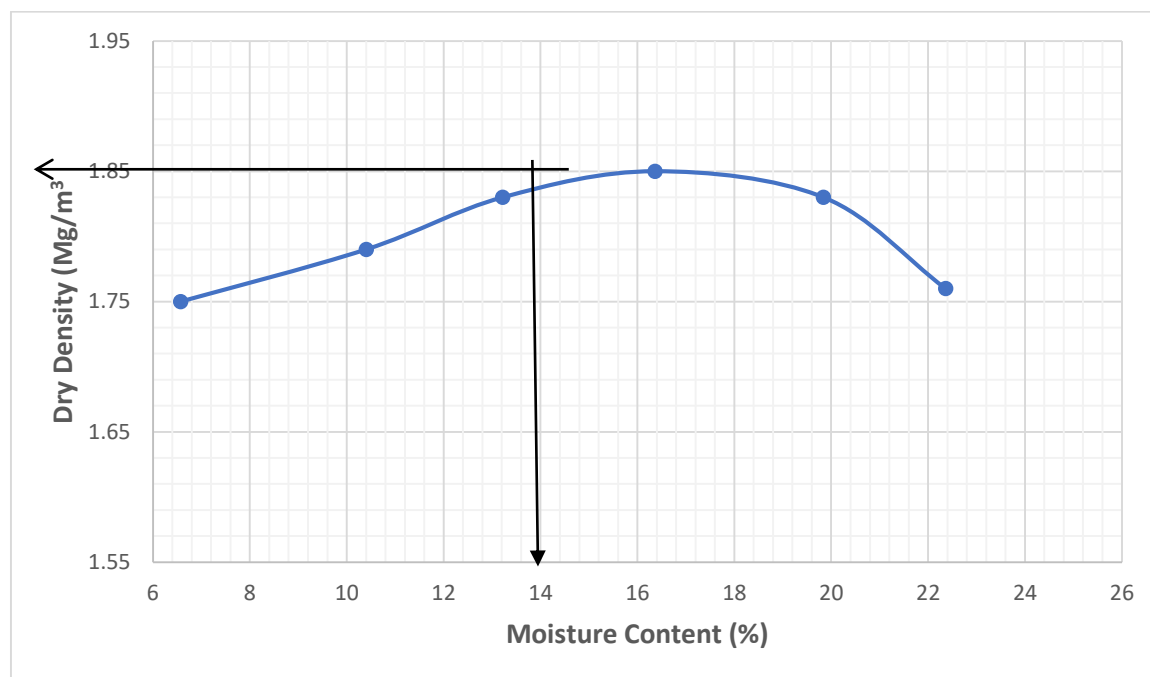


Fig.3: Graph of Dry density against Moisture Content for Sandy Sample

3.5 California bearing ratio (CBR)

According to clause 6201 of Federal Ministry of Works and Housing (F.M.W & H) Specification Requirement, the minimum strength of subgrade and sub-base material shall not be less than 20% and 50% un-soaked C.B.R respectively.

In light of the above, clay sample is a very poor subgrade material because it exhibits un-soaked CBR of 2.07% as control and (3.03, 3.90 and 5.13)% with the inclusion of

shredded plastic waste at (5, 10 and 15)% which is less than the stipulated 20%. The sandy sample is a very good subgrade and sub-base material because it exhibit un-soaked CBR value of 32.7% as control and (41.4%, 53.94 %,and 59.88%) with the inclusion of shredded plastic waste at (5, 10 and 15)% which is close to what is stipulated in the specification. Based on this, sandy sample is better than the clay sample as a subgrade and sub-base material for the construction of the road which is evident in their CBR values.

Table 2: CBR Value for both samples

Dosage of shredded plastic bottle (%)	clayey sample (%)	sandy sample (%)
0	2.07	32.7
5	3.03	41.4
10	3.90	53.94
15	5.13	59.88

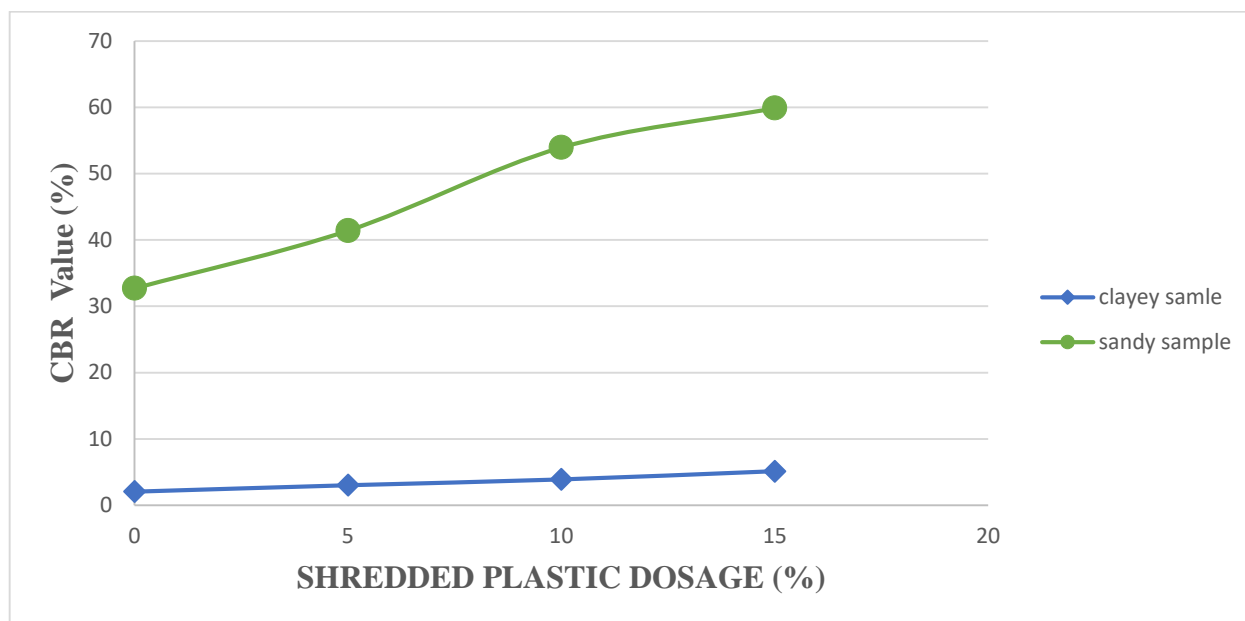


Fig.3: CBR Value against Shredded plastic Dosage for both sample

V. CONCLUSION

This research work examined the geotechnical properties of clayey and sandy soil reinforced with synthetic fibre {shredded plastic bottle}. The following were observed during the course of the practical aspect of the project:

1. The effect of plastic waste pieces on soil is influenced by various factors such as soil type and plastic waste content.
2. The addition of plastic pieces to the two types of soil increased the CBR values of both soil. However, significant increase was observed in CBR values of sandy soil.
3. The increment for clayey soil does not make it relevant in Engineering and Geotechnical world i.e for construction purpose based on the research result.
4. The plastic pieces decrease the maximum dry unit weight of the soil and optimum moisture content. The variation of optimum water content and maximum dry unit weight with plastic pieces content is linear.

VI. RECOMMENDATION

Based on the investigations of the study, the following recommendations are proffered;

1. It is recommended that shredded plastic material is a potential soil reinforcing material.
2. There is need to investigate more on the effect of higher percentage of plastic material on the

soil sample to determine optimum yield/performance.

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Application of Artificial Intelligence: A Review

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Abstract— Industry 4.0 is the modern demand and revolution to get more accuracy, desired shape, and quality with a less manpower in the industry by following advance technology like Artificial Intelligence (AI), Internet of Things (IoT). This rebellion was started from Germany and still continuing to get the modernized application of industry. Artificial Intelligence (Robot) is one of the advance applications in the modern industry. Nowadays, AI is a very popular field of science. Humans are using Artificial Intelligence in places where it is difficult and dangerous for a human to work. On the other hand, some people are trying to make Artificially Intelligent robots, which would be able to think like a human. Trying to replace the need for men, which is very dangerous because this act can result in the extinction of human civilization because Artificial Intelligence already has greater computational ability. This trying to make like a human or trying to imitate human's decision is also not accurate because human do not know how human thoughts work completely. Artificial Intelligence as technology has achieved many unthinkable developments, which is helping the human race to become more prosperous. However, it is affecting the morals and norms of humans also. People are becoming more dependent on AI. This paper aims to study various developments and achievements of Artificial Intelligence and discussed in the view of their positive and negative impacts on our life.

Keywords— Artificial Intelligence; Artificial neural network; Personal Computer; Artificial general knowledge.

I. INTRODUCTION

Artificial Intelligence is an intelligent machine or program, which can take decisions on its own by analyzing the circumstances, without human involvement. Major AI researchers and textbooks define this field as "the study and design of intelligent agents", in which an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success. John McCarthy, who coined the term in 1955, defines it as "the science and engineering of making intelligent machines" [1].

Artificial Intelligence has been a great tool for solving critical problems and for working in conditions and situations where the work is too dangerous for humans. For example, Repetitive works in many industries are injurious for humans to do with high speed. However, it is needed to be done and done faster to help the company's work. In this kind of conflicting situations, Artificial Intelligence is used [1,2]. Artificially Intelligent Robots can do the same repetitive work at very high speed without any accumulated stress. Similarly, if a human does the same work, then because of the repetitive movements human might become injured for a lifetime. His hands or legs might become paralyzed or his hearing ability might

decrease depending on the nature of work he does [3]. In some cases, the computational capability of Artificial Intelligence is used to aid humanity in various programs and services. Like various programs which run sequences and thus complete a process [4].

There are some effects of using this Artificial Intelligence. Since Artificial Intelligence is making things easier and doing some of our hard works, humans are relying more on Artificial Intelligence. Moreover, because of using Artificial Intelligence more there is less work opportunity for human. Since Artificial Intelligent Robots can do repetitive work with great speed and no fatigue which man cannot do in most cases, so Artificial Intelligence is preferred. Rather, this dependency on Artificial Intelligence is creating some unemployment [5,6].

1.1 Definition

Artificial Intelligent (AI) is a zone of software engineering that manages to enable machines to appear as like as human insight. It can be defined as the intensity of a machine to duplicate the intelligence of human conduct [7].

The expression AI (Artificial intelligence) was started at the 1956 Dartmouth meeting. The most part

acknowledged definition is the Turing test, first proposed in 1950, as the capacity of a machine conveying regular language over a teletype to an individual person to build a trust that it was a human. "AGI" or "Artificial General knowledge" stretches out this plan to expect machines to do everything that humans can do, for example, get pictures, explore a robot, perceive and react properly to outward appearances, recognize music kinds, etc [8].

Artificial Intelligence (AI) is the field inside software engineering that looks to disclose and to copy, through mechanical or computational procedures, a few or all parts of human intelligence. Included among these parts of intelligence is the capacity to connect with nature through tangible methods and the capacity to settle on choices in unanticipated conditions without human intercession [9]. Average regions of research in AI incorporate game playing, characteristic language realization and synthesis, PC vision, critical thinking, learning, and robotics [8, 9].

The above is a general depiction of the field; there is no endless supply of man-made consciousness, basically in light of the fact that there is little understanding regarding what comprises intelligence. Interpretation of being shrewd to differ, yet most can be ordered in one of three different ways. Intelligence can be thought of as a quality, a separately held property that is divisible from every single other property of the human individual [10]. Knowledge is additionally found in the capacities one performs, in activities or the capacity to do certain assignments. At long last, a few scientists consider intelligence to be a quality that must be obtained and showed through association with other intelligent beings. Every one of these understandings of knowledge has been utilized as the premise of a way to deal with creating PC programs with keen attributes.

II. BACKGROUND & IMPORTANCE AI

Artificial Intelligence has been used as a very useful tool in many cases. Starting from heavy industries, computational works, hospitals up to games and toys in every sector Artificial Intelligence has become a part and parcel. Some of the fields which use AI (Artificial Intelligence) are discussed below. Figure 1 shows the various application of AI.

2.1 Industries

In industries, AI agents are used very frequently nowadays. Most of the car manufacturing companies use robots extensively. Robots are used successfully in many situations where it is considered dangerous and degrading for human. Robots are also very expert at repetitive works

in which sudden lapse of concentration can cause damage and/or accidents [11].

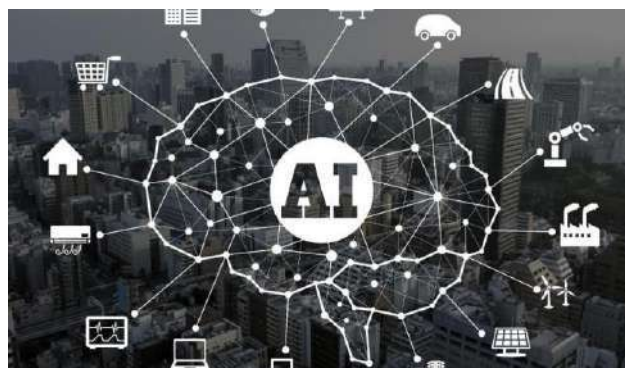


Fig. 1: Different applications of artificial intelligence [11]

2.2 Transportation

Fuzzy Logic controllers have been produced for programmed gearboxes in cars. For instance, the 2006 Audi TT, VW Toureg, and VW Caravell include the DSP transmission which uses Fuzzy Logic. Various Škoda variations (Škoda Fabia) additionally right now incorporate a Fuzzy Logic-based controller. Additionally, Google Car that is driven consequently with no driver is a miracle of AI use as of late [12, 13].

2.3 Finance

The use of AI in banking can be followed back to 1987 when the Security Pacific National Bank in USA set-up a Fraud Prevention Task power to counter the unapproved utilization of debit cards. Applications like Kasisito and Money stream are utilizing AI in budgetary administrations Banks utilize artificial intelligence frameworks to sort out tasks, put resources into stocks, and oversea properties. In August 2001, robots beat people in simulated money related exchanging competition [14].

Budgetary establishments have since quite a while ago utilized counterfeit neural system frameworks to identify charges or claims outside of the standard, hailing these for human inspection.

2.4 Hospital and Medicine

An MC can use the AI system to sort out bed plans, make a staff turn, and give therapeutic data and other significant undertakings. Artificial neural systems are utilized as clinical choice emotionally supportive networks for therapeutic analysis, for example, in Concept Processing technology in EMR programming software [15].

- Different shops in medication that can possibly be performed by AI include:

- Computer-helped elucidation of restorative pictures. Such frameworks help check computerized pictures, for example from processed tomography, for regular appearances and to feature prominent segments, for example, potential infections. A normal application is the identification of a tumor.
- Heart sound test
- Watson's task in where the utilization of AI in this field is Q/A program that proposes for specialists of cancer patients.

2.5 Online and Telephone Customer Service:

Artificial Network is actuated in computerized online associates that can be viewed as symbols on web pages. It can profit for endeavors to diminish their activity and preparing cost. A significant fundamental innovation in such frameworks is natural language preparation [16].

Comparable procedures might be utilized in answering mail of call focuses. For example, speech acknowledgment programming to enable PCs to deal with the first degree of client assistance, content mining and characteristic language preparing to permit better client taking care of, specialist preparing via programmed mining of best practices from past connections, bolster computerization and numerous different advancements to improve operator profitability and consumer loyalty.

Numerous media communications organizations utilize experimental inquiry in the administration of their workforces, for example, BT Group has sent heuristic pursuit in a booking application that gives the work routines of 20,000 engineers [17].

2.6 Music

The development of music has consistently been influenced by technology. With AI, researchers are attempting to cause the PC to copy the exercises of the adroit musician. Structure, execution, music theory, sound handling are a portion of the significant territories on which research in Music and Artificial Intelligence are centering. Among these endeavors, Melomics seems to go ahead by powering PC authors that figure out how to make the manner in which people do [18].

2.7 Aeronautics

The Air Operations Division (AOD) utilizes AI for the standard-based master frameworks. The AOD has a use for artificial intelligence for surrogate administrators for battle and preparing the system test, mission guides, emotionally supportive networks for strategic basic leadership, and post

handling of the test system information into symbolic gist's [19].

III. MERITS OF USING AI

Using Artificial Intelligence certainly has many merits. They are not corrupted like humans. They are not biased in their decisions. They are good at repetitive work. They are not lazy and certainly do not look for time to rest. They can be controlled better than humans in most cases. This acclaim for AI continues endlessly. An idealistic perspective on utilizing robotized vehicles can be considered. The positive effect of having intelligent vehicles would be massive. Consider the potential biological investment funds of utilizing interstates a great deal more productively as opposed to clearing over farmland. There is the wellbeing part of lessening the yearly road accident on the streets: it is assessed that 1.2 million individuals are killed, and in excess of 50 million are injured due to road accidents every year around the world [20]. Other than the subsequent decrease in accidents, there could be up to multiple times the traffic throughput. Old and disabled people would have the option to get around without anyone else. Individuals could dispatch their vehicles to the parking center self-sufficiently and afterward review them later.

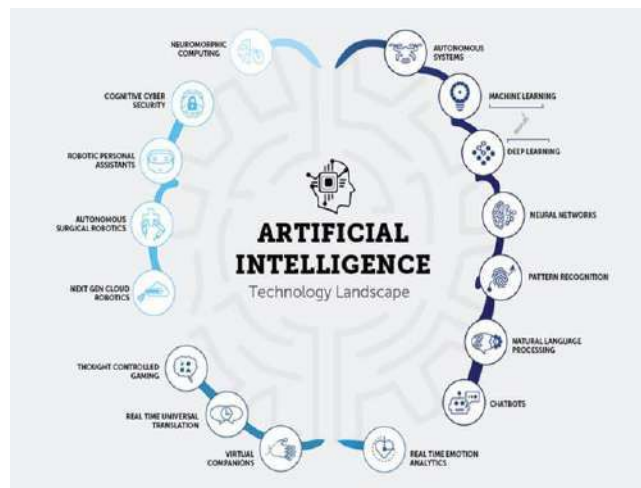


Fig. 2: Wide coverage of AI [21]

There would, in fact, be automated stockrooms for self-ruling cars as in lieu of utilizing surface land for stopping. Genuinely, the positive allegations of achievement around there are generally promising/ encouraging. That there are two fundamentally unique, yet not conflicting, situations for the results of the improvement of self-ruling vehicles recommend the requirement for insightful moral thought of their utilization [21]. The stuff of science fiction is quickly getting to be science actuality. Figure 2 shows the wide coverage of Artificial Intelligence. Computer-based

intelligence is currently developed, both as a science and, in its innovations and applications, as a building discipline.

Numerous open doors exist for AI to affect positively our planet's condition. Artificial intelligence scientists and improvement architects have an exceptional point of view and the abilities required to contribute essentially tending to worries of an Earth-wide temperature boost, neediness, nourishment creation, arms control, wellbeing, instruction, the maturing population, and statistic issues [22]. We could, as a straightforward model, improve access to devices for finding out about AI so individuals could be engaged to give AI methods a shot their very own issues, instead of depending on specialists to assemble hazy frameworks for them. Games and challenges dependent on AI frameworks can be exceptionally convincing receiving the hang of, educating, and explore situations, as appeared by the accomplishment of the Robo Cup for robot soccer [23]. We have just viewed as a portion of the ecological effect of intelligent cars and smart traffic control. Work on combinatorial closeouts effectively applied to range distribution and coordinations, and could further be applied to providing carbon offsets and to enhancing energy market interest. There could be more work on smart energy controllers utilizing conveyed sensors and actuators that would improve energy use in structures [24]. We could utilize qualitative demonstrating procedures for atmosphere situation displaying. The thoughts behind imperative based frameworks can be applied to break down reasonable frameworks. A framework is sustainable on the balance of chance that it is in a stable with its condition: fulfilling present moment and long haul requirements on the assets it devours and the output it produces. Figure 3 shows the advantages and disadvantages of AI.

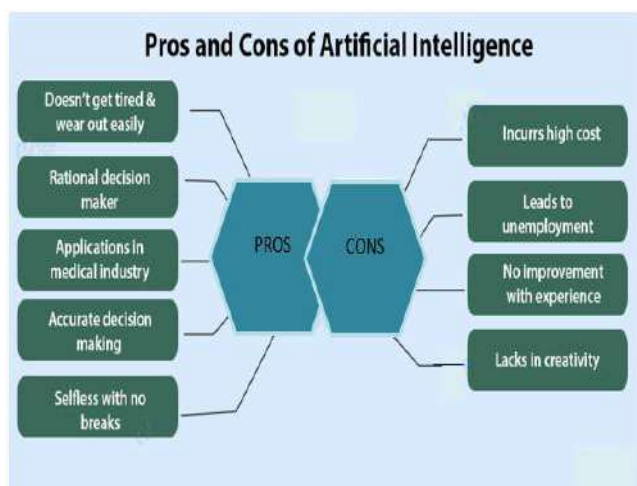


Fig. 3: Pros and Cons of AI [20]

IV. DEMERITS OF AI ON SOCIETY AND MANKIND

Artificial Intelligence has some demerits as well. They are replacing humans in many cases. Moreover, AI robots will not feel the empathy humans are able to feel. This emotion of humans can make them a great creature. In addition, in most cases, artificial intelligence can be hacked if there is a dedicated expert. This is a major warning because if the AI robot is hacked and turned against its purpose it would be a nightmare. Joseph Weizenbaum proposed that AI applications cannot understand, by definition, effectively reproduce certified human compassion and that the utilization of AI innovation in fields [25]. Weizenbaum was also reported that AI specialists (and a few rationalists) were eager to see the human personality as just a PC program (a position presently known as computationalism). He also proposes that AI research depreciates human life [25]. Martin Ford reported that Automation, Accelerating Technology and the Economy of the Future, and others contend that particular artificial intelligence applications, robotics and different types of automation will eventually bring significant changes in job life that means huge unemployment as machines coordinate and surpass the ability of laborers to perform daily schedule and boring employments [26]. Portage predicts that numerous information-based occupations and specifically entry-level employments—will be progressively vulnerable to robotization by means of expert system, AI and other AI-improved applications. Artificial intelligence-based applications may be utilized to enhance the capacities of low-wage seaward laborers, making it progressively practical to redistribute information work [26].

It was observed that a look at the eventual fate of AI in Google's self-driving vehicles. Presently imagine that some evil wrongdoing syndicate was to take such a vehicle, tie a weapon to the top, and reprogram it to shoot people. That is an AI weapon [27].

The capability of these weapons has not escaped from the minds of governments. This year, the US Navy's declaration of designs to create self-governing automaton weapons, just as the declaration of both the South Korean Super aegis II programmed turret and the Russian Platform-M programmed battle machine [28].

The governments are not the main players making AI weapons. Think about a GoPro-bearing quadcopter drone, the sort of thing anybody can purchase. Presently envision a straightforward bit of programming that enables it to fly consequently. The equivalent terrible wrongdoing syndicate that can weaponize a driverless vehicle is simply

inches from connecting a firearm and programming it to murder individuals in a packed open spot [29].

This is the impending threat with AI weapons: They are effectively changed over into aimless passing machines, unmistakably more hazardous than similar weapons with a human in charge.

In any case, Sharkey [30] mentioned some of the threats of depending on robotic assistance as allies for the Elder and the young. Same as with autonomous vehicles also conveying the threat and dangerous action.

We cannot yet depend on robots (AI) to make the best choice. They are not completely dependable and reliable, given the manner in which they are manufactured at this point. Anyway, would they be able to make the best decision? Will they make the best choice? What is the proper thing? In our aggregate thinking, the fear exists that in the end robots may turn out to be totally self-ruling, with choice, knowledge, and awareness; they may rebel us as Frankenstein-like beasts [31].

Vernor Vinge has reported that a time may come when a few PCs are more intelligent than men [25]. He calls this "the Singularity." He recommends that it might be to some degree or potentially exceptionally risky for people. This is talked about by a way of thinking called Singularitarianism. The Machine Intelligence Research Institute has recommended a need to assemble "Friendly AI", implying that the advances, which areas of now happening with AI. It can incorporate a push to make AI naturally well-disposed and humane [32].

"My take is that A.I. is dominating," said Sebastian Thrun, a notable roboticist who drove the advancement of Google's self-driving vehicle. "A couple of people may, in any case, be 'in control,' however less and less so." [32]

"Loss of control of A.I. frameworks has turned into a major concern," he said. "It panics individuals." Rather than reject these tragic cases, he stated, researchers rather should screen and constantly assess the innovations.

V. CONCLUSION

Artificial Intelligence is the latest wonder in science. Like most other wonders of science, it also has many merits and demerits. However, we cannot throw it away just because it seems dangerous. We have to understand it more. We have to become better at overcoming the demerits. We should use AI in order to solve our problems. Since it is a very sensitive area, we cannot afford to just play with it. We should not just try to make a Robot, which will behave like humans just out of curiosity. Because it would not be, as human. It would be super intelligent

because of the superior computational ability compared to a human. This is why playing around just because of self-interest should not be the way of using Artificial Intelligence. Artificial Intelligence nowadays is used in many research because of interest. Not because they are needed but because they are wanted. How can a human create something like a human when they just do not really fully understand how everything inside a human body and mind works! This intention of becoming Gods actually poses a real threat to Humanity. The intention of using Artificial intelligence should be the greater good of humanity.

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An Overview of Hydrological Studies by C. P. Kumar

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Abstract— This article presents an overview of hydrological studies undertaken and published by a Senior Scientist working at National Institute of Hydrology (A Government of India Society under Ministry of Jal Shakti), Roorkee - 247667 (Uttarakhand), India. It covers a wide variety of research outcomes related to groundwater assessment; seawater intrusion in coastal aquifers; numerical modelling of unsaturated flow, groundwater flow and contaminant transport; management of aquifer recharge; and impact of climate change on groundwater etc.

Keywords— Groundwater, Groundwater Balance, Groundwater Modelling, Hydrology, Hydrologist, Seawater Intrusion.

I. INTRODUCTION

The National Institute of Hydrology (NIH) was established in December 1978 as an Autonomous Society (presently under Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, Government of India). Main objectives of the Institute are to undertake, support, promote and coordinate systematic and scientific research work in all aspects of Hydrology and Water Resources. The Institute has its headquarters at Roorkee (Uttarakhand, India), four Regional Centres at Belagavi, Jammu, Kakinada and Bhopal and two Centres for Flood Management Studies at Guwahati and Patna. The institute is well equipped to carry out computer, laboratory and field oriented studies. The institute acts as a center of excellence for transfer of technology, human resources development and institutional development in specialized areas of hydrology and conducts user defined, demand-driven research through collaboration with relevant national and international organizations.

At the headquarters (Roorkee), the R & D activities and consulting services are carried out through six divisions – Surface Water Hydrology, Ground Water Hydrology, Environmental Hydrology, Water Resources System, Hydrological Investigations, Research Management and Outreach. The comprehensive work program of the Institute covers: (i) In-house R & D studies on emerging areas, (ii) Sponsored R & D studies, (iii) Demand driven and referred problems, (iv) Consultancy and Technical

services, and (v) Capacity building activities through regular training courses and technology transfer.

Ground Water Hydrology division, a key division of the Institute, has collaborated in many national and international projects. The division undertakes in-house R & D studies, sponsored studies and consultancy projects from the Central and State Government departments and other stakeholders of water. As part of the technology transfer program of the Institute, the division organizes various training courses/ workshops/ seminars/ symposia/ conferences from time to time. The division presently has a number of highly acclaimed scientists along with trained scientific and project staff. Two state-of-the-art units, viz., Centre of Excellence for Advanced Groundwater Research and Soil Water Laboratory, possessing advanced computational and analytical facilities are associated with the division. Providing efficient and effective methodologies and technologies for sustainable groundwater resources development and management are the vision of Ground Water Hydrology division of National Institute of Hydrology, Roorkee, Uttarakhand, India.

Presently, Mr. C. P. Kumar is the Head of Ground Water Hydrology division at NIH, Roorkee. He post-graduated in Hydraulic Engineering from University of Roorkee in 1985. From 1985, he has been working for National Institute of Hydrology (NIH), Roorkee - 247667 (Uttarakhand). His major research areas of interest include assessment of groundwater potential; seawater intrusion in coastal aquifers; numerical modelling of unsaturated flow, groundwater flow and contaminant transport; management

of aquifer recharge; and impact of climate change on papers and reports.
groundwater. He has authored more than 100 technical

II. WORK AREAS OF C. P. KUMAR

The specific areas of work by Mr. C. P. Kumar in the field of hydrology and water resources are presented in the following table.

Subject/ Work Area	Specific Studies
Groundwater Assessment	<ul style="list-style-type: none"> Groundwater Balance of Upper Ganga Canal Command Area Groundwater Balance of Jamnagar District (Gujarat) Estimation of Irrigation Return Flow Impact of Rainwater Harvesting on Groundwater in Savna Watershed
Laboratory and Field Determination of Soil Moisture Characteristics	<ul style="list-style-type: none"> RD 838 of Indira Gandhi Nahar Pariyojana, Stage-II Upper Part of Hindon River Catchment Malaprabha and Ghataprabha Basins Savna Watershed
Modelling of Soil Moisture Movement	<ul style="list-style-type: none"> Development of a Numerical Simulation Model for One-Dimensional Infiltration Prediction of Evaporation Losses from Shallow Water Table Evaporation from Layered Soils in the Presence of a Water Table Estimation of Ground Water Recharge due to Rainfall Effect of Water Table Depth on Recharge due to Rainfall
Modelling of Sea Water Intrusion	<ul style="list-style-type: none"> Nauru Island (Central Pacific Ocean) Ernakulam Coast Goa Coast Porbandar Coast (Minsar River Basin)
Modelling of Groundwater Flow and Solute Transport	<ul style="list-style-type: none"> Common Ground Water Modelling Errors Modeling of Solute Transport in Agricultural Fields Simulation of Solute Transport in Saline Areas of Ghataprabha Command
Application of Hydrological Models	<ul style="list-style-type: none"> Application of SHE Model to Narmada (upto Manot) Basin Application of SHE Model to Hemavati (upto Sakleshpur) Basin Simulation of Soil Moisture Movement in Barchi Watershed using SWIM Model
Impact of Climate Change	<ul style="list-style-type: none"> Impact of Climate Change on Groundwater Impact on Dynamic Groundwater System in Sonar Sub-basin
Books Published	<ul style="list-style-type: none"> Groundwater Assessment and Modelling Modelling of Sea Water Intrusion using SUTRA Assessment of Groundwater Potential (eBook) Groundwater Data Requirement and Analysis (eBook) Impact of Climate Change on Groundwater Resources (eBook)

Editorial Board Member	<ul style="list-style-type: none"> • American Journal of Water Resources • Advances in Engineering & Scientific Research • International Journal of Current Trends in Engineering & Research • Earth Science India • Current World Environment • Environmental Science: An Indian Journal • Madridge Journal of Agriculture and Environmental Sciences • International Journal of BioSciences and Technology
Internet Hydrology	<p>Creation and monitoring of the following websites and e-mail discussion groups:</p> <ul style="list-style-type: none"> • Kumar Links to Hydrology Resources http://www.angelfire.com/nh/cpkumar/hydrology.html • Hydrology Forum http://groups.yahoo.com/group/hydforum/ • Hydrological Modelling Discussion Group http://in.groups.yahoo.com/group/hydrologymodel/ • Ground Water Modelling Discussion Group http://groups.yahoo.com/group/gwmodel/

III. HYDROLOGICAL STUDIES BY C. P. KUMAR

Based-upon the hydrological studies undertaken, Mr. C. P. Kumar has published large number of technical reports, papers and articles. Many of his papers, technical notes and PowerPoint presentations are available at

<http://www.angelfire.com/nh/cpkumar/publication/>
Abstracts of his few publications are presented below.

Triangular Side Weirs (1987)

Discharge characteristics of sharp and broad-crested triangular side weirs have been experimentally investigated. Relations between discharge coefficient and main channel Froude number for different apex angles have been established.

Groundwater Balance in Upper Ganga Canal Command Area (1988)

The water balance study serves as a means of solution to important theoretical and practical hydrological problems. On the basis of the water balance approach, it is possible to make a quantitative evaluation of water resources and its dynamic behavior under the influence of man's activities. The water balance studies are undertaken in the Upper Ganga Canal command area to evaluate the various hydrological components constituting the recharge and discharge components for the groundwater reservoir and

understand their inter-relationship. This will facilitate for optimal planning and utilization of water resources.

The study deals with an area of around 12,500 sq. km. of Upper Ganga Canal command covering the district of Bulandshahr and parts of the districts of Ghaziabad, Meerut, Muzaffarnagar and Saharanpur. Considerable variations in rainfall, canal supplies, groundwater extraction and cropping pattern etc. exist within the study area.

The scope of the present study is the preparation of seasonal groundwater balance of 12 years (1972-73 to 1983-84) for monsoon (June to October) and non-monsoon (November to May) seasons. The various components which influence the groundwater balance in the study area are identified. These components are evaluated using the data made available by U.P. Irrigation Department and Ground Water Investigation Organization. The methodologies adopted for the estimation of water balance components have been discussed. Using the water balance approach, recharge from rainfall for the study area has been calculated. The values of various components of water balance are also verified with the results of various earlier investigators for their consistency.

Application of SHE Model to Narmada (upto Manot) Basin (1990)

The Systeme Hydrologique Europeen (SHE), a physically-based, distributed, catchment model has been implemented for Narmada (upto Manot) basin in Madhya Pradesh, India. The SHE is physically based in the sense that it is derived directly from equations of flow and mass conservation for the hydrologic processes it aims to represent, and it is distributed by describing the catchment on a rectangular grid system. The capacity of SHE to account for spatial variations in meteorologic and hydrologic inputs represents an important advantage over traditional lumped catchment models.

The computational grid network and channel system was set up for the basin, forming the basis for the spatial distribution of topographic elevation, soil type, land use and rainfall stations in the data files. The basic network was composed of grid squares of 1 km x 1 km, but in view of the heavy computing requirements associated with such densely defined system, this was converted to arrays with grid squares of 2 km x 2 km for the simulation work. Since direct measurements of soil and vegetation properties for the basin were not available, the model parameters were evaluated using information taken from the literature on neighbouring areas. Four land uses were identified (agricultural land, dense mixed forest, thin forest and waste land). Three categories of soil depth were defined for low land, semi-hilly and hilly areas, the distributions obtained from the topographic maps. However, the same soil retention curve, typical of black cotton clays, was used throughout.

The calibration and validation of the model was achieved on the basis of physical reasoning and through consideration of the variation of runoff response from the basin. The calibration was carried out for the period 1982-84 by varying only a few of the parameters and was then validated against 1985 and 1987 hydrographs, on the basis of changes in the initial level of the phreatic surface. Some deficiencies in the simulations were noted but, in general, there were good agreement between observed and simulated responses. Sensitivity analysis was also carried out for the basin to study the sensitivity of model grid spacing and flow resistance coefficients to the simulated hydrological regime.

Application of SHE Model to Hemavati (upto Sakleshpur) Basin (1991)

The Systeme Hydrologique Europeen (SHE) is a deterministic distributed and physically-based hydrological modelling system developed from the partial differential equations describing the processes of subsurface, overland and channel flow solved by finite difference methods. The model is completed by the

processes of interception, evapotranspiration and snowmelt. SHE has been developed in a joint effort by the Institute of Hydrology (UK), SOGREAH (France) and the Danish Hydraulic Institute (Denmark).

The description of the hydrological processes has been simplified by solving the unsaturated flow equation in independent one-dimensional vertical columns of variable depths. The columns link a two-dimensional surface flow component with a two-dimensional groundwater flow component. The catchment is represented in the horizontal plane by grid squares and the river system is superimposed on the boundaries of the grid squares. In the SHE programme, each process is solved in separate model components. The coordination and parallel running of the individual components is controlled by a Frame component. This means that the process components can be applied independently and/or in combination. The processes in the various components can be modelled at different levels of complexity and, in its simplest form, a component can be replaced by a dummy component in which default boundary conditions (flows or levels) are prescribed and transferred to the other components. This allows for great flexibility and the applications with SHE may range from single sub-surface column simulations to runs on large complex catchments. The capacity of the SHE to account for spatial variations in meteorologic and hydrologic inputs represents an important advantage over traditional lumped catchment models.

The computational grid network and channel system was set up for the basin, forming the basis for the spatial distribution of topographic elevation, soil type, land use and rainfall stations in the data files. The basic network was composed of grid squares of 1 km x 1 km, but in view of the heavy computing requirements associated with such densely defined system, this was converted to arrays with grid squares of 2 km x 2 km for the simulation work. Since direct measurements of soil and vegetation properties for the basin were not available, the model parameters were evaluated using information taken from the literature on neighbouring areas. Three land uses (forests, coffee plantations and unirrigated crop land) and two soil types (red loamy soils and red sandy soils) were identified. Three categories of soil depth were defined for low land, semi-hilly and hilly areas, the distributions obtained from the topographic maps. However, only one soil retention curve was used throughout.

The calibration and validation of the model was achieved on the basis of physical reasoning and through consideration of the variation of runoff response from the basin. The calibration was carried out for the period 1975-77 by varying only a few of the parameters and was then

validated against hydrographs for the period 1978-80, on the basis of changes in the initial level of the phreatic surface. In general, there were good agreements between observed and simulated responses. Sensitivity analysis was also carried out for the basin to study the sensitivity to the simulated hydrological regime of model structural parameters, flow resistance, unsaturated flow parameters, saturated flow parameter and spatial distribution of rainfall.

Ground Water Balance of Jamnagar District (1992)

With the ever increasing demand of water and inadequate surface water in drought prone areas, more attention is given on groundwater reserve. The present study forms a part of the development of a model to forecast the availability of drinking water in Jamnagar district. Drinking water availability has to be assessed both from surface water sources and from groundwater reserve. The groundwater balance study has been carried out for Jamnagar district for the period 1981-82 to 1985-86 and the percentage of rainfall that gets recharged to the groundwater storage, has been estimated from the water balance study.

Physically - Based Distributed Modelling of Narmada (upto Manot) Basin using the Systeme Hydrologique Europeen (1995)

The Systeme Hydrologique Europeen (SHE), a physically-based, distributed, catchment model has been implemented for Narmada (upto Manot) basin in Madhya Pradesh. The calibration and validation of the model was achieved on the basis of physical reasoning and through consideration of the variation of runoff response from the basin. The calibration was carried out for the period 1982-84 by varying only a few of the parameters and was then validated against 1985 and 1987 hydrographs, on the basis of changes in the initial level of the phreatic surface. Some deficiencies in the simulations were noted but, in general, there were good agreement between observed and simulated responses.

Developments in Ground Water Hydrology: An Overview (1996)

Groundwater development has shown phenomenal progress in our country during the past three decades. There has been a vast improvement in the perception, outlook and significance of groundwater resource. The objective of this paper is to present the status of developments in hydrological studies related to groundwater hydrology including review of the basic concepts and associated methodologies.

Prediction of Evaporation Losses from Shallow Water Table using a Numerical Model (1996)

A steady state flow problem of interest and importance is the upward movement of water from a water table and subsequent evaporation at the soil surface. This information is desirable when estimating water loss from soils by evaporation and estimating the amount of groundwater available to plants due to the upward movement of water from a water table. Soils may also become saline due to the upward movement of saline groundwater and its subsequent evaporation at the soil surface. To minimize the rate of salt accumulation and thus reduce the salinity hazard, attempts are usually made to lower the water table by pumping or by installation of drains. In order to determine at what depth the water table should be maintained, the relation between depth to water table, soil properties, and evaporation rate must be known.

The purpose of this study is to estimate the steady state evaporation rates from bare soils under conditions of high water table. A finite difference numerical scheme based upon the one-dimensional Richards equation has been employed to attain the steady state moisture profiles and estimate the evaporation rates under conditions of high water table. The procedure takes into account the relevant atmospheric factors and the soil's capability to conduct water. Field data required include soil water retention curves, water table depth, and a record of air temperature and air humidity. Results obtained with the method demonstrate how the soil water evaporation rates depend on water table depth.

Development of a Soil Moisture Prediction Model (1996)

Flow of water through unsaturated porous media is common in nature. The basic equation of flow in the unsaturated zone of a porous medium is Richards' equation. The exact solution to the Richards' equation is not yet known. Therefore finite difference methods are widely used for solving the partial differential equation describing one-dimensional water transfer in unsaturated soil. This paper deals with development of a numerical model for transient, one-dimensional water flow through the unsaturated porous medium. Seven models, employing different ways of discretization of the nonlinear infiltration equation, were compared with Philip's quasi-analytical solution. All models yielded good agreement with water content profiles at various times in a sand column.

Estimation of Natural Ground Water Recharge (1997)

Quantification of the rate of natural groundwater recharge is a pre-requisite for efficient groundwater resource management. It is particularly important in regions with large demands for groundwater supplies, where such resources are the key to economic development. However, the rate of aquifer recharge is one of the most difficult factors to measure in the evaluation of groundwater resources. Estimation of recharge, by whatever method, is normally subject to large uncertainties and errors. In this paper, various methods of estimating natural groundwater recharge are outlined and critically reviewed with regard to their limitations and associated uncertainties.

Effect of Water Table Depth on Recharge due to Rainfall (1997)

Reliable estimates of recharge rates to an aquifer are often a pre-requisite to the development of efficient plans for management of a groundwater resource. Groundwater recharge is a complex function of meteorological conditions, soil, vegetation, physiographic characteristics, antecedent soil moisture regime and properties of the geologic material within the paths of flow. Soil layering in the unsaturated zone plays an important role in facilitating or restricting downward water movement to the water table. Depth to water table is also important in groundwater recharge estimations.

The purpose of this study is to determine the effect of water table depth on recharge due to rainfall by studying one-dimensional vertical flow of water in the unsaturated zone. A model has been formulated for finite difference solution of the non-linear Richards equation applicable to transient, one-dimensional water flow through the unsaturated porous medium. The groundwater recharge has been estimated for various depths of the groundwater table using appropriate initial and boundary conditions to study the influence of water table depth.

A Numerical Simulation Model for One-Dimensional Infiltration (1998)

The theory for transient isothermal flow of water into non-swelling unsaturated soil has been developed to a large extent in terms of solutions of the non-linear Richards equation. In the field, the description of infiltration is highly complicated since the initial and boundary conditions are usually not constant while the soil characteristics may vary with time and space. In this study, a model has been formulated for finite difference solution of the nonlinear Richards equation applicable to transient, one-dimensional water flow through the unsaturated porous medium. The simulated soil moisture profiles for explicit, Crank-Nicolson and implicit schemes

have been compared with the quasi-analytical solution of Philip.

Estimation of Ground Water Recharge due to Rainfall by Modelling of Soil Moisture Movement (1998)

The purpose of this study is to estimate the groundwater recharge due to rainfall by studying one-dimensional vertical flow of water in the unsaturated zone. A model has been formulated for finite difference solution of the non-linear Richards equation applicable for transient one-dimensional water flow through the unsaturated porous medium. Implicit scheme with implicit linearization (prediction-correction) has been used for discretization. The groundwater recharge has been estimated using appropriate initial and boundary conditions for storm and inter-storm periods.

Estimation of Ground Water Recharge from Rainfall through Numerical Modelling (1998)

The amount of water that may be extracted from an aquifer without causing depletion is primarily dependent upon the groundwater recharge. Thus, a quantitative evaluation of spatial and temporal distribution of groundwater recharge is a pre-requisite for operating groundwater resources system in an optimal manner. This paper presents the methodology for estimation of groundwater recharge from rainfall by modelling of soil moisture movement.

Evaporation from Shallow Water Table through Layered Soil Profiles (1999)

Evaporation from shallow water table through a homogeneous soil profile has been studied theoretically and experimentally by many workers. However, uniform soil profiles rarely occur in nature. It is more common to find the soils having well-defined layers differing from each other either in texture or in structure. Therefore, it becomes necessary to determine the effect of layered soils on evaporation from a shallow water table.

The purpose of this study is to estimate the steady state evaporation rates from layered soils in the presence of high water table under isothermal conditions. A finite difference numerical scheme based upon the one-dimensional Richards equation has been employed to estimate the evaporation rates from a two-layered soil profile overlying shallow water for appropriate initial and boundary conditions. The method takes into account the relevant atmospheric factors and soil moisture characteristics of the two layers. The effects of sequence and thickness of the soil layers and water table depth on the evaporation rates have been examined.

Variation of Soil Moisture Characteristics in a Part of Hindon River Catchment (1999)

Mathematical models of hydrologic and agricultural systems require knowledge of the relationships between soil moisture content (θ), soil water pressure (h) and unsaturated hydraulic conductivity (K). Hence, a sustained research effort towards the parameterisation of $K(h)$ and $h(\theta)$ has resulted in the development of several laboratory, field and theoretical methods.

This study aims at field and laboratory determination of soil moisture characteristics in a part of Hindon river catchment and to study their variation along the Hindon river in its upstream reach. A total of 38 soil samples were collected from 14 sites in Aurangabad, Kamalpur, Budhakhera, Gagalheri and Dudhil Bukhara comprising around 24 km reach, upstream of Hindon river. Field determination of saturated hydraulic conductivity was made at 8 locations through Guelph Permeameter. Extensive laboratory measurements were made for each soil sample collected. Soil texture was determined through sieve analysis and laser diffraction technique. Porosity was obtained for each soil sample. Saturated hydraulic conductivity was measured through ICW Permeameter in the laboratory. Retention curve was obtained through pressure plate apparatus. Unsaturated hydraulic conductivity function was indirectly derived through van Genuchten retention parameters. The report presents a thorough soil investigation results for the uppermost part of Hindon river.

Soil Moisture Retention Characteristics in Upper Part of Hindon River Catchment (2000)

Mathematical models of hydrologic and agricultural systems require knowledge of the relationships between soil moisture content (θ), soil water pressure (h) and unsaturated hydraulic conductivity (K). Hence, a sustained research effort towards the parameterisation of $K(h)$ and $h(\theta)$ has resulted in the development of several laboratory, field and theoretical methods.

This paper presents the soil moisture retention characteristics and their variation along the Hindon river in its upstream reach. A total of 38 soil samples were collected from 14 sites in Aurangabad, Kamalpur, Budhakhera, Gagalheri and Dudhil Bukhara comprising around 24 km reach, upstream of Hindon river. Extensive laboratory measurements were made for each soil sample collected. Porosity was measured for each soil sample. Saturated hydraulic conductivity was measured through ICW Permeameter in the laboratory. Retention data was obtained through pressure plate apparatus. Parameters of water retention function of the van Genuchten model

were determined through non-linear regression analysis.

Simulation of Sea Water Intrusion and Tidal Influence (2001)

Coastal zones contain some of the most densely populated areas in the world as they generally present the best conditions for productivity. However, these regions face many hydrological problems like flooding due to cyclones and wave surge and drinking fresh water scarcity due to salt water intrusion. This paper presents the simulation of sea water intrusion in Nauru Island through Saturated-Unsaturated TRAnsport (SUTRA) model and examines the effect of tidal forcing on the fresh water resources.

Determination of Saturated Hydraulic Conductivity in Upper Part of Hindon River Catchment (2001)

A proper physical description of water flow in the soil requires that three parameters be specified: flux, hydraulic gradient and hydraulic conductivity. Knowledge of any two of these allows the calculation of the third, according to Darcy's law. Hydraulic conductivity plays an important role in Darcy's law which is applicable for saturated as well as unsaturated soils.

This paper presents the laboratory investigations of soil texture and saturated hydraulic conductivity in upper part of Hindon river catchment. A total of 38 soil samples were collected from 14 sites in Aurangabad, Kamalpur, Budhakhera, Gagalheri and Dudhil Bukhara comprising around 24 km reach, upstream of Hindon river. Extensive laboratory measurements were made for each soil sample collected. Soil texture was determined through sieve analysis and laser diffraction technique. Saturated hydraulic conductivity was measured through ICW Permeameter in the laboratory. An empirical relationship has been derived between soil texture and saturated hydraulic conductivity.

Soil Moisture Retention Characteristics at RD 838 of I.G.N.P. Stage-II (2001)

Mathematical models of hydrologic and agricultural systems require knowledge of the relationships between soil moisture content (θ), soil water pressure (h) and unsaturated hydraulic conductivity (K). Hence, a sustained research effort towards the parameterisation of $K(h)$ and $h(\theta)$ has resulted in the development of several laboratory, field and theoretical methods. This paper presents the soil moisture retention characteristics at RD 838 of Indira Gandhi Nahar Priyojana, Stage - II. A total of 15 soil samples were collected from 4 locations at different depths. Extensive laboratory measurements were made for each soil sample collected. Soil bulk density, particle density and porosity were measured for

each soil sample. Saturated hydraulic conductivity was measured through Permeameter. Retention data was obtained through pressure plate apparatus. Parameters of water retention function of the van Genuchten model were determined through non-linear regression analysis.

Soil Moisture Characteristics in Upper Part of Hindon River Catchment (2001)

Knowledge of the physics of soil water movement is crucial to the solution of problems in watershed hydrology, for example, the prediction of runoff and infiltration following precipitation, the subsequent distribution of infiltrated water by drainage and evaporation, and estimation of the contribution of various parts of a watershed to the groundwater storage. Convenient and reliable techniques for estimating the soil hydraulic properties are required for prediction of soil water flow.

This paper presents the field and laboratory determination of soil moisture characteristics and their variation along the Hindon river in its upstream reach. A total of 38 soil samples were collected from 14 sites in Aurangabad, Kamalpur, Budhakhera, Gagalheri and Dudhil Bukhara comprising around 24 km reach, upstream of Hindon river. Extensive laboratory measurements were made for each soil sample collected. Porosity was obtained for each soil sample. Saturated hydraulic conductivity was measured through ICW Permeameter in the laboratory. Retention curve data was obtained through pressure plate apparatus. Unsaturated hydraulic conductivity function was indirectly derived through van Genuchten retention parameters by non-linear regression analysis.

Simulation of Soil Moisture Movement in a Hard Rock Watershed using SWIM Model (2001)

A very large fraction of the water falling as rain on the land surfaces of the earth or applied irrigation water moves through unsaturated soil during the subsequent processes of infiltration, drainage, evaporation, and the absorption of soil-water by plant roots. The water movements in the unsaturated zone, together with the water holding capacity of this zone, are very important for the water demand of the vegetation, as well as for the recharge of the groundwater storage. A fair description of the flow in the unsaturated zone is also crucial for predictions of the movement of pollutants into groundwater aquifers.

A number of simulation models are available for investigating the soil water balance. SWIM (Soil Water Infiltration and Movement) is a physically based, isothermal, one dimensional model of water flow through the soil coupled with a simple crop water extraction

model in which the growth of the canopy and of the root system is a predetermined input. SWIM is driven by rainfall and potential evaporation, and so appears to be more appropriate than few other similar models if the available meteorological data are limited.

The present study aims at modelling of soil moisture movement in Barchi watershed (Karnataka) using SWIM. Field and laboratory investigations were carried out to determine the saturated hydraulic conductivity at eight locations using Guelph Permeameter and soil moisture retention characteristics using the Pressure Plate Apparatus. The van Genuchten parameters of soil moisture retention function and hydraulic conductivity function were obtained through non-linear regression analysis. Daily rainfall and evaporation data of Barchi for the period 1996-97 to 1999-2000 were used for the simulations. Water balance components like runoff, evapotranspiration and drainage (groundwater recharge from rainfall) were determined through SWIM.

Common Ground Water Modelling Errors and Remediation (2001)

Groundwater models are used to predict the future changes in hydraulic heads or the migration pathway and concentrations of contaminants in groundwater. The accuracy of model predictions depends upon the degree of successful calibration and verification of the model in determining transport flow directions, and the applicability of the groundwater flow and solute transport equations to the problem being simulated. Errors in the predictive model, even though small, can result in gross errors in solutions projected forward in time. This paper presents an overview of the common errors in any groundwater modelling study and ways to remove them.

Derivation of Soil Moisture Retention Characteristics from Saturated Hydraulic Conductivity (2001)

Knowledge of the physics of soil water movement is crucial to the solution of many problems in watershed hydrology, for example, the prediction of runoff and infiltration following precipitation, the subsequent distribution of infiltrated water by drainage and evaporation, and estimation of the contribution of various parts of a watershed to the groundwater storage. Mathematical models of hydrologic and agricultural systems require knowledge of the relationships between soil moisture content (θ), soil water pressure (h) and unsaturated hydraulic conductivity (K). Sustained research effort towards the parameterisation of $K(h)$ and $h(\theta)$ has resulted in the development of several laboratory, field and theoretical methods.

This study involved field and laboratory determination of soil moisture characteristics along the Hindon river in its upstream reach. The soils in this area are mainly sand, loamy sand, sandy loam and silt loam. A total of 37 soil samples were collected from 13 sites in 24 km upstream reach of the Hindon river. Extensive laboratory measurements were made for each soil sample. Saturated hydraulic conductivity was measured through ICW Permeameter in the laboratory. Retention curve data was obtained through pressure plate apparatus. These have been used to develop an empirical relationship to derive the approximate soil moisture retention curve at the places in upper part of Hindon river basin where only saturated hydraulic conductivity data are available.

Numerical Simulation Models for Seawater Intrusion (2002)

The development and management of coastal groundwater aquifers remain a very delicate issue. Under-utilization of the available resource means that valuable fresh water will discharge naturally to the sea and wasted; overdevelopment, on the other hand, will mine the resource and cause a gradual or sometimes sudden degradation of water quality due to the encroachment of seawater. As an aid to effective management, many models have been developed over the years to represent and study this problem. They range from relatively simple analytical solutions to complex state-of-art numerical models using large computing capacity. This paper presents the salient features of available numerical models to enable selection of appropriate code for the specific seawater intrusion problem.

Modelling of Solute Transport in Agricultural Fields using SWIM (2002)

Modern agricultural activities are based on the extensive use of fertilizers and pesticides to obtain high crop yield. Some of the chemicals applied to farm land, however, move down with the deep percolating water from the root zone and can contaminate underlying groundwater. The problem becomes more complicated when dealing with different kinds of soil with varying properties. In the present study, solute transport in three agricultural plots (Jowar, Gram and Safflower located at Belvatgi in Malaprabha subbasin in Dharwad district, Karnataka) has been modelled using a software package, SWIM (Soil Water Infiltration and Movement). Known quantities of fertilizer were applied and field/laboratory investigations were carried out for monitoring the chemical constituent (Nitrogen/Phosphorous/Potassium) at varying depths upto 120 cm. Field observed and simulated (through SWIM)

solute concentration (N, P and K) profiles after application of fertilizer were compared. The model can be used to predict the cumulative solute in the soil profile for different scenarios of fertilizer applications.

Assessment of Natural Ground Water Recharge in Upper Ganga Canal Command Area (2002)

Quantification of the rate of natural groundwater recharge is a pre-requisite for efficient groundwater resource management. It is particularly important in regions with large demands for groundwater supplies, where such resources are the key to economic development. However, the rate of aquifer recharge is one of the most difficult factors to measure in the evaluation of groundwater resources. Estimation of recharge, by whatever method, is normally subject to large uncertainties and errors. In this paper, an attempt has been made to derive an empirical relationship to determine groundwater recharge from rainfall in Upper Ganga Canal command area based upon seasonal groundwater balance study carried out for a number of years.

Conceptualisation in Groundwater Modelling (2003)

Mathematical models are tools, which are frequently used in studying groundwater systems. In general, mathematical models are used to simulate (or to predict) the groundwater flow. Predictive simulations must be viewed as estimates, dependent upon the quality and uncertainty of the input data. Model conceptualization is the process in which data describing field conditions are assembled in a systematic way to describe groundwater flow processes at a site. The model conceptualization aids in determining the modelling approach and which model software to use. This paper presents the conceptualisation process for any groundwater flow modelling study which will help to reduce the level of uncertainty.

Estimation of Ground Water Recharge Using Soil Moisture Balance Approach (2003)

The amount of water that may be extracted from an aquifer without causing depletion is primarily dependent upon the groundwater recharge. Thus, a quantitative evaluation of spatial and temporal distribution of groundwater recharge is a pre-requisite for operating groundwater resources system in an optimal manner. This paper presents a methodology with step-by-step procedure to determine the groundwater recharge by soil moisture balance in the unsaturated zone.

Pitfalls and Sensitivities in Groundwater Modelling (2003)

Groundwater models provide a scientific and predictive tool for determining appropriate solutions to water

allocation, surface water - groundwater interaction, landscape management or impact of new development scenarios. However, if the modelling studies are not well designed from the outset, or the model doesn't adequately represent the natural system being modelled, the modelling effort may be largely wasted, or decisions may be based on flawed model results, and long term adverse consequences may result. This paper presents the common pitfalls and sensitivities which are normally encountered during groundwater modelling studies. It will help in improving the model conceptualisation and understanding the uncertainty in model results.

Basic Guidelines for Groundwater Modelling Studies (2003)

Groundwater flow modelling studies are required to resolve groundwater and catchment issues. A model, no matter how sophisticated, will never describe the groundwater system under investigation without deviation of model simulations from the actual physical processes. As a consequence, in applying a numerical model to a field study, the model user should always understand the implications of simplifying assumptions. This paper addresses groundwater modelling concepts and outlines the approach for commissioning and understanding groundwater modelling studies. It will encourage best practice and help avoid potential problems.

Modelling of Soil Moisture Movement in a Watershed using SWIM (2003)

The present study aims at modelling of soil moisture movement in Barchi watershed (Karnataka) using SWIM (Soil Water Infiltration and Movement). Field and laboratory investigations were carried out to determine the saturated hydraulic conductivity at eight locations using Guelph Permeameter and soil moisture retention characteristics using the Pressure Plate Apparatus. The van Genuchten parameters of soil moisture retention function and hydraulic conductivity function were obtained through non-linear regression analysis. Daily rainfall and evaporation data of Barchi for the period 1996-97 to 1999-2000 were used for the simulations. Water balance components like runoff, evapotranspiration and drainage (groundwater recharge from rainfall) were determined through SWIM. The drainage was found to vary between 38% and 47% of rainfall (1241 mm to 1887 mm) while the runoff coefficient varied between 12% and 32% for the study period.

Constraints in the Numerical Modelling of Salt Water Intrusion (2004)

Mathematical models help us to understand the relevant processes that cause salt water intrusion in coastal

aquifers. In this paper, constraints of three-dimensional (3D) modelling of salt water intrusion in large-scale coastal (homogeneous) aquifers have been discussed. Computer codes, which solve the advection-dispersion equation based on standard finite element or finite difference techniques, can not yet be applied to model large-scale coastal aquifers. The reason is that these codes must satisfy a condition of spatial discretization, characterized by the so-called grid Peclet number. This number imposes that the dimension of the grid block should be not greater than a few times the magnitude of the longitudinal dispersivity, as otherwise numerical dispersion will occur. In addition, stand-alone personal computers are not yet fast enough to execute models with several hundreds of thousands of grid blocks. Finally, reliable and sufficient groundwater data, required for calibration and verification, are not available in most cases. However, effective 3D-modelling of salt water intrusion in large-scale coastal aquifers may be technically possible within next few years, though the availability of data will always restrict practical applications to a certain extent.

Groundwater Flow and Contaminant Transport Models: An Overview (2006)

In the management of a ground-water system in which decisions must be made with respect to both water quality and water quantity, a tool is needed to provide the decision maker with information about the future response of the system to the effects of management decisions. This tool is the model. A model may be defined as a simplified version of a real-world system (here, a ground-water system) that approximately simulates the relevant excitation-response relations of the real-world system. This paper presents an overview of the essential components of ground-water flow and contaminant transport modelling in saturated porous media.

Modelling of a Coastal Aquifer using FEFLOW (2007)

Coastal tracts of Goa are rapidly being transformed into settlement areas. The poor water supply facilities have encouraged people to have their own source of water by digging or boring a well. During the last decade, there have been large-scale withdrawals of groundwater by builders, hotels and other tourist establishments. Though the seawater intrusion has not yet assumed serious magnitude, but in the coming years it may turn to be a major problem if corrective measures are not initiated at this stage. It is necessary to understand how fresh and salt water move under various realistic pumping and recharge scenarios. Objectives of the present study include simulation of seawater intrusion in a part of the coastal

area in Bardez taluk of North Goa, evaluation of the impact on seawater intrusion due to various groundwater pumping scenarios and sensitivity analysis to find the most sensitive parameters affecting the simulation.

Soil Moisture Retention Characteristics and Hydraulic Conductivity for Different Areas in India in Selected States (2008)

Mathematical models of hydrologic and agricultural systems require knowledge of the relationships between soil moisture content (θ), soil water pressure (h) and unsaturated hydraulic conductivity (K). This study involved field and laboratory determination of soil moisture characteristics in different areas of India – Hindon, Kolar, Narsinghpur, Ghataprabha and Lokapavani. Saturated hydraulic conductivity was measured either through Guelph Permeameter in the field or through ICW Permeameter or Jodhpur Permeameter in the laboratory. Retention curve data was obtained through pressure plate apparatus. These have been used to develop empirical relationships to derive the approximate soil moisture retention curve at the places where only saturated hydraulic conductivity data is available.

Determination of Soil Hydraulic Properties in a Part of Hindon River Catchment using SOILPROP Software (2010)

Mathematical models of hydrologic and agricultural systems require knowledge of the relationships between soil moisture content (θ), soil water pressure (h) and unsaturated hydraulic conductivity (K). To model the retention and movement of water and chemicals in the unsaturated zone, it is necessary to know the relationships between soil water pressure, water content and hydraulic conductivity. It is often convenient to represent these functions by means of relatively simple parametric expressions. The problem of characterizing the soil hydraulic properties then reduces to estimating parameters of the appropriate constitutive model. A number of models for water retention function and unsaturated hydraulic conductivity are well reported in literature, the most popular being van Genuchten model and Brooks-Corey model. In general, the van Genuchten model matches experimental data more satisfactorily than Brooks-Corey model. However, the functional form of van Genuchten model is complicated and limits its usefulness for large number of analytical solutions available for infiltration and drainage problems. On the other hand, Brooks-Corey model yields conductivity and water retention functions that are easy to manipulate mathematically.

For this study, 27 soil samples were collected from various locations as well as depths in different villages, namely Aurangabad, Kamalpur, Budhakhera, Gagalheri, Dudhil Bukhara in the upstream part of Hindon river catchment and laboratory investigations were carried out to determine bulk density and grain size distribution. Using these data as input to the SOILPROP software, van Genuchten and Brooks-Corey parameters (α and n & h_d and λ) were determined to derive the retention characteristic and unsaturated hydraulic conductivity. The values of α and n (van Genuchten parameters) were found to vary from 0.00004 to 0.00078 and 1.19 to 1.65 respectively. The values of h_d and λ (Brooks-Corey parameters) were found to vary from 860 to 20200 cm and 0.189 to 0.538 respectively. These results (as necessary input for unsaturated zone modelling) will be helpful for prediction of soil moisture flow and groundwater recharge in the Hindon river catchment.

Assessment of Impact of Climate Change on Groundwater Resources (2012)

Climate change poses uncertainties to the supply and management of water resources. The Intergovernmental Panel on Climate Change (IPCC) estimates that the global mean surface temperature has increased 0.6 ± 0.2 °C since 1861, and predicts an increase of 2 to 4 °C over the next 100 years. Temperature increases also affect the hydrologic cycle by directly increasing evaporation of available surface water and vegetation transpiration. Consequently, these changes can influence precipitation amounts, timings and intensity rates, and indirectly impact the flux and storage of water in surface and subsurface reservoirs (i.e., lakes, soil moisture, groundwater). In addition, there may be other associated impacts, such as sea water intrusion, water quality deterioration, potable water shortage, etc.

While climate change affects surface water resources directly through changes in the major long-term climate variables such as air temperature, precipitation, and evapotranspiration, the relationship between the changing climate variables and groundwater is more complicated and poorly understood. The greater variability in rainfall could mean more frequent and prolonged periods of high or low groundwater levels, and saline intrusion in coastal aquifers due to sea level rise and resource reduction. Groundwater resources are related to climate change through the direct interaction with surface water resources, such as lakes and rivers, and indirectly through the recharge process. The direct effect of climate change on groundwater resources depends upon the change in the volume and distribution of groundwater recharge. Therefore, quantifying the impact of climate change on

groundwater resources requires not only reliable forecasting of changes in the major climatic variables, but also accurate estimation of groundwater recharge.

A number of Global Climate Models (GCM) are available for understanding climate and projecting climate change. There is a need to downscale GCM on a basin scale and couple them with relevant hydrological models considering all components of the hydrological cycle. Output of these coupled models such as quantification of the groundwater recharge will help in taking appropriate adaptation strategies due to the impact of climate change. This paper presents the likely impact of climate change on groundwater resources and methodology to assess the impact of climate change on groundwater resources.

Groundwater Modelling Software – Capabilities and Limitations (2012)

Groundwater modelling has become an important methodology in support of the planning and decision-making processes involved in ground-water management. Ground-water models provide an analytical framework for obtaining an understanding of the mechanisms and controls of ground-water systems and the processes that influence their quality, especially those caused by human intervention in such systems. Increasingly, models are an integral part of water resources assessment, protection and restoration studies; and provide essential and cost-effective support for planning and screening of alternative policies, regulations, and engineering designs affecting groundwater.

There are many different ground-water modelling codes available, each with their own capabilities, operational characteristics, and limitations. If modelling is considered for a project, it is important to determine if a particular code is appropriate for that project, or if a code exists that can perform the simulations required in the project.

In practice, it is often difficult to determine the capabilities, operational characteristics, and limitations of a particular ground-water modelling code from the documentation, or even impossible without actual running the code for situations relevant to the project for which a code is to be selected due to incompleteness, poor organization, or incorrectness of a code documentation. Systematic and comprehensive description of a code features based on an informative classification provides the necessary basis for efficient selection of a groundwater modelling code for a particular project or for the determination that no such code exists.

Assessment of Groundwater Potential (2012)

Water balance techniques have been extensively used to make quantitative estimates of water resources and the impact of man's activities on the hydrologic cycle. On the basis of the water balance approach, it is possible to make a quantitative evaluation of water resources and its dynamic behaviour under the influence of man's activities. In this paper, an attempt has been made to describe the methodologies to understand and evaluate various recharge and discharge components of groundwater balance equation and to establish the recharge coefficient with a view to work out the groundwater potential of an area.

Water Status and Problems in India (2013)

The surface water and groundwater resources of the country play a major role in agriculture, hydropower generation, livestock production, industrial activities, forestry, fisheries, navigation, recreational activities, etc. Traditionally, India has been an agriculture-based economy. Hence, development of irrigation to increase agricultural production for making the country self-sustained and for poverty alleviation has been of crucial importance for the planners. The rainfall in India shows great variations, unequal seasonal distribution, still more unequal geographical distribution and the frequent departures from the normal. In view of the existing status of water resources and increasing demands of water for meeting the requirements of the rapidly growing population of the country as well as the problems that are likely to arise in future, a holistic, well-planned long-term strategy needed for sustainable water resources management in India.

Numerical Modelling of Ground Water Flow using MODFLOW (2013)

Groundwater models provide a scientific and predictive tool for determining appropriate solutions to water allocation, surface water – groundwater interaction, landscape management or impact of new development scenarios. However, if the modelling studies are not well designed from the outset, or the model doesn't adequately represent the natural system being modelled, the modelling effort may be largely wasted, or decisions may be based on flawed model results, and long term adverse consequences may result. This paper presents an overview of the groundwater modelling technique and application of MODFLOW, a modular three-dimensional groundwater flow model.

Recent Studies on Impact of Climate Change on Groundwater Resources (2013)

We are in a period of climate change brought about by increasing atmospheric concentrations of greenhouse

gases. Atmospheric carbon dioxide levels have continually increased since the 1950s. The continuation of this phenomenon may significantly alter global and local climate characteristics, including temperature and precipitation. Changes in regional temperature and precipitation have important implications for all aspects of the hydrologic cycle. Variations in these parameters determine the amount of water that reaches the surface, evaporates or transpires back to the atmosphere, becomes stored as snow or ice, infiltrates into the groundwater system, runs off the land, and ultimately becomes base flow to streams and rivers.

While climate change affects surface water resources directly through changes in the major long-term climate variables such as air temperature, precipitation, and evapotranspiration, the relationship between the changing climate variables and groundwater is more complicated and poorly understood. The greater variability in rainfall could mean more frequent and prolonged periods of high or low groundwater levels, and saline intrusion in coastal aquifers due to sea level rise and resource reduction. This article presents the likely impact of climate change on groundwater resources and recent research studies carried out to assess the impact of climate change on groundwater resources.

Hydrological Studies Using Isotopes (2013)

Isotope hydrology is a field of hydrology that uses isotopic dating to estimate the age and origins of water and its movement within the hydrologic cycle. Water molecules carry unique fingerprints, based in part on differing proportions of the oxygen and hydrogen isotopes that constitute all water. Isotopes are forms of the same element that have variable numbers of neutrons in their nuclei. This article presents the details of hydrological studies using isotope techniques undertaken by National Institute of Hydrology, Roorkee (India) during last few years.

Impact of Climate Change on Agriculture (2014)

Climate change and agriculture are inter-related processes, both of which take place on a global scale. Global warming is projected to have significant impacts on conditions affecting agriculture, including temperature, carbon dioxide, glacial run-off, precipitation and interaction of these elements. The overall effect of climate change on agriculture will depend on the balance of these effects. Assessment of the effects of global climate changes on agriculture might help to properly anticipate and adapt farming to maximize agricultural production. This paper discusses probable impacts of climate change on agriculture.

Modelling of Groundwater Flow and Data Requirements (2015)

Groundwater is used for a variety of purposes, including irrigation, drinking and manufacturing. Groundwater is also the source of a large percentage of surface water. Accurate and reliable groundwater resource information (including quality) is critical to planners and decision-makers. Huge investment in the areas of groundwater exploration, development and management at state and national levels aims to meet the groundwater requirement for drinking and irrigation and generates enormous amount of data. We need to focus on improved data management, precise analysis and effective dissemination of data. Numerical models are capable of solving large and complex groundwater problems varying widely in size, nature and real life situations. With the advent of high speed computers, spatial heterogeneities, anisotropy and uncertainties can be tackled easily. However, the success of any modelling study, to a large measure depends upon the availability and accuracy of measured/recorded data required for that study. Therefore, identifying the data needs of a particular modelling study and collection/monitoring of required data form an integral part of any groundwater modelling exercise. This paper presents groundwater modelling process, basic data requirements for groundwater modelling and commonly used groundwater modelling software.

Concepts and Modelling of Groundwater System (2015)

Groundwater is of fundamental importance in water resources planning, development and management. Groundwater flow has many applications, among which are agricultural developments, domestic use such as supply of drinking water, irrigation, and a variety of water quality applications. As the usage of groundwater expands, our knowledge of groundwater systems must also expand. Numerical groundwater modelling is a tool that can aid in studying groundwater problems and can help increase our understanding of groundwater systems. The purpose of this article is to highlight major groundwater issues, concepts of groundwater modelling, and commonly used groundwater modelling software.

Climate Change Effects on Groundwater Resources (2015)

Climate change is normally defined as any change in climate over time, whether due to natural variability or from human activities. It poses uncertainties to the supply and management of water resources. Although climate change has been widely recognized, research on the effects of climate change on groundwater system is

relatively limited. Groundwater resources are related to climate change through the direct interaction with surface water resources, such as lakes and rivers, and indirectly through the recharge process. This article presents the likely effects of climate change on groundwater resources, and methodology to assess the impact of climate change on groundwater resources.

Contribution of Women in Hydrological Research (2016)

Women play a central part in the provision, management and safeguarding of water. This pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources. Acceptance and implementation of this principle requires positive policies to address women's specific needs and to equip and empower women to participate at all levels in water resources programmes, including decision-making and implementation. The objective of this paper is to highlight some of the recent contribution of women in the field of Hydrology.

Modelling Flow and Transport in Unsaturated Zone (2016)

Unsaturated zone transport models are indispensable tools for analyzing complex environmental pollution problems, and for developing practical management strategies. A quantitative study of water flow and contaminant transport in the unsaturated (vadose) zone is necessary for improvement and protection of the quality of groundwater supplies. This is the region bounded above by the land surface and below by the groundwater table. It is the region through which water derived from precipitation and irrigation infiltrates and transports contaminants to reach the groundwater. This article presents an overview of the modelling process for water flow and contaminant transport in the unsaturated zone, input data requirements and related software packages.

Sea Water Intrusion in Coastal Aquifers (2016)

The coastal regions, particularly deltaic regions, are the most developed and most densely populated regions all over the world. These regions are facing many hydrological problems both due to natural conditions and man's activities. The problems due to natural conditions range from flooding due to cyclones and wave surge to drinking fresh water scarcity due to problem of sea water intrusion. Man's activities compound these problems further. Sea water intrusion is one of the severe problems faced by coastal regions. Natural conditions and man's activities both contribute to this problem. There exists an urgent need to study systematically the causes and

remedial measures for sea water intrusion problem in coastal areas. This article presents the hydrological aspects, control measures and modelling of sea water intrusion in coastal aquifers.

Climate Change and Groundwater (2016)

The Intergovernmental Panel on Climate Change (IPCC) estimates that the global mean surface temperature has increased 0.6 ± 0.2 °C since 1861, and predicts an increase of 2 to 4 °C over the next 100 years. Temperature increases also affect the hydrologic cycle by directly increasing evaporation of available surface water and vegetation transpiration. Consequently, these changes can influence precipitation amounts, timings and intensity rates, and indirectly impact the flux and storage of water in surface and subsurface reservoirs (i.e., lakes, soil moisture, groundwater). In addition, there may be other associated impacts, such as sea water intrusion, water quality deterioration, potable water shortage, etc. While climate change affects surface water resources directly through changes in the major long-term climate variables such as air temperature, precipitation, and evapotranspiration, the relationship between the changing climate variables and groundwater is more complicated and poorly understood. This paper discusses the likely impacts of climate change on groundwater resources and the climate change scenario for groundwater in India.

Groundwater Studies at National Institute of Hydrology, Roorkee, India (2017)

National Institute of Hydrology is a Government of India society under Ministry of Water Resources, River Development & Ganga Rejuvenation. It has been functioning as a research Institute in the area of hydrology and water resources in the country since December 1978 with headquarters at Roorkee (Uttarakhand, India) and six regional centres located in different physiographic regions of the country. This article presents salient details of groundwater studies undertaken by Ground Water Hydrology division of the Institute during last few years.

Subsurface Water Modelling using SWIM and FEFLOW (2017)

Mathematical models provide a scientific and predictive tool for determining appropriate solutions to water allocation, surface water – groundwater interaction, landscape management or impact of new development scenarios. However, if the modelling studies are not well designed from the outset, or the model doesn't adequately represent the natural system being modelled, the modelling effort may be largely wasted, or decisions may be based on flawed model results, and long term adverse consequences may result. This article presents case

studies on modelling of soil moisture movement (unsaturated flow) using SWIM and modelling of seawater intrusion (density-dependent groundwater flow) using FEFLOW.

Hydrological Research at National Institute of Hydrology, India (2017)

The National Institute of Hydrology (NIH) is a premier research Institute in India in the area of hydrology and water resources. The Institute was established in 1978 with the main objective of undertaking, aiding, promoting and coordinating systematic and scientific work in all aspects of hydrology. The Institute has its headquarters at Roorkee (Uttarakhand), four regional centres at Belagavi, Jammu, Kakinada and Bhopal and two centres for flood management studies at Guwahati and Patna. The Institute is well equipped to carry out computer, laboratory and field oriented studies. This article presents an overview of research activities being undertaken by the Institute.

Water Security – Challenges and Needs (2018)

Our fate is intrinsically bound to the fate of our water resources. To build the future we want, we need to harness the contributions of science and innovation for water security. An interdisciplinary and integrated approach is needed for watershed and aquifer management, which incorporates the social dimension of water resources, and promotes and develops international research in hydrological and freshwater sciences. This article presents the challenges and needs pertaining to water security.

Water Resources Issues and Management in India (2018)

Water is one of the most essential natural resources for sustaining life. Its development and management play a vital role in agriculture production. Integrated water management is vital for poverty reduction, environmental sustenance, and sustainable economic development. In view of the rapid increase in population, urbanization, and industrialization, the demand for water for meeting various requirements is continuously increasing. Therefore, we are facing numerous challenges in the water sector, which include reducing per capita water availability, the decline in groundwater table in many areas, and saltwater intrusion in coastal aquifers. The quality of surface water and groundwater is also deteriorating because of increasing pollutant loads from various sources. Climate change may also adversely affect the availability and distribution of water resources. This article presents an overview of relevant issues pertaining to development and management of water resources in India.

Modelling Water Flow in Unsaturated Zone (2018)

The water movements in the unsaturated zone, together with the water holding capacity of this zone, are very important for the water demand of the vegetation, as well as for the recharge of the groundwater storage. A fair description of the flow in the unsaturated zone is crucial for predictions of the movement of pollutants into groundwater aquifers. This article presents an overview of the modelling process for water flow in the unsaturated zone, input data requirements, boundary conditions and related software packages.

Norms for Groundwater Resource Estimation in India (2019)

The occurrence and movement of groundwater are controlled by various hydrogeological, hydrological and climatological factors. Reasonably accurate assessment of groundwater recharge and discharge components is not easy because no direct measurement techniques are presently available. Therefore, indirect methods are generally employed for assessment of groundwater resources. Groundwater is a dynamic and replenishable resource which is normally estimated based upon the annual groundwater recharge. It is subjected to withdrawal for various uses such as irrigation, domestic, industrial etc. This article presents the norms for various groundwater recharge components for estimation of groundwater resources in India.

An Overview of Commonly Used Groundwater Modelling Software (2019)

A groundwater model is any computational method that represents an approximation of an underground water system. While groundwater models are, by definition, a simplification of a more complex reality, they have proven to be useful tools over several decades for addressing a range of groundwater problems and supporting the decision-making process. There are many different ground-water modelling codes available, each with their own capabilities, operational characteristics, and limitations. If modelling is considered for a project, it is important to determine if a particular code is appropriate for that project, or if a code exists that can perform the simulations required in the project. This article presents an overview of most commonly used groundwater modelling codes.

Purpose Driven Studies under National Hydrology Project, India (2019)

Considering the peculiarities and large variation in the nature of problems associated with water resources planning, development and management, the issues

involved in research related to particular region and specific project, there is a provision under National Hydrology Project (NHP) of India is to take up applied and action-oriented R&D studies by the implementing agencies. This article presents the details of purpose driven studies taken up by various implementing agencies under the National Hydrology Project of India.

IV. CONCLUDING REMARKS

This article has been written by Mr. C. P. Kumar to showcase his technical contribution as a Scientist at National Institute of Hydrology, Roorkee, India. He is due to retire from current government service at NIH in September 2020. He is likely to seek suitable post-retirement job opportunity to continue his services from October 2020. Any comments or suggestions are welcome at his e-mail address cpkumar@yahoo.com

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Environmental Education approach in the documents of Pedagogical Guidelines of the Municipal College Custódio Sento-Sé/Ba/Brasil

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Abstract— This article presents the analyzes made of a study on the approach of Environmental Education in the pedagogical activities of the Colégio Municipal Custódio Sento Sé/BA, with the aim of analyzing how the pedagogical guidance documents address Environmental Education. The research has a qualitative, documentary focus, of a descriptive type, which initially seeks to prepare a literature review on the subject, then analyzed the Pedagogical Political Project (PPP), in order to collect the information necessary to carry out the research. Therefore, the result made it possible to realize that the PPP recognizes the importance of the school's social role and the construction of social values for the promotion of citizenship, however, environmental issues were not explicitly addressed in the respective document.

Keyword— Environmental Education, Political Pedagogical Project, Awareness.

I. INTRODUCTION

This work aims to analyze how Environmental Education has been approached in the pedagogical guidance documents to promote awareness and training of critical, participatory and autonomous citizens, in an Elementary School II, at the seat of the municipality of Sento-Sé/BA.

Education has the capacity to transform the realities experienced by human beings, through sensitization and awareness, and Environmental Education is widely discussed today, with the purpose of demonstrating that social, economic and political factors are directly related to the changes that the environment has been suffering.

The development of Environmental Education in the educational scenario is of paramount importance to seek balance in the relationship between man and the natural environment, which is increasingly compromising the quality of life of society. In view of this, urgent measures are needed in order to raise people's awareness in the search for new concepts and ideas about the importance of preserving the environment, being a participatory and continuous process in the construction of values, knowledge and actions.

According to Dias (2004, p. 523) the process is permanent in which “individuals and the community become aware of their environment and acquire new knowledge, values, skills, experiences and determination that make them able to act and solve environmental problems, present and future”.

In this way, Environmental Education is a transversal theme that allows dialogue between different disciplines, enabling communication and joint action between education professionals and students, seeking to show that knowledge is composed by the union of the contents of the disciplines and that they communicate. It is a tool capable of bringing a contextualized and interdisciplinary view.

It is noticed that environmental issues have been discussed and researched today, and this study aims to answer the following question: ¿How is Environmental Education addressed in the pedagogical guidance documents of the School Unit?

In view of the problem of this research, it was determined to verify the following hypotheses: the documents of pedagogical guidelines address the theme of Environmental Education. Or, the pedagogical guidance documents do not address the issue of Environmental

Education. In this sense, the general objective of this study is to analyze how the pedagogical guidance documents address Environmental Education and, to consolidate this analysis, it was listed as specific objectives: a) To know the pedagogical guidance documents of the school; b) To analyze how the Environmental Education is addressed by the Political Pedagogical Project.

The results found point out that the Pedagogical Political Project (PPP) does not have an approach that actually contemplates Environmental Education, thus hindering the respective approach in the school environment based on the pedagogical perspective.

II. THEORETICAL REFERENCE

2.1 – The history of Environmental Education

The transformations in the production processes that occurred after the Industrial Revolution, aroused concerns on the part of social organizations about environmental issues worldwide, starting in the 1960s in the 20th century, because of the levels of pollution and rising temperatures in the Earth (SAMPAIO, 2011).

In 1972, the United Nations (UN) held the first meeting to address environmental issues. The United Nations Conference on the Environment, in Stockholm, which generated the document called “Declaration of the UN Conference on the Human Environment”, proclaiming criteria of relationship between man, production and the environment, that citizens and companies seek balance to find the path that leads to sustainable development (CABEDA, 2017).

Among several determined principles, awareness and awareness is sought to promote the preservation of natural resources such as air, water, land, flora, fauna and parts of natural ecosystems need to be conserved to guarantee the existence of present and future generations. Man has the responsibility to preserve and manage the heritage of flora and fauna and their habitat, which is in grave danger (COELHO; REZENDE, 2016).

After the Stockholm Conference, some actions were taken, such as: 1. The United Nations Educational, Scientific and Cultural Organization (UNESCO), took over the organization of regional and international discussions on Environmental Education (EA); 2. The International Seminar on EE was held in Belgrade, Yugoslavia, in 1975; 3. The United Nations Conference on Environment and Development was held in the city of Rio de Janeiro, known as Rio - 92, where Agenda 21 was created; and, 4. The Creation of the Environmental Education Treaty for Sustainable Society and Global Responsibility.

With all these actions, the world begins to worry about seeking knowledge to address environmental issues. It was noted the need that global societies need to build public policies aimed at the conservation and balance of the environment, establishing principles and rules for the use of non-renewable natural resources. It is the moment when the transversal theme - Environmental Education - starts to be developed within society.

International organizations started to address the issue of sustainable development after the Rio 92 conference. Agenda 21 was a historic milestone, containing the commitment of rich countries in relation to poor countries, each participating country has a duty to incorporate policies based on the proposal for sustainable development, with the aim of improving the quality of life of the population. This document recognizes that poverty and environmental degradation are intertwined. Proposing discussions on combating poverty, changing consumption patterns, combating deforestation. Where it seeks a balance between the relations of economic development, the environment and the human being (GOTTARDO, 2003).

2.2 The Need for Environmental Education

Developing actions in a sustainable manner in the social environment where we operate is a necessity in the contemporary society scenario. In view of the expansion of the capitalist economy, which leads to a consumerist society, causing environmental destruction, such as the climate changes that we already experience today.

Society must adopt economic attitudes that are less aggressive to the environment and these attitudes must come from all nations, from the least developed to the most developed, with the precept of ensuring quality of life for the planet and all forms of life that exist on it.

Humanity needs to balance itself in a sustainable way with the environment, use only what is necessary for its existence and, seek to reorganize nature preservation and active actions in an active and quick way, so that we can ensure the survival of the various forms of life that inhabits the planet. It is of utmost importance to effectively program a quality Environmental Education, which brings in its theme a perspective of raising awareness and sensitizing people in a more active coexistence in benefits of the preservation of natural resources, ensuring better quality of life for all forms of beings existing. It is necessary that the human species be reeducated in a perspective of coexistence and respect for the environment, so that it will generate a mutuality between man and nature (MORIN, 2016).

Environmental Education is an interdisciplinary, multidisciplinary theme that needs the support of

knowledge from various areas acting in partnership to achieve the holistic of the whole. According to Paviani (2014, p.16):

[...] it is not too much to reinforce the idea that interdisciplinarity takes place in each situation in a peculiar way and presupposes the integration of knowledge and people, of units and syntheses of knowledge or of "content", of use or application theories and methods and collaboration (principle of collaboration) between teachers or researchers.

Fazenda (2011, p. 75) points out that "the possibility of being in the world today, understanding and criticizing the innumerable information that attacks us daily, can only happen in overcoming the existing barriers between the disciplines".

Seeking a dialogue between economic development, the environment and human beings is one of the objectives of Environmental Education.

According to Medina and Santos (2008, p.24):

Environmental Education will allow, by its basic assumptions, a new creative interaction that redefines the type of people we want to train and the future scenarios that we want to build for humanity, in function of the development of a new environmental rationality. It is necessary to train individuals who can respond to the challenges posed by the dominant development style, based on the construction of a new harmonious style between society and nature and who, at the same time, are able to overcome merely instrumental rationality and economist, which gave rise to the environmental and social crisis that concern us today.

Such assumptions allow us to understand that it is necessary to integrate society in the search for knowledge, to understand the changes that the environment has been undergoing. Environmental Education leads us to the possibility of exploring, knowing, identifying, describing and interpreting social behaviors in the search to find new proposals for changing the relationship and culture of the human being with the environment through less aggressive actions, and sources of energy alternatives.

However, the new attitudes must be based on the lessons learned in the school environment through the contents studied in the classroom. According to Figaro:

The concrete experience of the students' lives is not outside the school. Connecting school content to the interest of young students presupposes understanding them as discourse producers, in which they select, categorize and organize, from their experiences, all statements addressed to them (FÍGARO, 2010, p.27).

Therefore, Environmental Education, when developed, allows to promote curricular integration in the educational environment, developing interdisciplinarity and contextualization of contents with the lived reality, in the perspective of integral human formation, seeking to form autonomous and critical citizens who can interact and intervene in the environment social environment.

2.3 Environmental Education in the Brazilian educational scenario

Environmental Education is a term that emerged only in the 1970s, as a result of concern with the environmental issue. From then on, the organization of several events that consolidated such issues began, such as the Stockholm Conference in 1972, the Rio-92 Conference in 1992, held in Rio de Janeiro, which established an important measure, Agenda 21, which it was an action plan for the 21st century aimed at the sustainability of life on earth (DIAS, 2004).

In Brazil, Environmental Education became law on April 27, 1999, by Law No. 9,795 - National Environmental Education Policy, where in its Art. 1:

Environmental education is understood as the processes by which the individual and the community build social values, knowledge, skills, attitudes and competences aimed at the conservation of the environment, a common use of the people, essential to a healthy quality of life and its sustainability (PNEA, 1999, p1).

In Art. 2nd states: "Environmental education is an essential and permanent component of national education, and must be present, in an articulated manner, at all levels and modalities of the educational process, in a formal and non-formal character" (PNEA, 1999, p. 1).

In this perspective, Environmental Education is not a new discipline, it has an interdisciplinary character,

where its approach must be integrated and continuous. Interdisciplinarity requires a broader and more meaningful view to understand, the concepts, phenomena and problems of everyday life, through knowledge of different areas of knowledge. We can observe in the National Curriculum Parameters (PCNs), “in the school perspective, interdisciplinarity does not intend to create new disciplines or knowledge, but to use the knowledge of several disciplines to solve a specific problem or understand a particular phenomenon under different points of view sight”(BRASIL, 1999, p.34-36).

Therefore, we realize that Environmental Education with Law, is a policy considered recent, widely discussed today. However, little developed and worked in the school context.

III. METHODOLOGY

The present research was carried out in the Municipality of Sento-Sé - BA/Brazil (figure 1), located in the territory of the Sertão do São Francisco (figure 2), on the edge of Lago de Sobradinho, in the North of the State of Bahia. The Municipality of Sento-Sé according to the Brazilian Institute of Geography and Statistics (IBGE) has an estimated population of 40,684 inhabitants and has a territorial extension of approximately 12,181,239 km² (IBGE, 2019).



Fig.1: Sento Sé/Bahia/Brazil

Source: IBGE (2020)

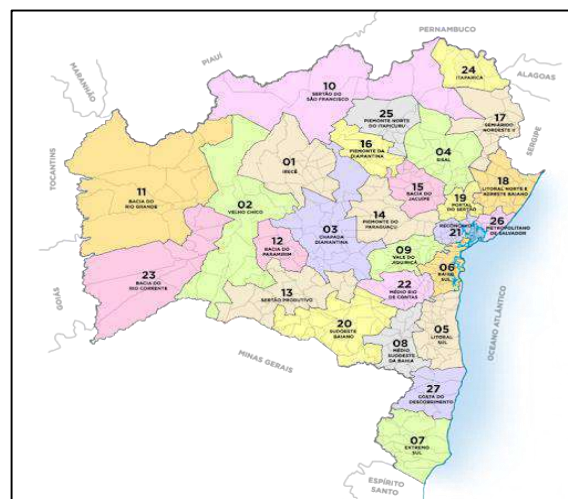


Fig.2: SSF/BA/BR Territory

Source: SECULT/BA (2020)

The School Unit where the research was conducted was Colégio Municipal Custódio Sento-Sé, located at Praça Dr. Juvêncio Alves no number, neighborhood Centro. The school serves classes from Elementary School II and Youth and Adult Education (EJA), in the morning, afternoon and evening shifts, with a population of 955 enrolled students and 57 teachers (CENSO, 2019).

In order to carry out a research, it is essential to define how it will be carried out through the design that, according to Sampieri, Collado and Lucio (2006, p. 154), the term model means the “plan or strategy designed to obtain the information that is want”. For Gonzáles, Fernández and Camargo (2014, p. 43) “a design of the research is determined by the type of investigation that is intended to be carried out, and by the hypothesis that one wishes to verify during the process”.

The methodological approach was qualitative because it is related to analyzing, understanding and interpreting the data of the analyzed documents, about how the pedagogical guidance documents address the theme of Environmental Education and reflecting its directions for activities in teaching practice.

The qualitative approach sought to reach as much information as possible, aiming to expand the knowledge under study. Still according to Sampieri et al. (2006, p.15) “the qualitative research gives depth to the data, the dispersion, the interpretative richness, the contextualization of the environment, the details and the unique experiences”. In this sense, it was sought through the observation moments with the professionals involved in the research process of that school, to reach deeper results,

imbued with veracity and feelings and, thus, reconstruct the reality from their observation, experience and experience.

According to Gil (2008, p. 8), "one can define method as a way to reach a certain end". The author also endorses that "for knowledge to be considered scientific, it is necessary to identify the mental and technical operations that make it possible to verify it". Or, in other words, to determine the method that made it possible to reach that knowledge.

The research also had a documentary character, developed from the survey of documentary analysis of institutional records. Lüdke and André (1986) mention that document analysis can be understood as several operations, which seeks to study and analyze one or several documents, aiming to identify information of facts in them, to find social, economic and ecological circumstances with which there is a possibility of relationships, focusing on issues of interest to the research.

IV. RESULTS AND DISCUSSIONS

The present study was developed through documentary analysis of the instruments of pedagogical guidance of the researched College, in order to understand how Environmental Education is approached in these instruments. The instrument used by the School Unit for its pedagogical organization is the Pedagogical Political Project (PPP).

Given the moments of analysis of the PPP, it can be noted that it was built collectively during the year 2011, and it is explicitly found throughout the text, the search for citizen training to work in the social environment at the same time. Which is inserted, as the school's mission. It was noticed the emphasis given on the social function of the school, to the formation of values focused on citizenship, guiding teachers to the construction of a reflective and contextualized teaching practice.

Starting from the principle that Environmental Education contemplates the environment as a whole, from the relationship between people and the use and care for natural resources, it was analyzed that, when the PPP mentions the formation of citizens and is concerned with the school's social function, it is understood that some principles of Environmental Education are being implicitly contemplated.

For the National Curricular Guidelines for Environmental Education, Art. 2:

Environmental Education is a dimension of education, it is an intentional activity of

social practice, which must give individual development a social character in its relationship with nature and with other human beings, aiming to enhance this human activity in order to make it full of social practice and environmental ethics"(BRASIL/DCNEA, 2012, p.2).

However, it was noticeable that Environmental Education is not explicitly and objectively included in the PPP of the school that is the focus of this research. However, the document is in the process of restructuring. However, its restructuring is being carried out in stages, according to the guidelines of the Municipal Department of Education, and three meetings have already been held.

These meetings were moments of studies for the appropriation of knowledge from the National Common Curricular Base (BNCC), so that the PPP's of the Municipal School Units are rebuilt taking into account the new trends of the national education scenario. Through the analysis of the reports built in the three meetings, it was possible to notice that the theme of Environmental Education until now has not been considered with the necessary and emerging notoriety in the face of the crucial global scenario.

V. CONCLUSIONS

Addressing the theme of Environmental Education in contemporary school environments is a necessity in view of the environmental crises that society has been facing. Having its principles included in the pedagogical guidance documents is indispensable so that the theme can be developed in the pedagogical practice of teachers, to meet social demands.

The research consisted of the analysis of pedagogical guidance documents in order to verify if there is an approach to Environmental Education in the respective documents. The PPP of Colégio Municipal Custódio Sento-Sé/BA recognizes the importance of the school's social role and the construction of social values for the promotion of citizenship, however, environmental issues are not addressed in an explicit and objective way.

However, contemporary society needs an education that can work to develop skills, making individuals able to find solutions to problems through the interaction of knowledge and people. Much is said about Environmental Education, but it is still a distant reality within the School Unit that was researched, taking into account the instructions contained in the PPP.

Therefore, the results of this research collaborate to rethink the fundamental importance of Environmental Education to be explicit in the pedagogical guidance documents, enabling the respective approach in the school environment in an effective way in the teaching pedagogical practice. Thus, contributing to the formation of citizens who seek actions to preserve and conserve the environment, to ensure the survival and quality of life of the various existing beings.

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Opening Effect of Core Type Shear Wall used in Multistoried Structures: A Technical approach in Structural Engineering

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Abstract— The reduction of the overall budget of the project leads to the cost effective one and there should be such criteria of reduction of the cost in different manner. To make economic structure without losing the stiffness criteria, the work has been performed in two stages. The former one is building with single shear wall core and the latter one is building with dual core shear wall; the entire work has performed with four different phases. In first phase total 5 buildings that are modeled with different openings in single core types shear wall and then second phase performs the analysis procedures of the same. The third phases have total 6 buildings that are modeled with different openings in dual core types shear wall and then fourth phase performs the analysis procedures of the same. The result analysis has been performed and then conclusions are drawn. Building with 25% opening area in single core type shear wall and 50% opening area in dual core type shear wall performs well to reduce the cost of the project.

Keywords— Deduction Area, Earthquake Effects, Opening Area, Response spectrum, Shear Wall, Wall Area Reduction, Wall Deduction Ratio.

I. INTRODUCTION

Shear wall is a firm and stiff member, is a structural component used generally around the lift areas. Shear wall has constructed from foundation base to the top of the structure. These walls have the ability to resist the lateral forces along with the uplift forces due to the pull of wind. It has to resist the force that aim to push the walls over. The shear walls are connected with column components; thereby transfer the entire horizontal and vertical loads throughout itself. The shear walls do not need extra finishing or plastering when construction is going on.

II. OBJECTIVES OF THE CURRENT STUDY

The main purpose is to find the optimum building case to counteract earthquake forces and analysis is done using software STAAD Pro. So for this, different loads applied and parametric values obtained are considered and the point of comparison on different building models is as follows:

1. Use of response spectrum method in with and without opening dual configuration multistoried structure.

2. To take 10 different buildings, (5 for Single Core + 6 for Dual Core) comparing them among each heads by using Response Spectrum Method of dynamic analysis using Staad pro software.
3. To calculate maximum displacement and then comparing all the 5 single core cases and 6 dual core cases.
4. To compare base shear in both X and Z direction and then comparison have performed on all the 5 single core cases and 6 dual core cases.
5. To explore the possibilities of overall structural resistance by minimal use of shear wall area.
6. To determine maximum Axial Forces in column and then comparison have performed on all the 5 single core cases and 6 dual core cases.
7. To evaluate maximum Torsional Moments in beams along X and Z directions and then comparison have performed on all the 5 single core cases and 6 dual core cases.

To obtain the best building with opening threshold criteria, all buildings are thoroughly observed and compared their parametric values.

III. PROCEDURE AND 3D MODELING OF THE STRUCTURE

As per criteria for earthquake resistance design of structures, a commercial building (G+20) with plinth area 625 sq. m. for single core and 750 sq. m. for dual core has taken for analysis. A total of five different cases have been chosen for parametric analysis for single core type shear wall and total six different cases have been chosen for parametric analysis for dual core type shear wall, its description shown below with its own abbreviations. Various input parameters of buildings are shown in Table 1 with earthquake input parameters taken respectively.

M 30 grade of concrete with Fe 415 grade of steel is used in the entire analysis procedure. Dead loads, Live loads, Response spectrum loads are applied on the structure with various load combinations. Figure 1 and figure 2 shows floor plan and the entire sectional 3D views of the single core building. Figure 3 and figure 4 shows the typical floor plan and entire sectional 3D views of the dual core building. After then, the comparative result of various parameters has shown with graphical representation of each core case.

Table 1: Input Parameters Used

Constraint	Assumed data for all buildings
Soil type	Medium Soil
Seismic zone	III
Response reduction factor (ordinary shear wall with SMRF)	4
Importance factor (For all semi commercial building)	1.2
Damping ratio	5%
Fundamental natural period of vibration (T_a)	$0.09 \cdot h / (d)^{0.5}$
Plinth area of building (For Single Core)	625 sq. m
Plinth area of building (For Dual Core)	750 sq. m
Floors configuration	G + 20
Height of building	77 m
Floor to floor height	3.5 m
Depth of foundation	3.5 m
Beam sizes	450 mm X 600 mm
Column sizes	550 mm X 650 mm
Slab thickness	170 mm (0.17 m)

Shear wall thickness	270 mm (0.27 m)
Material properties	M 30 Concrete Fe 415 grade steel

Different building model cases selected for analysis using Staad Pro software

When Single Core is used:-

Table 2: List of buildings framed with assigned abbreviation for Single Core Shear Wall

S. No.	Buildings framed for analysis when Single Core Type Shear Wall used	Abbreviation
1.	Building with 100 % shear wall area used	Core 1
2.	Building with 90 % shear wall area used	Core 2
3.	Building with 87.5 % shear wall area used	Core 3
4.	Building with 83.33 % shear wall area used	Core 4
5.	Building with 75 % shear wall area used	Core 5

When Dual Core is used:-

Table 3: List of buildings framed when dual core is used with assigned abbreviation

S. No.	Buildings framed for analysis when Dual Core Type Shear Wall used	Abbreviation
1.	Building with 100 % shear wall area used	Dual Core 1
2.	Building with 90 % shear wall area used	Dual Core 2
3.	Building with 87.5 % shear wall area used	Dual Core 3
4.	Building with 83.33 % shear wall area used	Dual Core 4
5.	Building with 75 % shear wall area used	Dual Core 5
6.	Building with 50 % shear wall area used	Dual Core 6

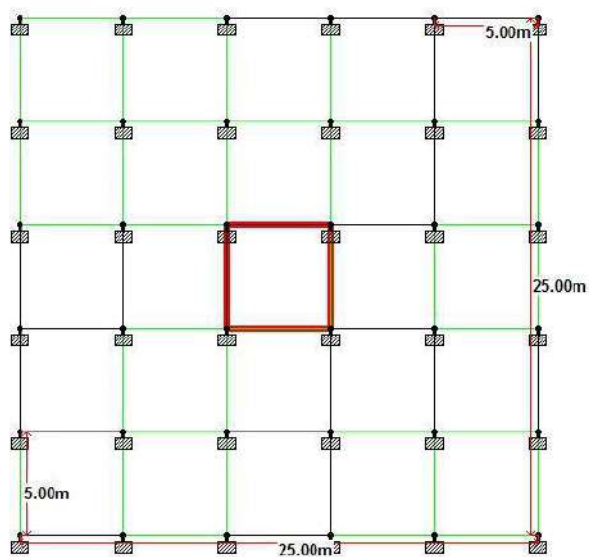


Fig. 1: Typical floor plan of single core

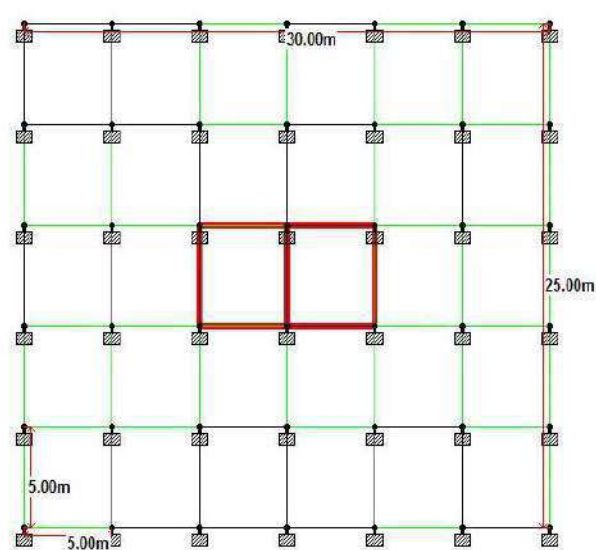


Fig. 3: Typical floor plan of Dual Core

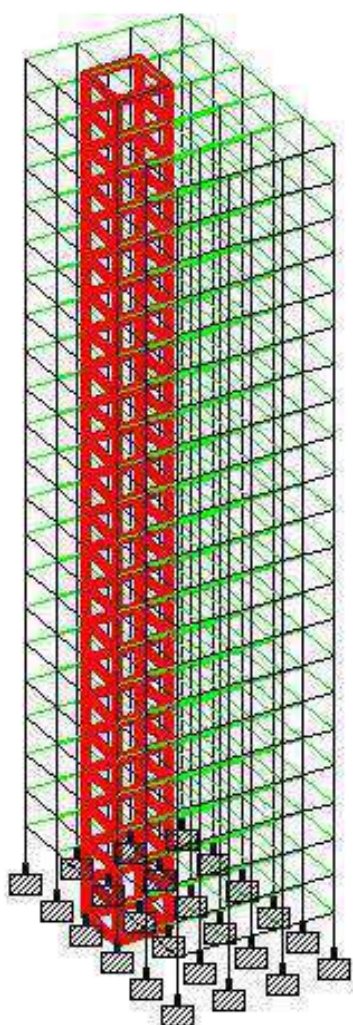


Fig. 2: Sectional 3D view of Single Core

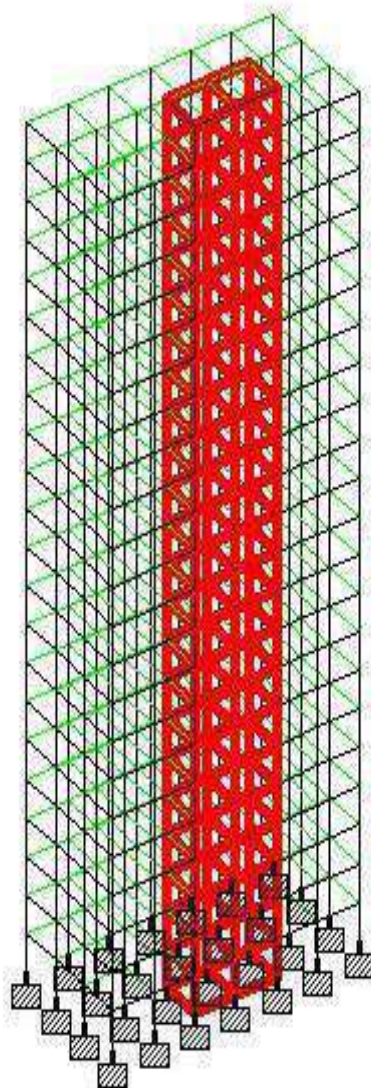


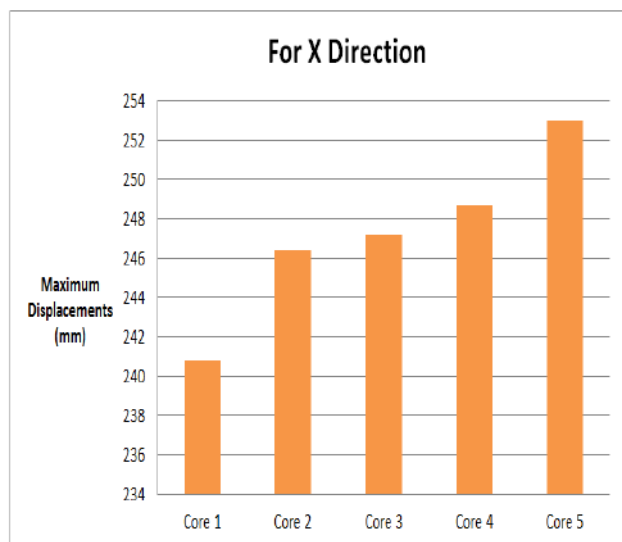
Fig. 4: Sectional 3D view of Dual Core

IV. RESULTS ANALYSIS

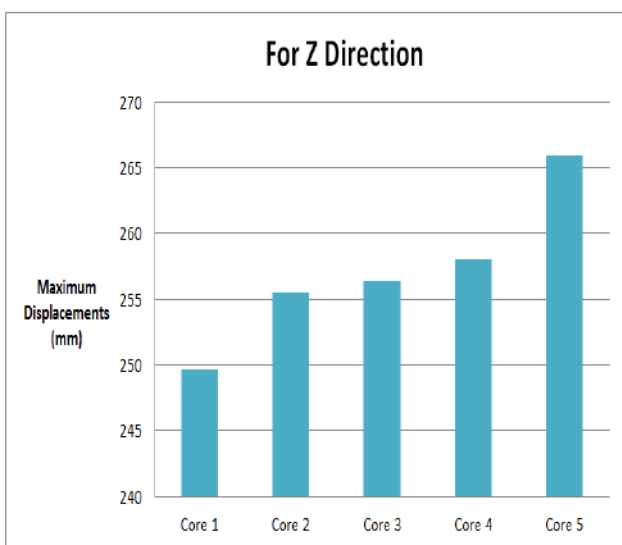
To reduce the overall cost and to reduce the weight of the structure, For the stability of the structure by changing the grade of concrete in columns at different pairs, parameters such as the nodal displacement in both X and Z directions, base shear in both X and Z directions, column axial forces, and last but not the least beam torsion values in both X and Z directions.

The above parameters obtained by the application of loads and their combinations on various cases of the multistory building as per Indian Standard 1893: 2016 code of practice.

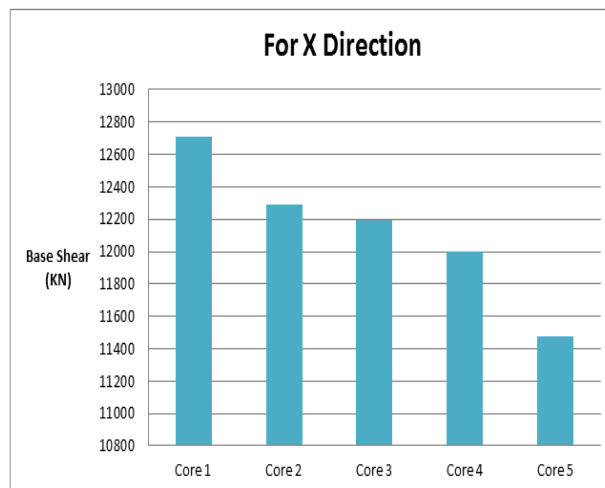
Result of each parameter and for both single and dual core has discussed with its graphical form below:-



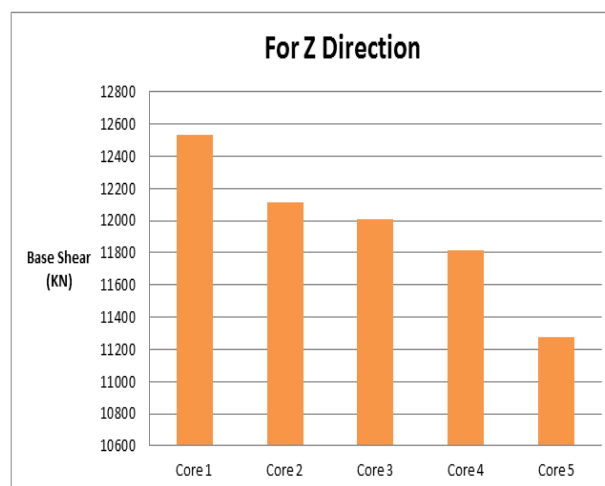
Graph 1: Graphical Representation of Maximum Displacement in X direction for all Single Core Cases



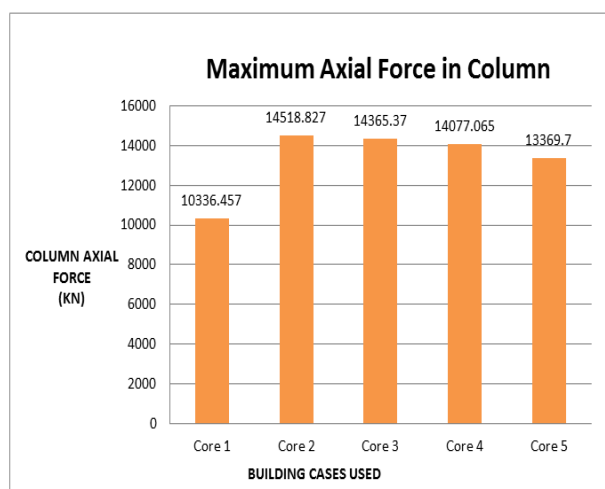
Graph 2: Graphical Representation of Maximum Displacement in Z direction for all Single Core Cases



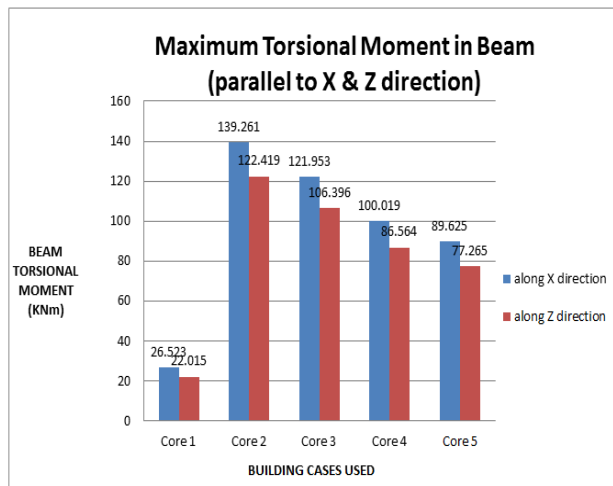
Graph 3: Graphical Representation of Base Shear in X direction for all Single Core Cases



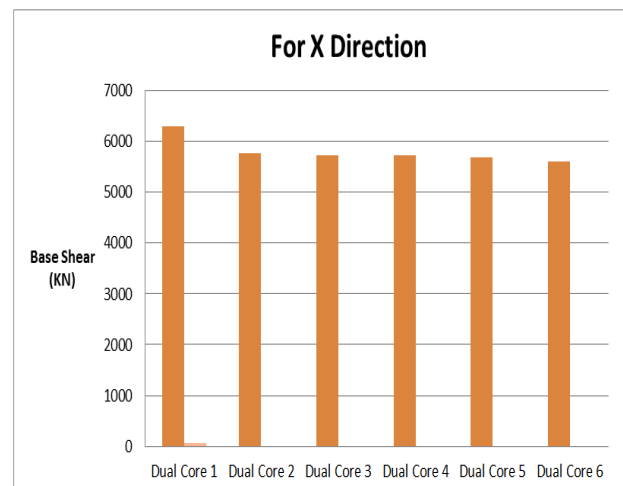
Graph 4: Graphical Representation of Base Shear in Z direction for all Single Core Cases



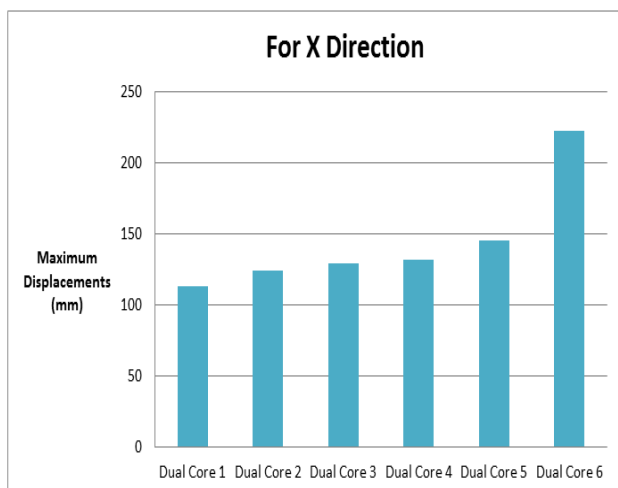
Graph 5: Graphical Representation of Maximum Axial Forces in Column for all Single Core Cases



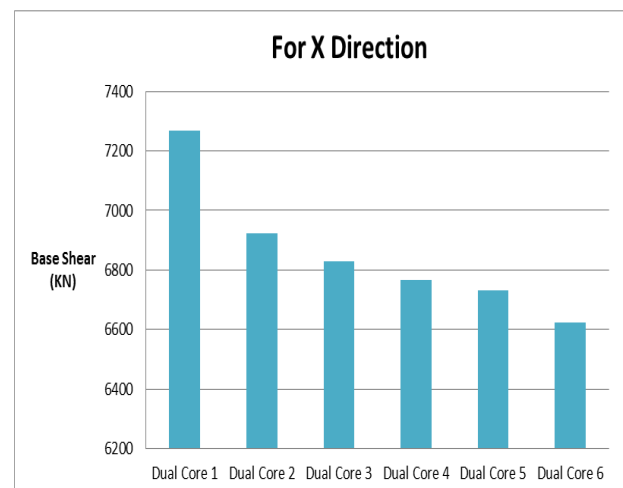
Graph 6: Graphical Representation of Maximum Torsional Moment in beams along X and Z direction for all Single Core Cases



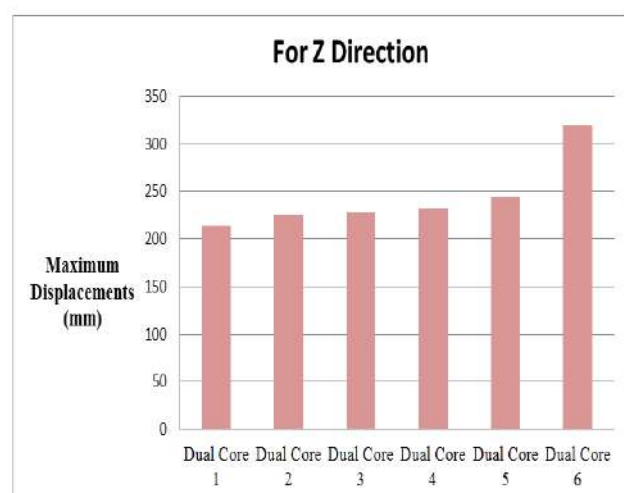
Graph 9: Graphical Representation of Base Shear in X direction for all Dual Core Cases



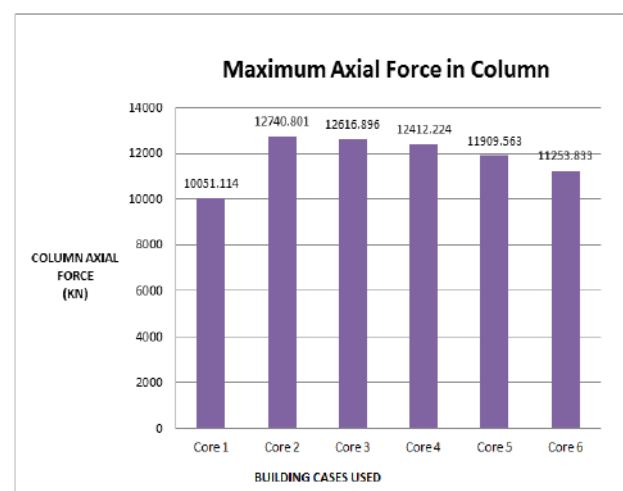
Graph 7: Graphical Representation of Maximum Displacement in X direction for all Dual Core Cases



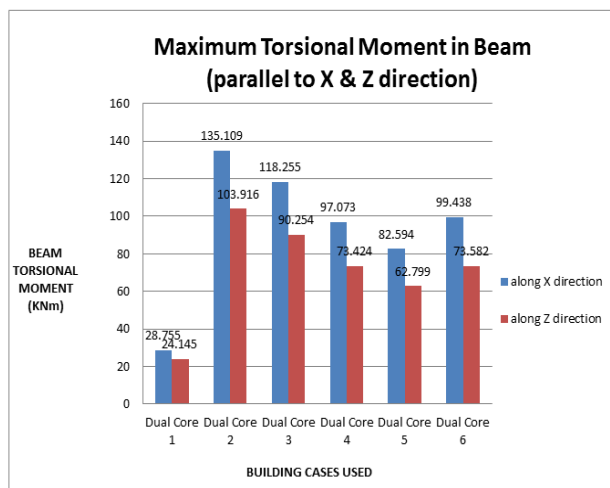
Graph 10: Graphical Representation of Base Shear in Z direction for all Dual Core Cases



Graph 8: Graphical Representation of Maximum Displacement in Z direction for all Dual Core Cases



Graph 11: Graphical Representation of Maximum Axial Forces in Column for all Dual Core Cases



Graph 12: Graphical Representation of Maximum Torsional Moment in beams along X and Z direction for all Dual Core Cases

V. CONCLUSIONS

Conclusions evolved by analyzing the result data of various parameters for all five Single Core are as follows:-

1. Maximum displacement in X direction and Z direction increases due to reduction in Shear Wall and when the opening crosses 10%, there is an increase in displacements for single core cases.
2. Base shear values decreases as the weight of the structure decreases since there is an increase in opening area percentage. For this, in both X and Z directions, building core case 5 shows the best parametric values at 25 % shear wall opening.
3. Values of Maximum Axial forces in column first increases from 0% to 10 % opening area and then the values constantly decreases and hence building core case 5 is economical among all.
4. Torsion in beam shows limiting parametric values up to building core case 5 when there will be deduction in shear wall area.

Conclusions evolved by analyzing the result data of various parameters for all six Dual Core Cases are as follows:-

1. Maximum displacement in X direction and Z direction increases due to reduction in Shear Wall and when the opening crosses 10%, there is an increase in displacements for dual core cases.
2. Base shear values decreases as the weight of the structure decreases since there is an increase in opening area percentage. For this, in both X and Z

directions, building dual core case 6 shows the best parametric values at 50 % shear wall opening.

3. Values of Maximum Axial forces in column first increases from 0% to 10 % opening area and then the values constantly decreases and hence building core case 6 is economical among all with 50% opening area.
4. Torsion in beam shows limiting parametric values under dual core case 2 when there will be deduction in shear wall area.

Due to Seismic effects, for single core structures, building core case 5 shows best parametric values among all. Similarly, for dual core structures, building core case 6 shows best parametric values among all.

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Numerical Analysis of Free Convection flow in Square Enclosure Partially Heated from below using the Multigrid Method

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Abstract— The present work investigates the efficiency of the Multigrid method when applied to solve two-dimensional laminar steady free convection flow in a square enclosure partially heated from below. The numerical method includes finite volume discretization with upwind scheme on structure orthogonal regular meshes. The performance of the correction storage (CS) Multigrid algorithm is compared for different numbers of sweeps in each grid level. Up to two grids, for both Multigrid V- and W- cycles, are presented. The results are mainly analyzed in terms of the average heat transfer at the walls of the enclosure and Multigrid performance on the rate of convergence. It is also shown that convective heat transfer has a characteristic behavior for each boundary conditions adopted in given ranges of the governing parameters.

Keywords— Multigrid, Free convection, Finite Volume, Numerical Methods.

Abbreviated title: Numerical Analysis of Free Convection Using the Multigrid Method

Nomenclature

C_p	Specific heat at constant pressure
CPU	CPU Time (s)
g	Gravitational acceleration
Gr	Grashof number
h	Average convective heat transfer coefficient
H	Height of the enclosure
L	Domain length / height
k	Thermal conductivity of the fluid
M	Maximum grid number
Nu	Average Nusselt number,
p	Thermodynamic pressure
Pe	Peclet number
Pr	Prandtl number
R_{ij}	Residue
T	Temperature
t_w	Temperature of the isothermal vertical wall

S_φ	Source term for φ , $\varphi = U, V, p, t$
U	Component of velocity along x axis
V	Component of velocity along y axis
w	Width of the inlet, and the vent
x, y	Cartesian coordinates
Subscript	
i, j	Nodal index
in	Input values
k	Grid level
nb	Neighboring
Greeks Characters	
α	Thermal diffusivity, $\rho C_p / k$
β	Coefficient of thermal expansion, $\left(\frac{-1}{\rho}\right)\left(\frac{\partial p}{\partial t}\right)_p$
ε	Dimensionless length of the heat source, $= l/L$
ν	Kinetic viscosity of the fluid
μ	Dynamic viscosity
ρ	Density of fluid
φ	General variable
Γ_φ	Diffusion coefficient for φ , $\varphi = U, V, p, t$
ν^{cg}	Number of Coarsest-grid iterations
ν^{pre}	Number of pre-smoothing iterations
ν^{post}	Number of post-smoothing iteration

I. INTRODUCTION

This study promotes a discussion surrounding the efficiency of the Multigrid method applied in a specific configuration. Multigrid methods have been used in many different calculations as a result of its facilitated converge capability. In single-grids, convergence rates solutions are greater in the beginning of calculations, reducing this sensibility while the iterative processes goes on. This hard-to-converge behavior is due to the iterative methods which smooth out only those Fourier error components of wavelengths smaller than or equal to the grid size. Naturally, this effect becomes more significant as the mesh becomes refined. At another level, Multigrid methods cover a broader range of wavelengths through relaxation on more than one grid, making it easier to converge.

A Multigrid cycle is a repetitive procedure practiced at each grid level according to the grid hierarchy. The V- and W- cycles are types of Multigrid that determine the convergence criterion and the number of iterations in each step along consecutive grid levels visited by the algorithm. Within each cycle, the intermediate solution is relaxed before (pre-) and after (post-smoothing) the transportation of values to coarser (restriction) or to finer (prolongation) grids [[1]-[3]].

The Multigrid method can be roughly classified into two major categories. The CS formulation, where algebraic equations are solved for the corrections of the variables and the Full Approximation Storage (FAS) scheme, where variables themselves are handled in all grid levels. Since much work has been done on both major classifications, specific recommendations are admitted. The application of

the CS formulation is recommended for the solution of linear problems being the FAS formulation more suitable to non-linear cases [[1]-[3]]. Therefore, an exception has been disclosed in the work of [[4]], who reported predictions for the Navier-Stokes equations successfully applying the Multigrid CS formulation. In the literature, however, not too many attempts in solving non-linear problems with Multigrid linear operators are found.

Acknowledging the advantages of using multiple grids, [[5]] presented numerical computations applying this technique to recirculating flows in several geometries of engineering interest. There, the correction storage (CS) formulation was applied to non-linear problems. Later [[6]], analyzed the effect of Peclet number and the use of different solution cycles when solving the temperature field within flows with a given velocity distribution. In all those cases, the advantages in using more than one grid in iterative solution was confirmed, furthermore, [[7]], introduced the solution of the energy equation in their Multigrid algorithm. Temperature distribution was calculated solving the whole equation set together with the flow field as well as uncoupling the momentum and energy equations. A study on optimal relaxation parameters was there reported. More recently, [[8]] analyzed the influence of the increase of points of the mesh and optimal values of the parameters of the Multigrid cycle for different geometries. Also, [[8]-[11]], presented a study on optimal convergence characteristics in solution of conductive-convective problems.

Much work has been done with enclosure geometries, studying heat and mass transfer, (simultaneously or not) because of its engineering response value. The reason for the attention behind the physical nature of buoyance-induced flows is well represented in [[12]]. Cooling of electronic devices before its excessive heating, recovery of remnant oil in petroleum reservoirs, dispersion of atmospheric pollution and its implications in adjacent cities, spreading chemical and nuclear waste in soil, are just some examples of its importance.

The current work considers that free convection conditions can be imposed inside a square cavity and aims to study the interactions between buoyancy forces and heat elements inside. This application involves the work showed in the literature that has been discussed by many authors. The interaction between buoyancy forces and the heated elements and the numerical analysis of Multigrid solution applied into momentum and heat transfer forms the main objective of current work.

II. GOVERNING EQUATIONS

The following equations emerge from the mathematical descriptions of fluid flow and convective heat transfer in the enclosure. These governing equations are based on two-dimensional, incompressible, laminar flow in Cartesian coordinate system.

$$\frac{\partial U}{\partial x} + \frac{\partial V}{\partial y} = 0 \quad (1)$$

$$U \frac{\partial U}{\partial x} + V \frac{\partial V}{\partial y} = -\frac{1}{\rho} \frac{\partial p}{\partial x} + \nu \nabla^2 U \quad (2)$$

$$U \frac{\partial V}{\partial x} + V \frac{\partial V}{\partial y} = -\frac{1}{\rho} \frac{\partial p}{\partial y} + \nu \nabla^2 V + g [\beta_T (T - T_{ref})] \quad (3)$$

$$U \frac{\partial T}{\partial x} + V \frac{\partial T}{\partial y} = \alpha \nabla^2 T \quad (4)$$

Where U and V are the velocity components in x and y directions respectively, ρ is the density of the fluid, p is the total pressure and ν is the kinematic viscosity of the fluid. The gravity acceleration is defined by g and β_T is the thermal expansion coefficient. T and T_{ref} are the temperature and the reference temperature, respectively, and α is the thermal diffusivity.

The transport dimensionless parameters, Grashoff (Gr), which provides the relationship between fluid buoyancy and viscosity, Prandtl (Pr), that provides the relationship of momentum diffusivity and thermal diffusivity and the Rayleigh number (Ra), which is an associated number of buoyancy-driven flow (natural convection) are given by:

$$Gr = \frac{g \beta_T \Delta T H^3}{\nu^2}, Pr = \frac{\nu}{\alpha} \quad (5)$$

$$Ra = Gr \cdot Pr \quad (6)$$

III. NUMERICAL MODEL

The solution domain consist on a number of rectangular control volumes (CV), resulting in a structure orthogonal non-uniform mesh. Grid points are located according to a

cell-centered scheme and velocities are store in a collocated arrangement[[13]]. A typical CV with its main dimensions

and internodal distances is sketched in Fig. **Error! Reference source not found..**

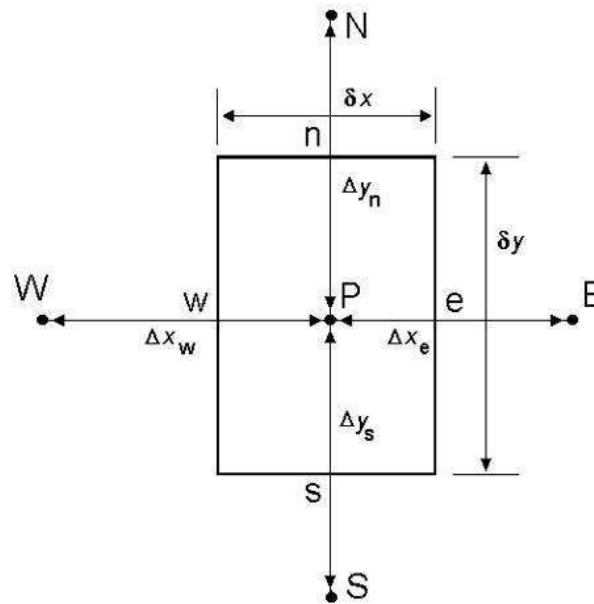


Fig. 1– Control Volume for discretization.

Writing equations (1), (2), (3) and (4) in terms of a general variable $\varphi = \{1, U, V, T\}$ with

$$\Gamma_\varphi = \left\{ 0, \mu, \mu, \frac{\mu}{Pr} \right\} \text{ and } S_\varphi = \left\{ 0, -\frac{\partial P}{\partial x}, -\frac{\partial P}{\partial y}, 0 \right\}$$

one gets,

$$\frac{\partial}{\partial x} \left(\rho U \varphi - \Gamma_\varphi \frac{\partial \varphi}{\partial x} \right) + \frac{\partial}{\partial y} \left(\rho V \varphi - \Gamma_\varphi \frac{\partial \varphi}{\partial y} \right) = S_\varphi \quad (7)$$

After integrating it over the CV of Fig. **Error!**

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$$\int_{\partial V} \left[\frac{\partial}{\partial x} (\rho U \varphi) + \frac{\partial}{\partial y} (\rho V \varphi) \right] dV = \int_{\partial V} \left[\frac{\partial}{\partial x} \left(\Gamma_\varphi \frac{\partial \varphi}{\partial x} \right) + \frac{\partial}{\partial y} \left(\Gamma_\varphi \frac{\partial \varphi}{\partial y} \right) \right] dV + \int_{\partial V} S_\varphi dV \quad (8)$$

A set of algebraic equations are resulted from the integration of terms in (8), as one can name it, convection, diffusion, and source. Since these procedures are described somewhere else (e.g. **Error! Reference source not found.**)

they are not repeated in this paper. To summarize, convective terms are discretized using the upwind differencing scheme (UDS) and diffusive fluxes make use of the central differencing scheme (CDS).

The final discretization for grid node P is done by using the integrated transport equation (8) with the substitution of all approximate expressions for interface values and gradients.

$$a_P \varphi_P = a_E \varphi_E + a_W \varphi_W + a_N \varphi_N + a_S \varphi_S + b \quad (9)$$

With the east face coefficient, for example, being defined as:

$$a_E = \max[-C_e, 0] + D_e \quad (10)$$

In (10), $D_e = \mu_e \delta_y / \Delta x_e$ and $C_e = (\rho U)_e \delta_y$ are the diffusive and convective fluxes at the CV east face, respectively, and as usual, the operator $\max[a, b]$ returns the greater between a and b .

IV. MULTIGRID TECHNIQUE

The wanted effect of the Multigrid approach in this work is for the convergence rate to become independent on

the grid spacing and the numerical solution faster. The task behind the Multigrid method is to involve a hierarchy of successively coarsened grids into the iterative solution process. When done, an adequate strategy for the movement through the different grid levels should follow, along with consistently transferring data with the discretization scheme between the grids. This process allows an efficient error reduction over a wide spectrum of frequencies.

If an iterative scheme as the one described below is applied to the system of equations on a given grid, it turns out only those frequencies of the solution error can be reduced efficiently, which corresponds to the grid spacing. The high frequencies of the error are reduced a few iterations, while the low frequencies nearly remain unchanged. At another level, the steps usually taken in Multigrid algorithm are the reduction of high frequency errors (smoothing), computation of residual error (residual computation), decimation of the residual error to a coarser

grid (restriction), and the interpolation into a finer grid. The present development about the Multigrid technique is also presented in [[5],[6],[10],[11]] and for this reason the development is not repeated here.

V. RESULTS AND DISCUSSION

The computer code was run on an IBM PC machine with an INTEL CORE 2 DUO 2.0 GHz processor. Grid independence studies were conducted such that the solutions presented herein are essentially grid independent. For both cycles, pre- and post-smoothing iterations were accomplished via the Gauss-Seidel algorithm while, at the coarsest-grid, the TDMA method has been applied [[13]].

The Fig. 2 a) represent general geometries that were run with the finest grid having 66x66 grid points highlighted in Fig. 2 b).

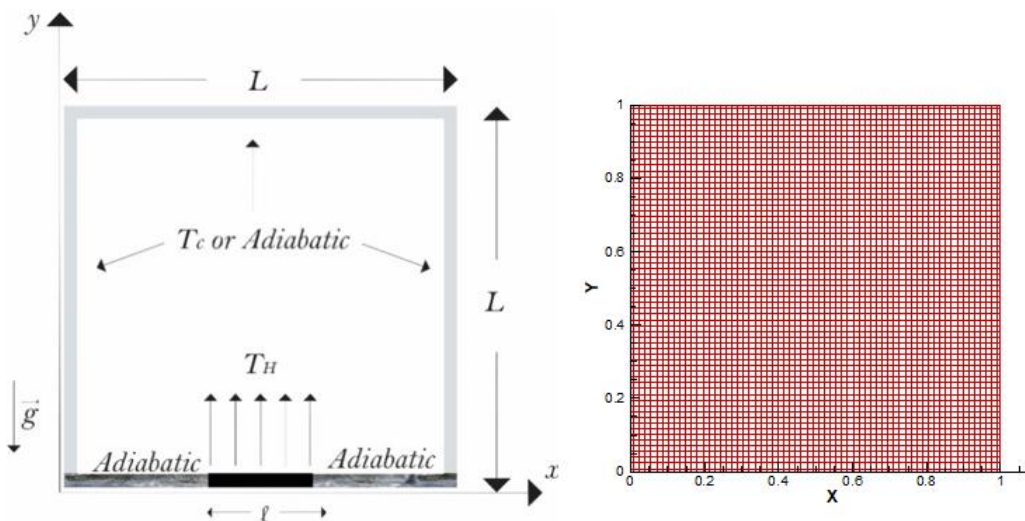


Fig. 2 - a) Geometries and boundary conditions and b) computational grid.

The main difference between the present work and the work from [[14]] is that here it is used the prescribed values (temperature - T_H) while in the reference work is used heat fluxes. This particularity reinforces a permanent regime with constant physical properties of the flux.

In order to understand better the implications of this new configuration and construct a simpler idea of the square cavity, for comparison meaning, Fig. 3 shows the streamlines and isotherms, respectively, of a clear square cavity heated on the left and cooled from the opposing side for Rayleigh numbers ranging from 1×10^3 to 1×10^6 .

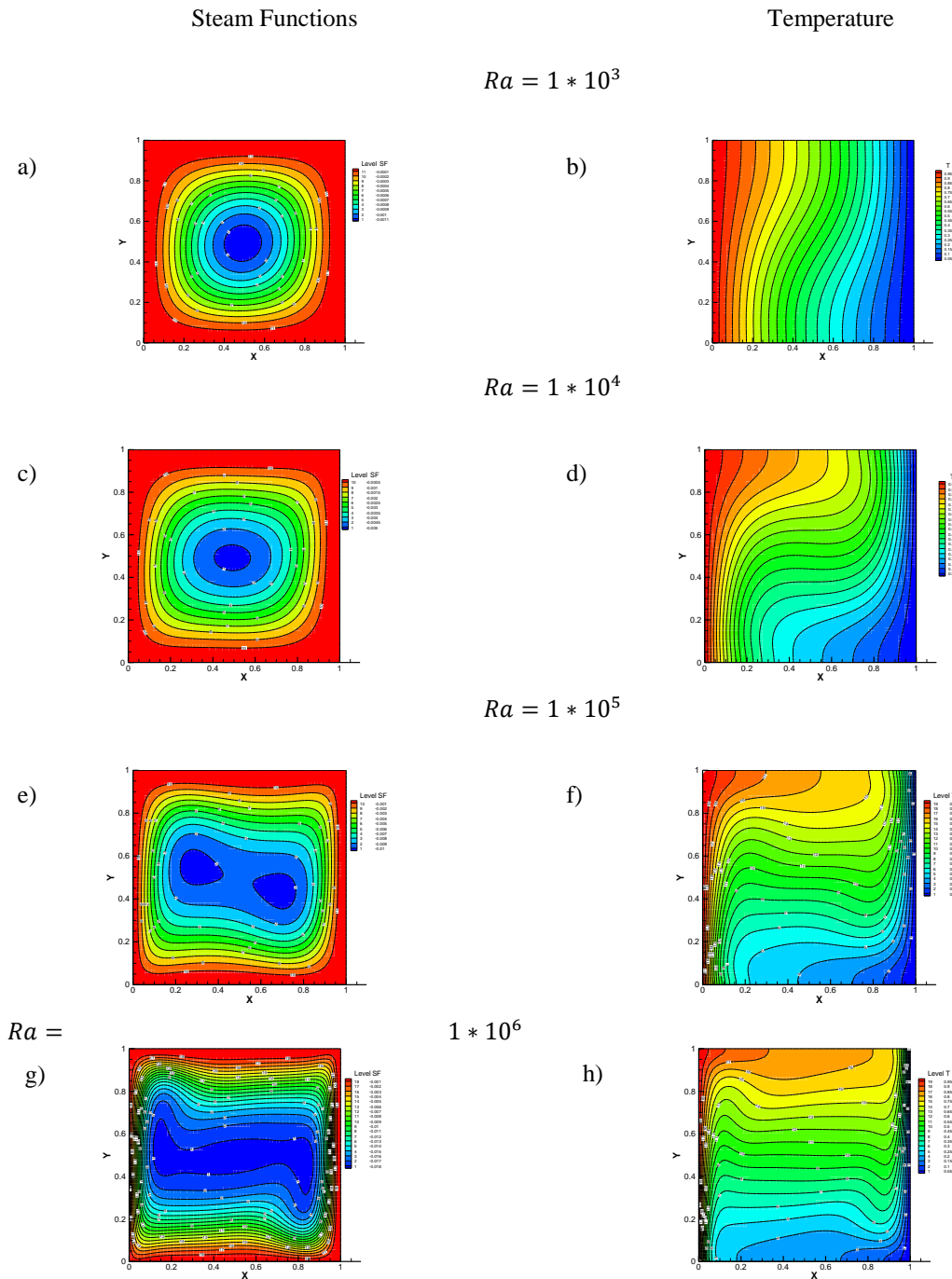


Fig. 3 - Natural Convection in Square Cavity from left to bottom $Ra = 1 * 10^3$, $Ra = 1 * 10^4$,
 $Ra = 1 * 10^5$ and $Ra = 1 * 10^6$, respectively.

In Fig. (3a), $Ra = 1 \times 10^3$, the streamlines indicate an existence of one centered vortex while corresponding isotherms, Fig. (3b), indicate a conductive heat transfer, expressed by the almost parallel pattern with the heated wall. The vortex is generated by the horizontal temperature

gradient across the section. This gradient, $\frac{\partial T}{\partial y}$ is negative everywhere, inducing a clockwise oriented vorticity.

When the Rayleigh number is increased to $Ra = 1 \times 10^4$, Fig. (3c), the vortex in the middle of the

cavity starts to shape differently, slightly into a more elliptic configuration. The isotherms, Fig (3d), therefore, have a considerable convection advance, and the parallel

configuration is undone, especially in the middle of the cavity. Temperature gradients are stronger near the vertical walls, but decrease in the center region.

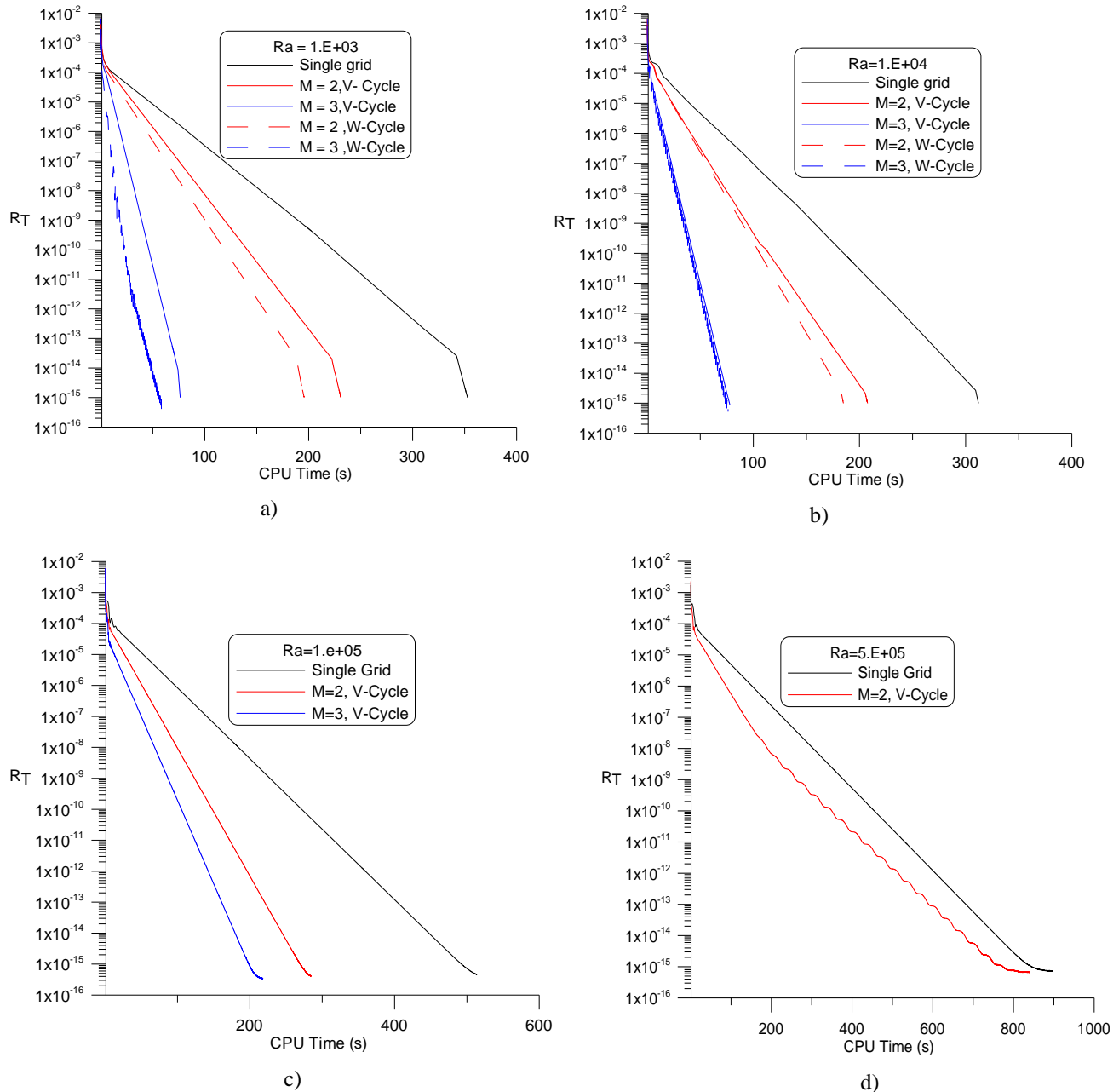


Fig. 4 – Temperatures residues history for different values of the Rayleigh number: a) $Ra = 1 \times 10^3$,

b) $Ra = 1 \times 10^4$, c) $Ra = 1 \times 10^5$ and d) $Ra = 1 \times 10^5$

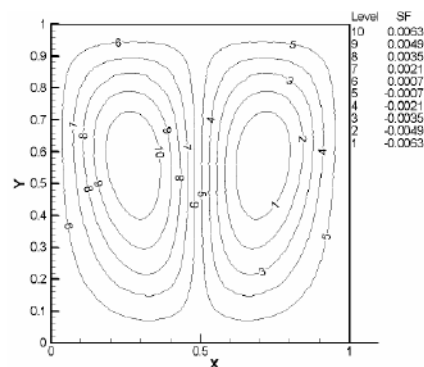
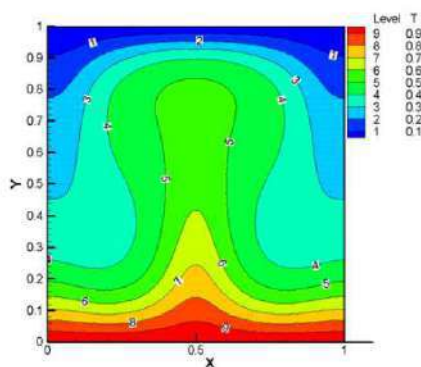
For $Ra = 1 \times 10^5$, Fig. (3e), the elliptical behavior continuous and the centered vortex is stretched so that two secondary vortices can be shown inside of it. Heat transfer by convection in the viscous boundary layer alters the temperature distribution to such an extent that temperature gradients in the center of the domain are close to zero. Fig. (3e) shows that, with this change in the sign of the source term negative, vorticity is induced within the domain. This also causes the development of secondary vortices in the core. Fig. (3f) continuous its convection advance in the square cavity indicating a faster movement of the flux closer to the walls.

Finally, in Fig. (3g), $Ra = 1 \times 10^6$, one can see an initiative attempt for a three vortices configuration inside the main vortex. Corresponding Fig. (3h) shows that heat transfer is mostly convective, again due to the faster movement on boarders.

Fig.4 above, shows the residue history for temperature with different values of $Ra = 1 \times 10^3$ to 5×10^5 , up to 3 grids, for the V- and W-cycles. For a three grids, with $Ra = 1 \times 10^3$ one can notice a slight advantage in using the W-cycle, while in $Ra = 1 \times 10^4$ that advantage is almost unnoticeable. Now, looking at higher Rayleigh numbers, $Ra = 1 \times 10^5$ to $Ra = 5 \times 10^5$, the V-cycle can be better stipulated. This change of cycle due to the increase in the Rayleigh number happens because of the changing flux attempt to turn turbulent. An explanation for this matter are on many references of Multigrid approximation on turbulent flow, which in most of the cases use the FAS formulation.

Another configuration, shows the results of isotherms and streamlines of a clear square cavity heated on the bottom and cooled from the top for a Rayleigh number of $Ra = 4 \times 10^4$. The work of [[12]] is used for comparison.

Reference [[12]]



Present Results

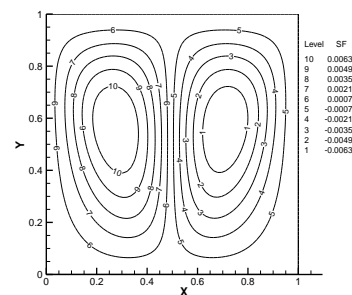
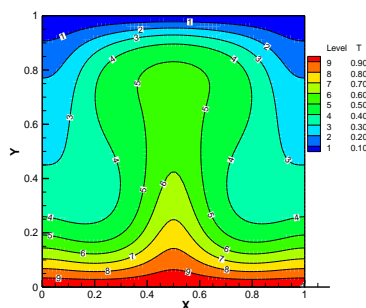


Fig. 5 – Isotherms and Streamlines for a clear square cavity heated from bottom and from the ceiling for $Ra = 1 \times 10^4$, comparison between [[12]] and present research.

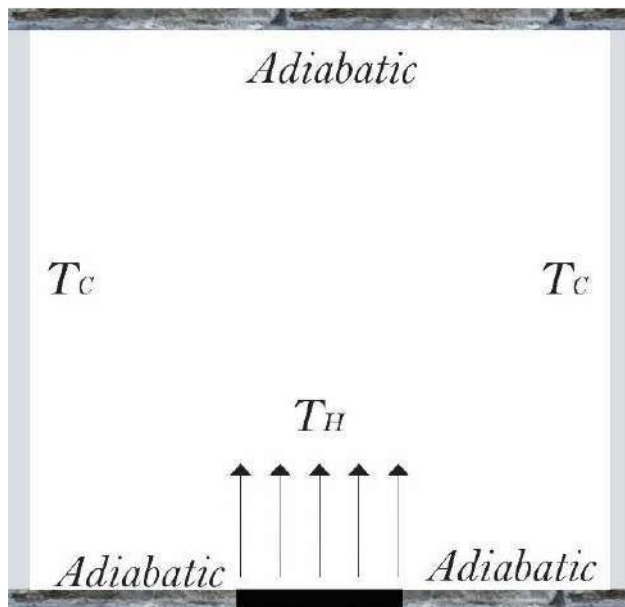
In Fig. 5, it is easy to see the similarities in the results of both works. Studying these results, one can note the plume

shaped structure starting at the bottom of the cavity moving towards the top. Circulatory motion brings the bottom hot

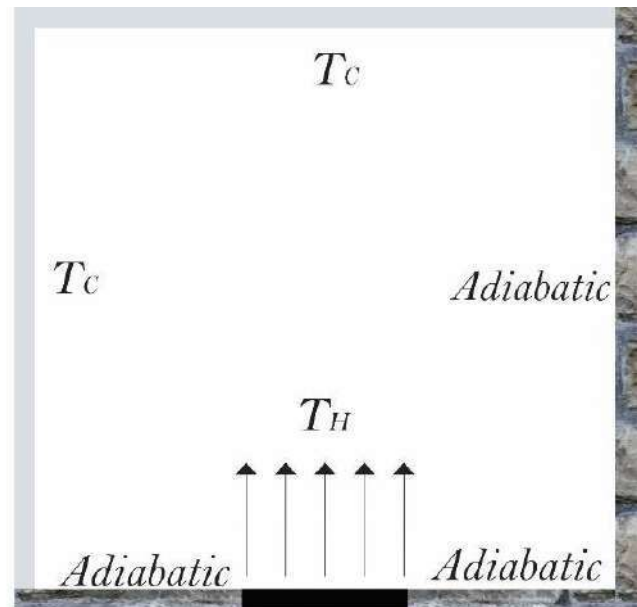
temperature stream up to the top wall, substantially penetrating into the flow core.

From these results, is expected a better understanding and a certain familiarization with the final configuration, Fig. 2a, due to the heated bottom in the square cavity. Additionally, Fig. 5 represents the only possible solutions for that Ra number, reinforcing the final results and the geometry qualitatively.

Final configuration, square cavity partially heated from above, is separated into two different forms, denoted as C_1 and C_2 . The C_1 structure has both lateral walls cooled at temperature T_c and top wall adiabatic, while C_2 has left lateral wall and top wall cooled at temperature T_c and right lateral wall adiabatic. Fig. 6 is a representative scheme of C_1 and C_2 . Notice that for all configurations the total surfaces of the cooled walls are identical.



Configuration C1



Configuration C2

Fig. 6 - Thermal configurations of the cavity.

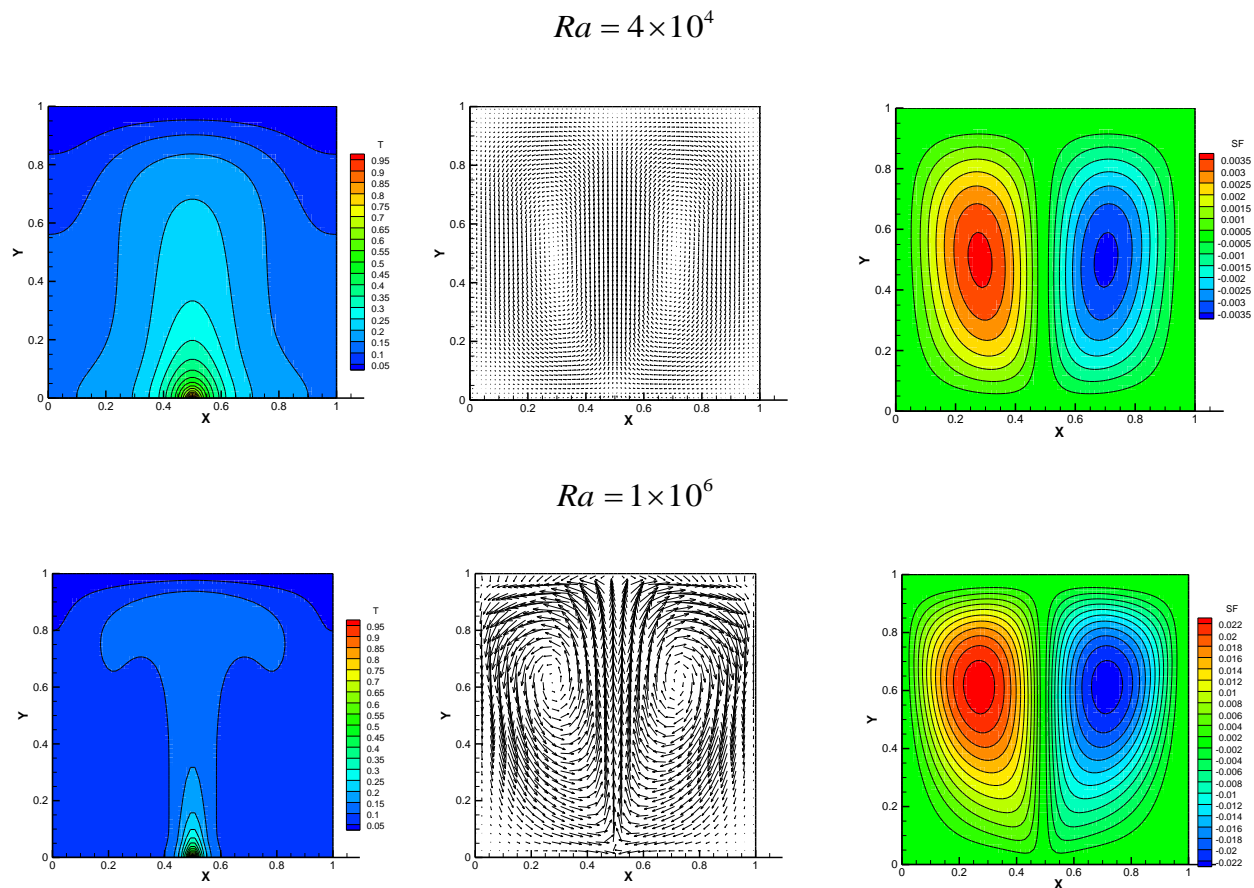


Fig. 7 – Isotherms, vectors and isotherms in the cavity for $\varepsilon = 0.03$.

Final results can be seen in Fig. 7, 8 and 9 for C_1 and C_2 conditions, side by side, as Rayleigh number increases top to bottom. As ε was incremented, the streamlines and isotherms related are plotted.

First observation lies on the boundary thermal conditions. When these conditions are symmetrical, about the vertical mid plane, i.e., case C_1 , the fluid motion is also symmetrical and two counter-rotating cells are formed in the cavity. The isotherms are also symmetrical about the vertical mid plane and it is noticed that the temperature gradient becomes steeper and bigger at the hot surface where a thermal plume may be located. In case C_2 , fluid flow takes a direction towards the adiabatic wall on the side of the cavity,

making the flow asymmetric and characterized with a single-cell of anticlockwise circulation.

In each case the stagnation point is observed at the middle of the bottom wall. It is easy to see the similarity between case C_1 and the bottom-heated arrangement in Fig. 5, making a plume shaped pattern. Similar behaviors of the flow and thermal fields are observed at other Rayleigh numbers as an increment for the following Figures. Finally, Fig. 10 presents temperatures residues history for different values of the Rayleigh number, $Ra = 4 \times 10^4$ and $Ra = 1 \times 10^6$ for the case it was presented in Fig. 7. Once more again the Multigrid solution has the best results at least in the computational effort reduction.

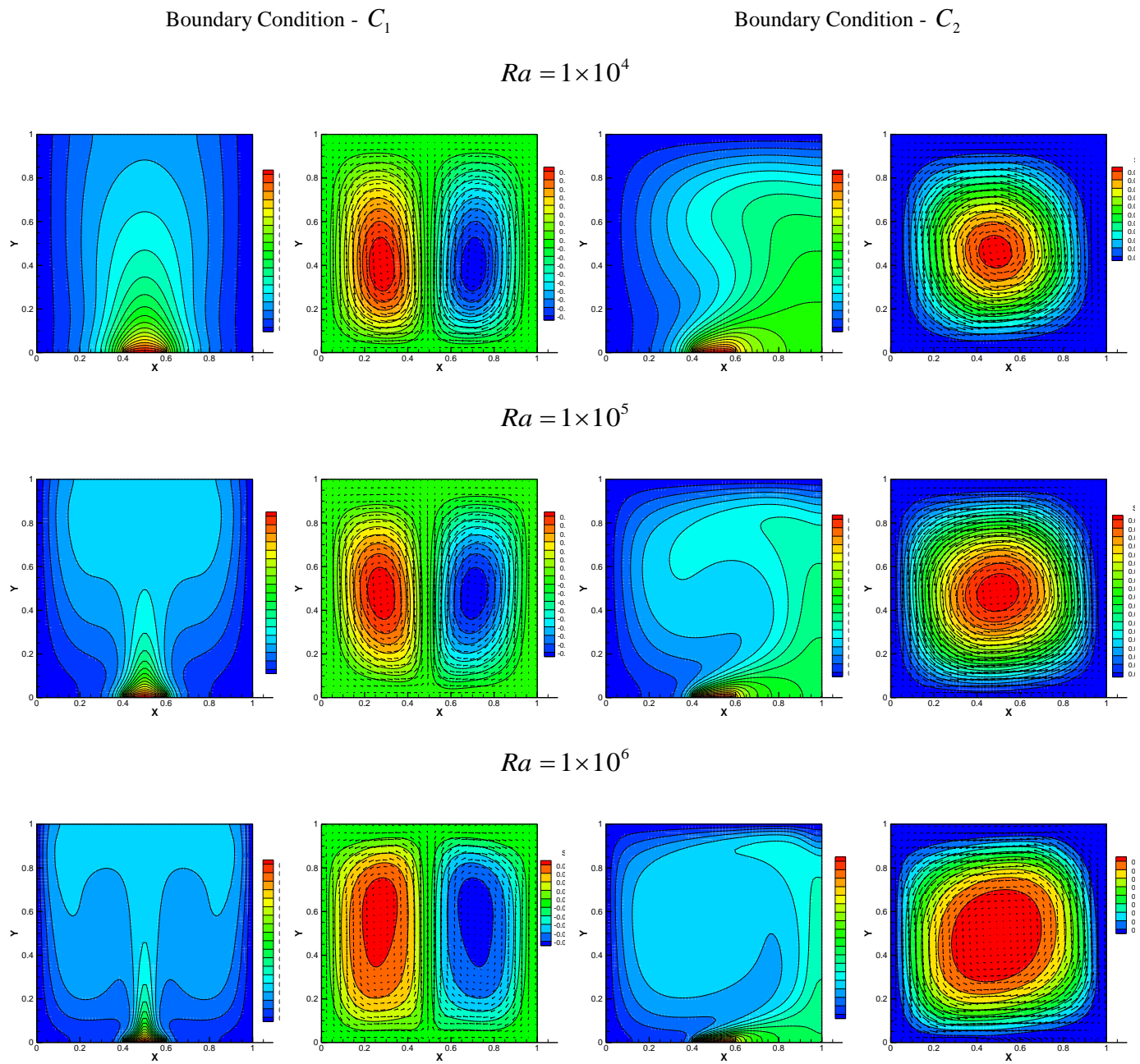


Fig. 8 - Streamlines and isotherms in the cavity for $\varepsilon = 0.2$.

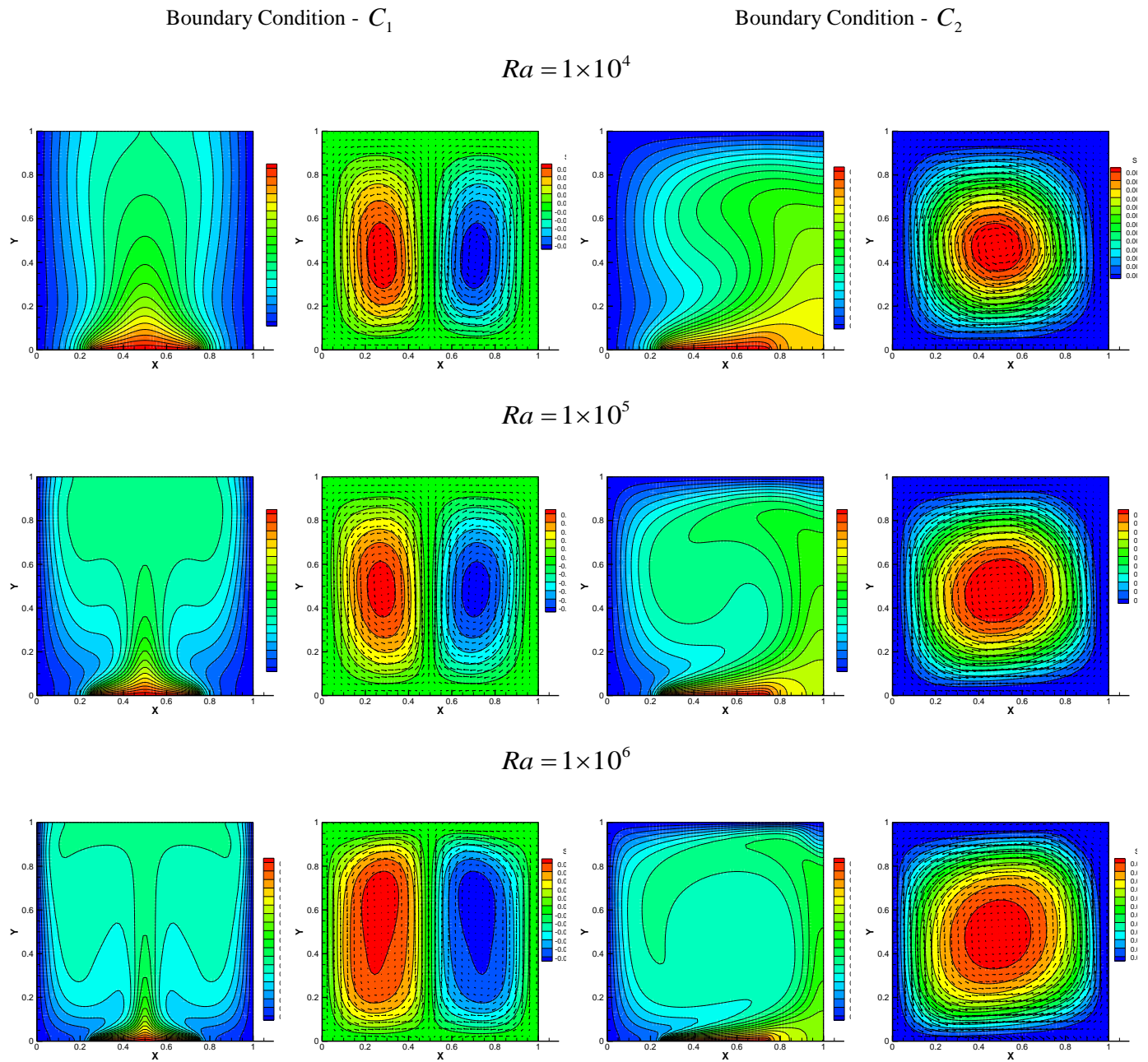


Fig. 9- Streamlines and isotherms in the cavity for $\varepsilon = 0.5$.

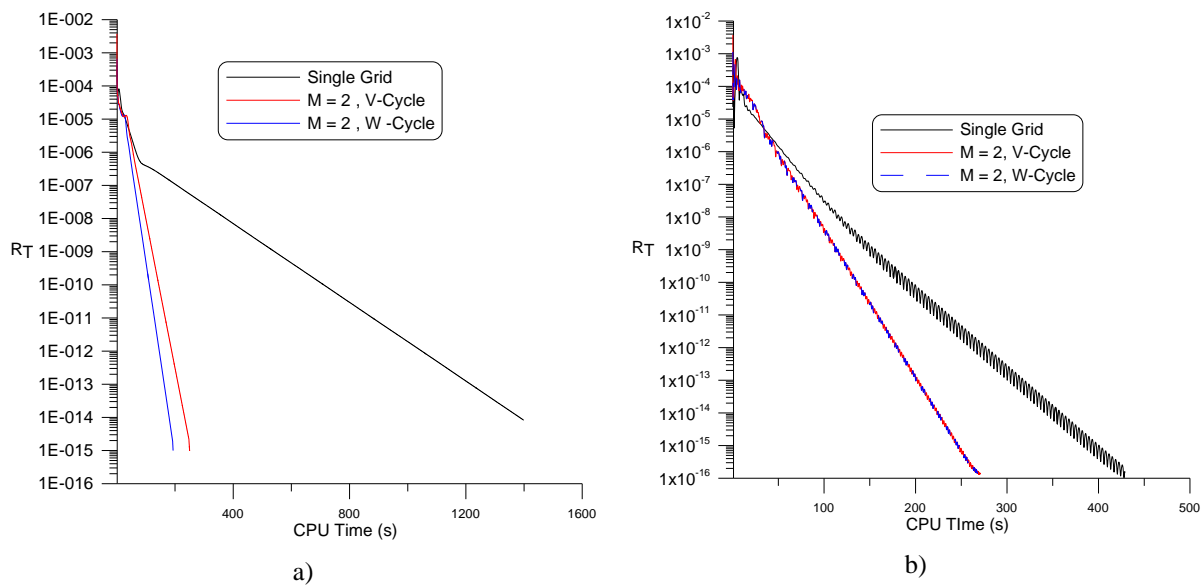


Fig. 10 – Temperatures residues history for different values of the Rayleigh number: a)

$Ra = 1 * 10^4$ and b) $Ra = 1 * 10^6$

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The global issue of statutory rape: Brazil's experience

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Abstract— *Background: More women, and especially those younger than 14 years, have reported their first sexual intercourse as coerced. These age groups need to be targeted for interventions to delay sexual debut and prevent sexual coercion. This study sought to compare the prevalence of sexual debut (SD) in adolescents under 14 years old before and after the implementation of the Statutory Rape Law in Brazil.*

Methods: We conducted a retrospective analysis of medical records of 591 pregnant adolescents aged 10-18 years served at teaching maternity hospital of Brazil's National Health System (Sistema Único de Saúde – SUS). Sociodemographic data and information on clinical history of SD were collected.

Results: The prevalence rate of SD under 14 years of age was 26% in 2006 versus 48.5% in 2016 ($p < 0.001$). In 2006, the median age of the partner was 19 years versus 17 years in 2016 ($p = 0.001$).

Conclusions: The prevalence of early sexual debut was significantly higher 7 years after the implementation of the Statutory Rape law as compared to 3 years prior.

Keywords— *Sexuality; Date rape; Adolescent; Statutory rape.*

I. INTRODUCTION

Researchers suggest that in some instances early sexual debut is the result of sexual violence including rape and other forms of coercion (Ankomah, Mamman-Daura, Omoregie, & Anyanti, 2011). Data from longitudinal research carried in South Africa shows that more women, and especially those younger than 14 years, reported their first sexual intercourse as coerced. The data show that these age groups need to be targeted for interventions to delay sexual debut and prevent sexual coercion (Richter, Mabaso, Ramjith, & Norris, 2015).

Data from the World Health Organization show that one in five girls has been sexually abused during childhood, with estimates from some countries placing that proportion closer to one in three (World Health Organization [WHO], 2014).

According to the Epidemiological Bulletin issued by Brazil's Health Surveillance Secretariat, there were 76,716 cases of sexual abuse against women under the age of 19, which accounted for 92.4% of all reported cases of sexual abuse in Brazil. Moreover, 67.1% of these women were aged 10 to 14 years. The bulletin highlighted the difficulty in giving visibility to the problem due to its intimate nature, the victims' poor autonomy to communicate the event, the social stigma and the feeling of shame (Brasil, 2018).

Peer group pressure (50%), monetary gain (27.5%), personal satisfaction (16.7%), curiosity (4.2%) and lack of home guidance from parents and relatives (1.7%) have been reported as the most common reasons for having premarital sex (Duru, Ubajaka, Nnebue, Ifeadike, & Okoro, 2010).

Another factor that contributes to early sexual debut is child marriage. Brazil ranks fourth in absolute numbers of women married by age 15. However, Informal unions are more common than formal marriages involving underage girls and adult men and usually occur after a period of courtship, casual sex or dating (Taylor, Lauro, Segundo, & Greene, 2015).

In certain given societies, culture, honor, tradition, and religion undergird adult-adolescent marriage. Therefore, understanding the practical physical and mental health needs related to child marriage should underpin any plans for development at the community, state, regional and international levels (Equality Now, 2014). Faced with this problem, Canada set the general age of consent for sexual activity at 16 years old (Fleming, O'Driscoll, Becker, & Spitzer, 2015).

The age of marriage in Brazil is 16, with parental consent required when individuals are under the age of 18 (Brasil, 2008). The law sets out that marriage under the age of 16 may be allowed only in two cases: 1) to avoid the imposition or enforcement of criminal penalties; or 2) in case of pregnancy. However, child marriage is very common and widely accepted in Brazil, which is ranked fourth in the number of girls married to a partner by the age of 15. These girls usually seek older husbands to escape from sexual and other violence in the home, or because of teenage pregnancy or the lack of job opportunities (Taylor et al., 2015).

In Brazil, with the purpose of protecting young adolescents, Law No. 12 015 was put into effect in 2009 to alter art. 1 of Law No. 8072 of 1990. The law defines in its article 217-A "Statutory Rape" as any action that, even with consent, may result in "sexual intercourse or practice of another libidinous act with individuals under the age of 14 (fourteen) years". Punishment for this crime is 8 to 15 years of imprisonment. It should be noted, however, that if the perpetrator is under the age of 18, it is still a crime. However, in Brazil, the age of criminal responsibility is 18 years old. Therefore, individuals under the age of 18 will not be sent to jail (Brasil, 2009).

Therefore, the changes in this law should have implications for the fight against crimes against sexual freedom, either with regard to coverage of cases or redefinition of penalties (Nucci, 2014). However, the rates have not decreased, and a significant proportion of cases are not reported to the police (Gallo et al, 2016).

Thus, considering the hypothesis that the rate of early sexual debut in girls under the age of 14 may have decreased in 2016 compared with 2006 after the implementation of the Statutory Rape Law in 2009, our

study aimed to compare the prevalence of early sexual debut (SD) in adolescents under 14 years old before and after the implementation of the Statutory Rape Law in Brazil.

II. METHODS

This quantitative research is based on a retrospective analysis of secondary data collected from medical records of pregnant adolescents who attended the Pediatric and Adolescent Obstetrics and Gynecology Clinic at the Assis Chateaubriand Maternity Hospital, a teaching hospital affiliated with the Federal University of Ceará. The hospital is part of Brazil's National Health System – the Unified Health System (*Sistema Único de Saúde – SUS*) – and has been serving the population of Ceará since 1965. It is a reference center with the mission of promoting education, research and tertiary health care.

The study used a census of medical records of adolescents who attended the clinic in 2006 and 2016 in order to assess the age of sexual debut before and after the implementation of Law No. 12 015, which defines Statutory Rape as any sexual act with an individual under the age of 14. The years analyzed corresponded to the period when the data were fully consolidated.

Data were collected from the medical records of pregnant adolescents who spontaneously sought the clinic for prenatal care. The medical record was completed by the doctor's assistant during the first prenatal care consultation.

Data were collected using an author-developed form that addressed sociodemographic information (age, education, partner's age, marital status, knowledge and use of contraceptive methods) and clinical history (age of sexual debut and menarche). The study was carried out from September to November 2017 after approval from the Research Ethics Committee (Approval No. 1.898.946).

Inclusion criterion was: age between 10 and 18 years, as the clinic served girls up to 18 years of age. Medical records that did not inform the age of the adolescents were excluded.

The results were organized and consolidated using the Statistical Package for the Social Sciences, version 23.0 (SPSS Inc., Chicago, IL, USA). The results were analyzed using inferential statistics (Pearson's Chi-squared test, Fisher's Exact test, and Mann-Whitney U) test with the significance threshold set at 5%. The Shapiro-Wilk test was used to test the normality of the quantitative variables.

III. RESULTS

The quantitative variables presented a non-normal distribution ($p < 0.001$). In all, 591 medical records were assessed. Of these, 319 corresponded to adolescents who attended the clinic in 2006, whose age ranged from 12 to 18 years, with a mean age of 16.2 ± 1.5 years. The other 272 medical records corresponded to adolescents who attended the clinic in 2016, whose age ranged 12 to 18 years, with a mean age of 15.2 ± 1.4 years.

Table 1 shows a statistically significant difference in adolescents' age of sexual debut between the two periods ($p < 0.001$). The prevalence of early SD was 26% among the study cohort in 2006 as compared to 48.5% in 2016.

Table 1. Sexual debut by year. Fortaleza, Brazil, 2017.

Age of SD	2006	2016	p value
	n (%)	n (%)	
<14	83 (26.0)	132 (48.5)	<0.001
≥ 14	236 (74.0)	140 (51.5)	

Source: Research data. Chi-squared test. SD = Sexual Debut.

Table 2 shows the characteristics (marital status, years of study and knowledge and use of contraceptive methods) of the adolescents whose SD occurred before the age of 14 years. The adolescents' mean years of study was 8.6 ± 2.7 years in 2006 and 8.0 ± 2.2 years in 2016.

Table 2. Characteristics of the adolescents whose SD occurred before the age of 14 in 2006 and 2016. Fortaleza, Ceará, 2017.

Variables	2006 (n=83)	2016 (n=132)	p value
	n (%)	n (%)	
Age of SD			0.453 ²
10	-	3 (2.3)	
11	6 (7.2)	13 (9.8)	
12	24 (28.9)	30 (22.7)	
13	53 (63.9)	86 (65.2)	
Marital status			<0.001¹
Married or living with a partner	80 (96.4)	92 (71.9)	
Single or living without a partner	3 (3.6)	36 (28.1)	
Years of study	8.6 \pm 2.7	8.0 \pm 2.2	0.279 ³
Knowledge about contraceptive methods			0.009¹
Yes	72 (93.5)	78 (79.6)	
No	5 (6.5)	20 (20.4)	
Use of contraceptive methods			0.041¹
Yes	32 (50.8)	63 (67.0)	
No	31 (49.2)	31 (33.0)	

¹ Pearson's Chi-squared Test; ² Fisher's Exact Test; ³ Mann-Whitney U Test

Years of study were similar in both groups. In all, 80 (96.4%) adolescents in 2006 and 92 (71.9%) adolescents in 2016 were married or lived with a partner, with a statistically significant difference between the years ($p < 0.001$) and significant standardized residuals.

Most of the adolescents knew contraceptive methods – 72 (93.5%) in 2006 and 78 (79.6%) in 2016

($p = 0.009$) – and how to use them – 32 (50.8) in 2006 and 63 (67.0) in 2016 ($p = 0.041$).

Table 3 depicts the median and the quartile values for SD, age of menarche, and age of the partner at SD in 2006 and 2016. The median age of SD was 13 in both years, with no significant difference ($p = 0.915$).

Table 3. Characteristics of sexual debut before the age of 14 in 2006 and 2016. Fortaleza, Ceará, 2017.

Variables	2006 (n=83)		2016 (n=132)		p value
	Mean \pm SD	Median (1 st – 3 rd quartile)	Mean \pm SD	Median (1 st – 3 rd quartile)	
Age of SD	12.6 \pm 0.6	13.0 (12.0 - 13.0)	12.5 \pm 0.8	13.0 (12.0 - 13.0)	0.915
Age of menarche	11.2 \pm 1.1	11.0 (10.0 - 12.0)	11.2 \pm 1.1	11.0 (11.0 - 12.0)	0.715
Age of the partner at SD	21.0 \pm 6.3	19.0 (17.0 - 23.0)	18.2 \pm 3.4	17.0 (16.0 - 20.0)	0.001

Mann-Whitney U test

The median age of menarche was also the same in both cohorts. The age of the partner at SD ranged 12 to 45 years in 2006 and 12 to 30 years in 2016, with a median of 19 years in 2006 and 17 years in 2016 ($p=0.001$).

IV. DISCUSSION

Most studies on sexual debut focus on girls aged 15-19 years. Given that, the present study is relevant because it analyzes sexual debut in girls under 14 years of age, which may contribute to the planning of public health policies targeted at this population group.

The statistically significant difference ($p<0.001$) in the number of pregnant adolescents under 14 years of age in 2006 (26%) compared with 2016 (48.5%) demonstrates that Brazilian girls are having sex at earlier ages, which, in Brazil, is considered Statutory Rape, as defined in Law 12 015 (Brasil, 2009). However, as mentioned previously, even with the existence and redefinition of the Law, the number of cases continue to grow, with major implications for adolescents (Nucci, 2014).

It should be noted that our study analyzed the medical records of pregnant adolescents who attended a reference pediatric and adolescent obstetrics and gynecology clinic. Data from a study of 21 countries with complete statistics on teenage pregnancy rate showed that, among countries with reliable evidence, the highest rate among 10- to 14-year olds was in Hungary (1.19/1000 pregnancies) and the lowest was in Switzerland (0.09/1000). In addition, the study reported that the proportion of teen pregnancies that ended in abortion ranged from 17% in Slovakia to 69% in Sweden (Sedgh, Finer, Bankole, Eilers, & Singh, 2015).

The adolescents analyzed in the present study had a mean of seven years of study in both periods. In Brazil, there have been two models of sex education: the biological-centered and preventive approach and the

biopsychosocial approach. The first focuses on the biological aspects of sexuality and on the prevention of STD and pregnancy in adolescence. The latter introduces a broader concept of sexuality, which includes social, cultural and subjective aspects (Vieira & Matsukura, 2017).

The relevance of sex education for adolescents is emphasized by the results of a national study on the sexual behavior of Brazilian adolescents. Adolescents who did not receive pregnancy prevention education at school exhibited increased sexual intercourse ($OR=1.41$) and unprotected sex ($OR=1.87$) (Oliveira-Campos et al., 2014).

It should be noted that despite knowing contraceptive methods (93.5% in 2005 and 79.6% in 2016), most of the adolescents analyzed (50.8% in 2005 and 67.0 % in 2016) did not use any. This finding is consistent with the findings of a study in which less than half (45%) of the adolescents consistently used condoms with the most recent partner (Fortenberry, 2013).

Early sexual intercourse has been associated with unprotected sex and more partners over a lifetime (Oliveira-Campos et al, 2014; Shafii, Stovel, & Holmes, 2007). In addition, ESD is associated with increased risk for sexually transmitted infections. One fourth of current Danish adolescents do not use any protection at their sexual debut. Therefore, strengthened preventive measures are still needed (Stryhn & Graugaard, 2014).

In this context, research using nationally representative data from the National Survey of Family Growth (NSFG) to examine timing of sexual initiation and contraceptive use in adolescents aged 10 to 19 years found that girls who start having sex at 14 or younger are less likely to have used a contraceptive method at first sex and take longer to begin using contraception (Finer & Philbin, 2013).

In this regard, the World Health Organization (WHO, 2014b) advocates for a human rights-based

approach to adolescent health that should be clear about the obligations and duties of governments, focus on equity, support interventions and policies that are needed, especially those that are culturally sensitive and controversial, such as sexuality education and informed consent, and ensure that adolescents are listened to and engaged.

Research has reported that girls in the United States are maturing at an earlier age than they did 30 years ago and that research on this topic is necessary to inform health professionals of the current trends and incidence of precocious puberty to better meet the physical and psychosocial needs of these girls and their families (Sandra & Cesario, 2007). Such early maturation was observed in our study as the median age at menarche was the same (11 years) in the two periods analyzed (2006 and 2016).

Early menarche has been associated with early coitarche before age 15 in Swedish girls, which is in turn associated with an increased risk for STD and unintended pregnancy. However, there is a liberal attitude towards sexual relations among adolescents in Sweden, where education on sexuality and personal relationships has been part of the national school curriculum since 1956 and youth polyclinics are tailored to the needs of adolescents to form a network over the country in order to support young people in developing responsible sexual behavior and to minimize reproductive health problems (Edgardh, 2000).

Another important finding that justifies the implementation of the Statutory Rape Law is the age of the partner at adolescents' SD. Partners were much older than the adolescents, particularly in 2006 (before implementation of the Statutory Rape Law), when the median age of partners of adolescents aged 14 or less was 19 years compared with 17 years in 2016 (after implementation of the Statutory Rape Law) ($p=0.001$).

A study of 294,484 incidents of sexual assault involving a single victim and single offender found that older men have much higher rates of offending (Felson & Cundiff, 2014). Thus, the implementation of Law No. 12.015/2009 made Statutory Rape a more severe crime in Brazil and may have decreased the number of adult men who engage in sexual intercourse or other libidinous acts with younger girls, although it did not reduce the number of girls who had sex at ages 14 and less.

It should be noted, however, that most of the adolescents (96.4% in 2006 and 71.9% in 2016) in our study were either married or had a partner. This finding is consistent with the findings of a study which showed that many adolescents start sexual activity within an established

relationship characterized by terms that indicate relative commitment and exclusivity (e.g., friend, boyfriend/girlfriend or fiancée) (Manning, Giordano, Longmore, & Flanigan, 2012).

Early age of sexual initiation is much more tolerated than marriage at an early age. Research has found that over half of men and girls believe that girls are able to consent to sex between ages 15 and 18 and that the percentage of men who believe girls are able to consent to sex at ages 13 and 14 (20%) is nearly double girls' agreement about sexual consent in reference to the same age group of girls. In addition, one-quarter of the men surveyed (compared to 16% of girls) also believe that when a girl's body shows signs of puberty, she is ready to have sex with an adult above the age of 18 (Taylor et al., 2015).

Any kind of sexual act against a child has serious consequences, especially if perpetrated by someone who is responsible for or who has power or control over the child or anyone who is in a position of trust. Moreover, the population aged 10 to 14 years living in unfavorable conditions are at an increased risk compared with their counterparts, and girls are particularly vulnerable to pregnancy, HIV and violence (Pinheiro, 2006).

According to the Global Status Report on Violence Prevention 2014, child protection services were the most widely reported of all services (69% of all countries), followed by medico-legal services for victims of sexual violence. However, the quality of these services and their accessibility to victims were not ascertained, and these relatively high levels of reported availability may conceal low-quality services (WHO, 2014a). In Brazil, few States have carried out a thorough review of the legal framework so that it can address violence against children more effectively, and implementation of laws, including legal reforms, remains a challenge (Pinheiro, 2006).

The increase from 26.0% to 48.5% in the rate of early sexual debut in girls aged under 14 years in the analyzed period show that the Statutory Rape law, put into effect in 2009, has been ineffective in preventing early sexual debut in girls under the age of 14. Effective interventions during adolescence may reduce the adverse long-term impacts of violence and abuse in childhood and prevent them from undermining future health (WHO, 2014b).

Marriage and statutory rape laws in Brazil seem contradicting as early marriage is associated with early sexual debut (Duru et al., 2007). This contradicting aspect undermines a more detailed analysis of the problem and is a limitation of the present study.

It should be noted that although our study used a census of medical records, it focused on adolescents attending one single maternity hospital. Therefore, the results presented cannot be extrapolated because the population analyzed may be different from populations in other regions. In addition, there were no reports of coerced sex and there was no information on the reason that led adolescents to early sexual debut. However, it should also be noted that the study was carried out in a reference center for child and adolescent health care located in the fifth largest city in Brazil and that its findings are consistent with the findings of other national and international studies, thus suggesting that they may also be found in other places.

V. CONCLUSIONS

The results of our study are expected to draw attention to Statutory Rape, a problem whose magnitude points to the need for implementing government actions towards this problem. Our findings also show that adolescents are having sex at earlier ages and although most of the adolescents analyzed were either married or lived with a partner, further research should be carried out to improve knowledge on the issue so that public policies can be used more effectively.

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Intensification of the leachate treatment process of nitrocellulose production

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Abstract— Purification of cellulose is one of the most important steps in the production of nitrocellulose for explosives. However, it generates highly polluting wastewater. In this study, nitrocellulose industry wastewater (leachate) was characterized and treated chemically and biologically. Untreated leachate had a pH of 12.4 ± 0.5 , color of $27,065 \pm 879$ units, chemical oxygen demand (COD) of $7,615 \pm 252$ mg/L, biological oxygen demand (BOD) of $4,413 \pm 194$ mg/L, total organic carbon (TOC) content of $2,455 \pm 158$ mg/L, total solids of $8,613 \pm 232$ mg/L, fixed solids of $3,845 \pm 103$ mg/L, and volatile solids of $4,768 \pm 129$ mg/L and was toxic to *Escherichia coli* and *Artemia salina*. Industrial-scale chemical treatment followed by pilot-scale biological treatment reduced COD by 97%, BOD by 99%, and TOC by 97% and eliminated toxicity.

Keywords— Delignification, Explosives, Nitration, Treatment, Wastewater.

I. INTRODUCTION

The discharge of untreated or inadequately treated wastewater into water bodies can cause serious damage to aquatic ecosystems. Wastewater may contain high levels of phosphorus, nitrogen, antibiotics, herbicides, pesticides, heavy metals, and organic matter [1-4]. Such contaminants have been associated with acute and chronic toxicity, endocrine-disrupting effects, and antibiotic resistance [4].

Several biological, chemical, and physical wastewater treatments have been proposed [5-10], but their implementation in industries is not always feasible from operational and economic points of view. Prior to biological treatments, wastewater may need to be treated chemically to reduce the negative effects of recalcitrant contaminants on biological agents [10-13]. Chemical treatments remove or convert contaminants through chemical reactions. Typical chemical processes include coagulation, precipitation, and chemical oxidation [5]. Chemical precipitation is achieved by using reagents capable of reacting and forming stable precipitates with contaminants. The precipitate can then be removed. Organic matter is transformed into carbon dioxide, water, and inorganic ions via degradation reactions involving oxidizing species, particularly hydroxyl radicals [11-13].

In biological treatments, contaminant removal is achieved by the action of microorganisms. The process is based on the self-regeneration of water bodies, whereby organic material is transformed into inert substances [12]. Activated sludge processes are the most commonly used biological treatments. Aerobic microorganisms digest organic matter and form flocculated particles (active sludge) and a liquid practically free of suspended solids and organic material. The organic matter is broken down via biological oxidation, resulting in CO_2 , H_2O , NH_3 , energy, and other products [12, 13]. Activated sludge treatment can be combined with other processes to improve the quality of the final effluent [10-13].

Textile, paper, and explosives wastewaters are opaque and have a high color because of the presence of lignin and its derivatives. In water bodies, these industrial wastewaters prevent light penetration and, consequently, photosynthesis. Furthermore, they contain high amounts of organic matter and toxic chemicals [14, 18, 32].

Nitrocellulose is the main raw material used to produce nitroglycerin, an explosive liquid present in smokeless gunpowder, propellants, and dynamites. Nitrocellulose production involves the following steps: mechanical separation, delignification, and bleaching of cotton fibers, nitration of cellulose, and stabilization of nitrocellulose [16]. The delignification process generates

leachate containing up to 10,000 mg/L of lignin, determined as soluble and insoluble Klason lignin. Lignin degradation products, such as hemicelluloses, extractives, and proteins, are also released during the delignification step [16, 19-26]. Resin and fatty acids from extractives and lignin degradation products are responsible for the high chemical oxygen demand (COD), biochemical oxygen demand (BOD), toxicity, and color in nitrocellulose industry wastewater [22].

This study aimed to characterize and intensify of the treatment of the leachate to reduce its color, organic load, and toxicity by integration of processes: chemical followed by biological treatment.

II. MATERIALS AND METHODS

Nitrocellulose industry leachate was collected and stored according to the National Guide for Sample Collection and Preservation [27]. Treated and untreated leachate was characterized following the Standard Methods for the Examination of Water and Wastewater [28], with modifications. Toxicity tests using *Escherichia coli* and *Artemia salina* were carried out in triplicate according to the methods described by Garden et al. (1990) [29] and Hartl and Humpt (2000) [30], respectively, with modifications.

2.1. Acute toxicity assay

E. coli was cultured in medium containing K_2HPO_4 , KH_2PO_4 , trisodium citrate, $(NH_4)_2SO_4$, and $MgSO_4$ diluted in 800 mL of deionized water to the concentrations shown in Table 1.

Table 1: Composition of the culture medium used for *Escherichia coli*

Compound	Concentration (g/L)
K_2HPO_4	7.0
KH_2PO_4	3.0
Trisodium citrate	0.5
$(NH_4)_2SO_4$	1.0
$MgSO_4$	0.2
D-Glucose	4.0

Source: Authors, 2020.

The culture medium was placed in a microwave oven and boiled for 10 min. A 200 mL solution of 10% (w/v) glucose was prepared and boiled for 5 min. The two solutions were cooled to 90 °C and mixed, and the pH was adjusted to 7.0 ± 0.2 using 4 mol/L NaOH.

A 100 mL stock solution containing 100 mmol/L Na_2CO_3 (previously oven dried at 120°C for 1 h) was prepared and diluted to obtain 0.25, 0.50, 1.0, 2.0, and 3.0 mmol/L solutions. Aliquots of 135 μ L were used to construct a calibration curve using a conductometry system [29]. The culture medium was inoculated with *E. coli*, and CO_2 concentration was monitored until reaching 0.5 mmol/L. The initial pH of the samples was adjusted to 7.0 ± 0.2 using 1 mol/L NaOH or 1 mol/L H_2SO_4 . Leachate was added to culture flasks at concentrations of 2, 6, and 10%, and CO_2 measurements were taken at 30 min intervals. The experiment lasted for 3 h.

2.2. Chronic toxicity assay

A. salina cysts (eggs) were incubated in 3.8% (w/v) NaCl in deionized water at 28–30 °C under a 60 W fluorescent lamp for 24 h. After hatching, larvae were separated and placed in 5 mL vials containing 1 mL of saline solution. Vials contained 10 larvae each and received the addition of 1.5 or 3.0 mL of leachate, corresponding to 30 and 60% (v/v), respectively. Vials were then filled to 5 mL with saline solution and incubated for 24 h at 28–30 °C. A control vial was prepared and subjected to the same conditions but without the addition of leachate. Dead and live larvae were counted in each vial, and results were expressed as the percentage of dead larvae [30].

2.3. Industrial-scale chemical treatment of leachate

Leachate is transported from the nitrocellulose production plant to the treatment plant via a 4-inch PVC pipe. The liquid is sieved (SS) and is discharged, by gravity, into the reservoir tank (RT). Then, it is pumped into RST 1 and RST 2, which are operated alternatively in batch. In RSTs, leachate is acidified to pH < 1.5 using the acid wastewater from the nitration step or, when not available, sulfuric acid. Solutions are mixed using air diffusers. After 2 h, the supernatant follows to the compartmentalized tank for coagulation (CT), pH adjustment (AT), flocculation (FT), and decantation (ST). Solids retained in the decanter are sent to a filter press (FP). The filtered liquid returns to the treatment system, and the sludge is directed to the final treatment step at the outlet of the decanter. The chemically treated leachate is then subjected to biological treatment using an activated sludge process in a sequencing batch reactor.

2.3.1. Chemical treatment

Fig. 1 shows a scheme of the treatment system used for the chemical treatment of leachate. The system has a capacity for processing 40 m³/h. The project was designed on the basis of experimental bench-scale results. The reaction and settling tanks (RST 1 and RST 2) were

designed taking into account the decanting time. Flow, hydraulic retention time, and other process parameters were taken into account in the design of the coagulation,

alkalization, flocculation, and settling tanks, according to literature data [11-13].

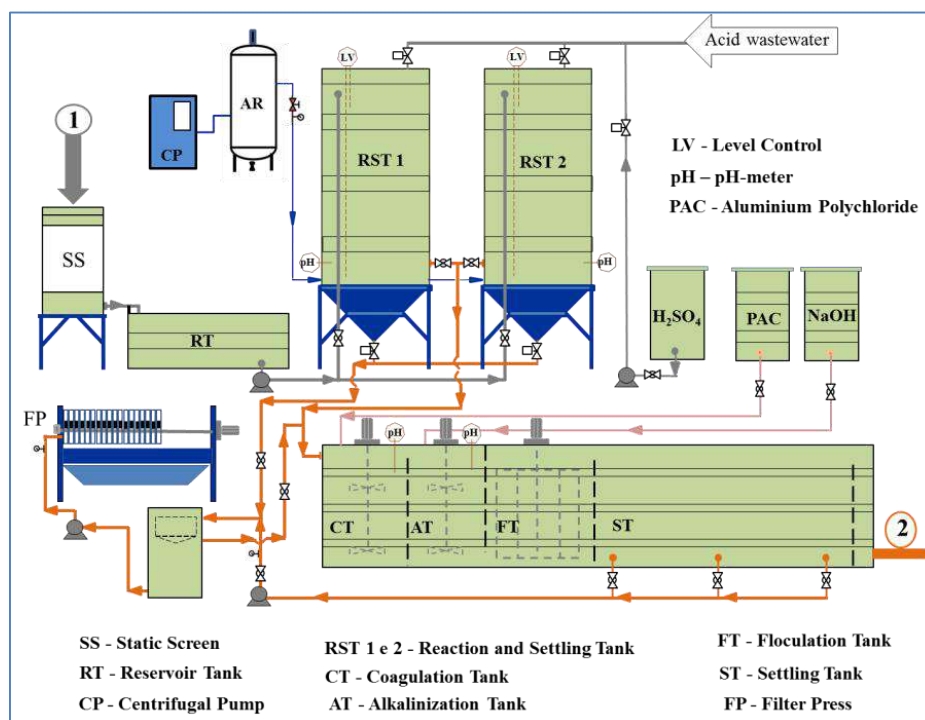


Fig.1: Industrial chemical system for treatment of nitrocellulose leachate

Source: Authors, 2020.

2.4. Pilot-scale biological treatment

Biological reactions were carried out in a 500 L stainless steel reactor (Fig. 2) equipped with three valves and operated in sequencing batch mode with 6 h cycles consisting of fill, react, settle, and draw periods. The time for sludge sedimentation ranged from 20 to 30 min [12]. Air was supplied to the system using an air compressor and diffusers.

The airflow was adjusted to provide a minimum oxygen concentration of 3 mg/L and ensure that the microbial biomass remained in suspension during the entire reaction period. Prior to the reaction, the pH of leachate was adjusted to 7.0 ± 0.3 with 10% (w/v) NaOH solution. pH (B-374 pH-meter, Micronal, São Paulo, Brazil), dissolved oxygen (TO 401 analyzer, Digimed, São Paulo, Brazil), and temperature were monitored throughout the process [13].

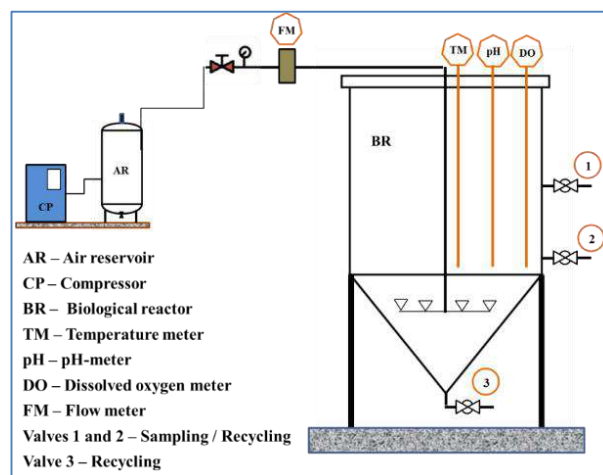


Fig.2: Schematic diagram of the biological reactor

Source: Authors, 2020.

III. RESULTS AND DISCUSSION

Table 2 presents the physicochemical characteristics of leachate before and after industrial-scale chemical treatment and pilot-scale biological treatment.

Table 2: Physicochemical characteristics of untreated, chemically treated, and chemically and biologically treated leachate

Parameter	Untreated	Chemically treated	Chemically and biologically treated
pH	12.4 ± 0.5	7.1 ± 0.3*	7.1 ± 0.3*
Color (units)	27,065 ± 879	1,988 ± 84	2,113 ± 132
COD (mg/L)	7,615 ± 252	908 ± 38	198 ± 17
BOD _{5,20} (mg/L)	4,413 ± 194	369 ± 14	43 ± 7
TOC (mg/L)	2,455 ± 158	153 ± 10	83 ± 7
TS (mg/L)	8,613 ± 232	3,472 ± 86	288 ± 13
FS (mg/L)	3,845 ± 103	1,540 ± 49	176 ± 16
VS (mg/L)	4,768 ± 129	1,932 ± 76	112 ± 9
N (mg/L)	25 ± 6	1.9 ± 0.2	4.7 ± 0.6
P (mg/L)	<5	<5	<5

Results are presented as mean ± standard deviation. * The pH was adjusted to 7.0 ± 0.3 with 10% (w/v) NaOH solution before the reaction. COD, chemical oxygen demand; BOD_{5,20}, biochemical oxygen demand (5 days at 20 °C); TOC, total organic carbon; TS, total solids; FS, fixed solids; VS, volatile solids; N, nitrogen; P, phosphorus.

Source: Authors, 2020.

Untreated leachate had a very high color intensity (27,065 ± 879 color units), COD (7,615 ± 252 mg/L), BOD_{5,20} (4,413 ± 194 mg/L), and TOC content (2,455 ± 158 mg/L). The COD/BOD ratio was 1.73, indicating that leachate is susceptible to biological degradation [11]. Nevertheless, an industrial chemical process was used before biological treatment.

Chemical treatment decreased color intensity by 93%, COD by 88%, BOD_{5,20} by 92%, and TOC by 94%. After biological treatment, COD was reduced by 97%, BOD_{5,20} by 99%, and TOC by 97% compared with untreated leachate. No changes in color intensity were observed, suggesting that activated sludge is not effective in removing or degrading color compounds present in nitrocellulose leachate. Chemical processes, such as coagulation, are widely used as tertiary treatment for the removal of suspended solids, organic matter, and phosphorus [31, 32].

However, in this study, the chemical process was used to intensify the biological process for the treatment of leachate from nitrocellulose production. Fig. 3 and 4 show the effects of integrated treatment.

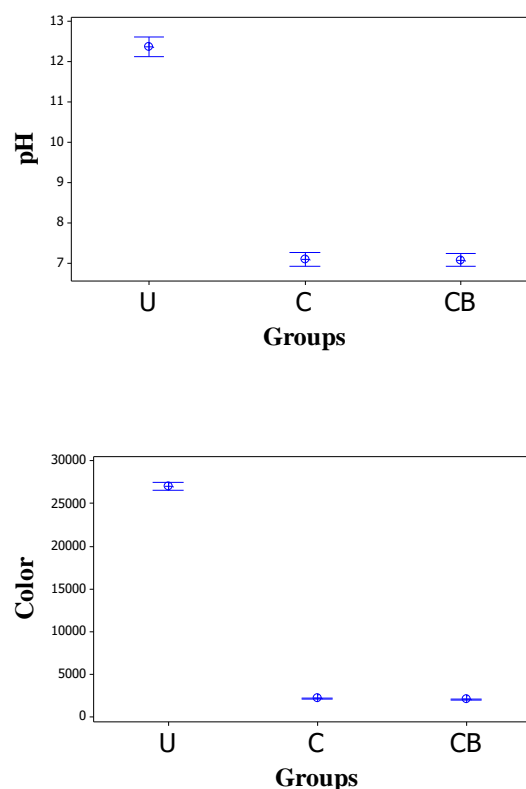


Fig.3: pH and color. The circle is the mean and the lines above and below are the 95% confidence intervals.

Source: Authors, 2020.

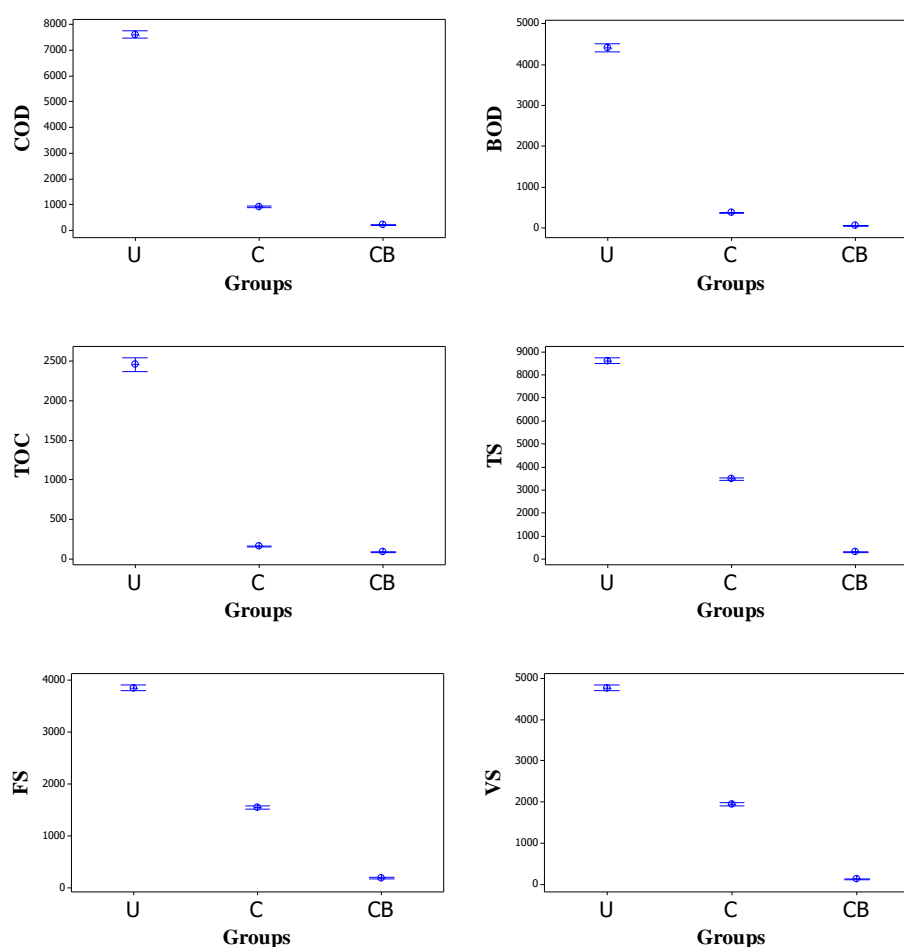


Fig.4: Chemical oxygen demand (COD), biochemical oxygen demand (BOD), total organic carbon (TOC) content, total solids (TS), fixed solids (FS), and volatile solids (VS) in untreated (U), chemically treated (C), and chemically and biologically treated (CB) leachate. The circle is the mean and the lines above and below are the 95% confidence intervals.

Source: Authors, 2020.

BOD_{5,20} values of untreated leachate ($4,413 \pm 194$ mg/L) were well above those commonly reported for domestic sewage (300 mg/L)[12, 13, 33, 34]. This parameter is widely used to indicate whether wastewater is suitable for discharge. Therefore, a model was developed to predict the BOD of biologically treated leachate (Eq. 1).

$$\text{BOD} = 4027.73 - 1.05 \times \text{COD}_u + 7.17 \times 10^{-5}(\text{COD}_u)^2 - 1.19 \times 10^{-5}\text{COD}_u\text{FS}_c \quad (1)$$

where COD_u is the chemical oxygen demand of untreated leachate and FS_c is the fixed solids content in chemically treated leachate. The analysis of variance for the proposed model is presented in Table 3.

Table 3: Analysis of variance for the model

Source	df	Seq SS	Adj SS	Adj MS	F	P
Regression	3	629.59	629.589	209.863	4.16747	0.0284069
COD _u	1	31.53	245.346	245.346	4.87209	0.0458797
COD _u × FS _c	1	337.00	301.819	301.819	5.99354	0.0293136
COD _u × COD _u	1	261.06	261.059	261.059	5.18413	0.0403523
Error	13	654.65	654.646	50.357		
Total	16	1284.24				

Source: Authors, 2020.

All model parameters were significant at $P < 0.05$. A P-value of 0.27 was obtained for the Anderson–Darling statistic, ruling out the hypothesis of normality of data. This result indicates that the model can adequately predict BOD values after biological treatment. With an $R^2 = 0.49$, the model shows that the characteristics of untreated and chemically treated leachate influence the performance of biological treatment.

We calculated the 95% confidence intervals for experimental results and model predictions (Fig.5). The model indicates that the combined treatment can reduce BOD to less than 60 mg/L.

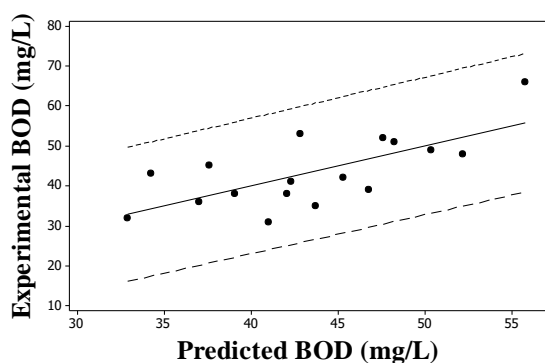


Fig.5: Experimental and predicted biochemical oxygen demand (BOD) of leachate after chemical and biological treatment. Black dots are experimental points, the solid line is the best fit, and the dashed lines are the 95% confidence intervals.

Source: Authors, 2020.

The acute toxicity of untreated leachate was assessed using *E. coli*. Black pulp at 2% immobilized 69% of microorganisms. At 6 and 10%, leachate completely immobilized *E. coli*. After chemical treatment, bacteria mobility was not affected by 2% leachate. At 6 and 10%, chemically treated leachate decreased bacterial mobility by 16 and 50%, respectively. Biologically treated leachate did not affect *E. coli* mobility.

Untreated leachate at concentrations of 30 and 60% showed chronic toxicity to *A. salina*, killing all microorganisms. Toxicity was not fully eliminated by chemical treatment. At 30 and 60%, chemically treated leachate killed 36 and 62% of micro crustaceans, respectively. Wastewater treatment should eliminate as many toxic compounds as possible, as contaminants are generally carcinogenic [35, 36]. The complexity of wastewater composition can further increase its recalcitrance to degradation [35]. Chemical treatment, despite reducing the organic load of leachate by more than 90%, was not sufficient to eliminate toxicity. Therefore, a

second treatment was necessary. After treatment with activated sludge, leachate was not toxic to *A. salina* at the tested concentrations.

The toxicity of leachate to the two microorganisms was probably due to the high concentration of organic matter and the presence of high molecular weight compounds (>kDa) derived from lignin. The recalcitrance to activated sludge treatment may be related to the limited ability of microorganisms to metabolize high molecular weight compounds [19, 20].

Nitrocellulose industry wastewater is highly toxic to the environment because it contains chlorophenols, chlorolignins, organic acids, acid resins, and dioxins [23, 32], as well as high levels of organic matter and metal ions [22]. There are few studies analyzing the toxicity of nitrocellulose to aquatic organisms [37-39], but many studies reported the detrimental effects of other explosives, such as 2,4,6-trinitrotoluene (TNT), 1,3,5-Trinitroperhydro-1,3,5-triazine (RDX), and 1,3,5,7-tetranitro-1,3,5,7-tetrazocane (HMX) [40-46].

IV. CONCLUSION

Leachate had high levels of lignin and organic matter, as evidenced by the high COD ($7,615 \pm 252$ mg/L), color intensity ($27,065 \pm 879$ units), and toxicity to *E. coli* and *A. salina*, which indicates that this wastewater can cause serious environmental contamination if released untreated.

Industrial chemical treatment reduced color intensity by 93%, COD by 88%, BOD by 92%, and TOC content by 94%. However, these reductions were not sufficient to meet regulatory requirements for wastewater discharge. Therefore, chemically treated leachate was subjected to a biological treatment with activated sludge, which reduced COD (198 ± 17 mg/L), BOD (43 ± 7 mg/L), and TOC content (83 ± 7 mg/L) to levels below regulatory limits. Chemical treatment did not eliminate toxicity but increased the susceptibility of leachate to biological treatment. Overall, the results show that integrated chemical and biological processes are promising for the remediation of leachate.

All wastewater generated by the pulp nitration step was reused for pH correction in the leachate treatment process. The reuse of the effluent from the nitration step made it possible to reduce the expenses with reagents for pH correction of this effluent before its release into the environment.

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The Aftermath Impacts on the Abolition of Slavery and Slave Trade on the Social and Political Issues in the British Sphere of Influence in Cameroon 1807-2011

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Abstract— The suppression or abolition of the Slave trade was quiet successful in a wider dimension involving the British Sphere of influence: It is the case in the southern Cameroons from 1807-2011. After the abolition, some prints, marks or scars were left behind; what is known as impacts which actually prevailed up till date or today. These impacts entirely could be examined in two main levels: the social and the political aspects. Within these two spheres of studies, the inconvenience proposed for rectifications and has been forwarded based on some social affiliated problems in the world and the chosen vicinity or area. Furthermore, accompany with case files we examine some marriages in the said area and some political institutions as reactions after the suppression or abolition of slavery and slave trade. In addition, a positive reaction that ameliorates situations after the halting of the act, Social ills emerged and political means resolved.

This work has been carried out with the use of some documents, Archive materials, articles and interviews. Here, what we should also learn is the fact that the application of some laws is still under-going processes even after the study period.

Keywords— southern Cameroons, slave trade, 1807-2011, abolition, impacts, Social, Political aspects, marriages, institutions.

Résumé— La suppression ou l'abolition du commerce des esclaves a véritablement réussi dans une large mesure dans la zone d'influence britannique : ceci a d'ailleurs été le cas dans le Cameroun méridional de 1807 à 2011. Après l'abolition, certaines empreintes, marques et séquelles sont restées. C'est ce qui peut être considéré comme les impacts qui ont subsisté jusqu'à nos jours. Ces impacts pourraient être examinés à deux niveaux : les aspects sociaux et politiques. A l'intérieur de ces deux cadres d'analyse, nous avons présenté pour réparations certaines atrocités qui ont eu un impact notable sur le plan social dans le monde en général et sur notre zone d'étude en particulier. Bien plus, à travers des études de cas, nous examinons certains mariages dans ladite zone et certaines institutions politiques comme corollaires de l'abolition de l'esclavage et du commerce des esclaves. Aussi, on a observé des réactions positives ayant eu pour objectifs d'améliorer les conditions de vie après l'abolition. Ainsi, on va assister à l'émergence de certains fléaux sociaux suivis des réponses politiques pour les résoudre.

Ce travail a été mené avec l'appui de certains documents d'archives, des articles et interviews. Ici, ce que nous devons aussi apprendre est le fait que l'application de certaines lois est toujours d'actualité même après cette période d'étude.

Mots-clés— Cameroun méridional, commerce d'esclaves, 1807-2011, abolition, impacts, aspects politiques et sociaux, mariages, institutions.

I. INTRODUCTION

In 1807 the British in the House of Common abolish Slavery and Slave trade and ratify it in 1833. Before, as early as noted, the main countries, those in charge and were at the fore front of all that surrounds Slavery and the Slave Trade in the area at one time; British Sphere of influence: the case of pre-colonial Cameroon, southern Cameroons, British southern Cameroon, west Cameroon, unitary Cameroon and part of The Republic of Cameroon that runs from the periods 1807 to 2011, decided to put an end to this entire act in the following times. Before then, Denmark has made the Slave trade illegal for her own nationals in 1805, Holland in 1814, France in 1818, while in 1815 and 1817 Spain and Portugal respectively, restricted Slave Traders to the sea south of the Equator. The British abolished the act in 1807 and even went as far as carried this new anti-slavery policy to establish a naval patrol in West Africa waters. Sierra Leon was declared as a Freed-Slave settlement in 1808. The slaves in the above also settled in the area, British Southern Cameroon. The long period of Slavery and Slave Trade in the World and British Sphere of influence put humankind in a delima. This act was abominable in diverse forms. But, aftermath checked, it was unveiled that the cat has changed and taken another shape. The greatest dismay to this cross examination, matters change direction. As impact people started using other means to keep people still in bondage hence dealing with “innocent culprit” like husbands of some women in marriage with the intention of putting the suitors or husband to difficult situation of slavery. Also with this, putting their daughters in to slavery, thus selling them as a way for money makings in the name of marriage, within the territory of British influence was a result or impact of the Slavery and slave trade. It should be noted that there were some problems that came as a result of the abolition and some that still prevailed in another sense of the same problems.

The aforementioned impact went along way to evoke another impact which was the making of laws in States institutions which could bring to an end and subdue the new negative impact for the achievement of positive dreams. This is not an evil of a society but a history that takes place in the world at large involving British southern Cameroon. Here, the question that we need to ask is what are the socio-political impacts of the Abolition of Slavery and Slave trade in the British southern Cameroons? To answer this question it will be interesting to examine, firstly, the Social impacts and secondly, the Political impacts after the Abolition of Slavery and Slave Trade.

II. SOCIAL IMPACT IN THE AFTERMATH OF THE ABOLITION OF SLAVE TRADE IN BRITISH SOUTHERN CAMEROONS

After the abolition of Slavery and Slave Trade, the general idea was that slave Trade has finally come to an end. But to our greatest dismay the end of Slave Trade did not provoke the end of the Slavery and enslavement. It should be noted that the New forms and New motives of servitude have appeared. Also, It should be known that in the colonial period many actors like the Colonial Administration, United Nations (U N) and other International Organisations, the Non-governmental Organisation (N G O), continue to fight against the said practices leading to human servitude.

2.1. A Delight or plight of Maltreating Suitors

Many things remain uncertain about the slave trade and its impacts. The general picture after a good survey of incidents, it was couple in great destructiveness, which is clear. The destructiveness can be shown to be the logical impact in the manner of receiving suitors. The British Sphere of influence had connective characteristics of this phenomenon. Henceforth, after the ruling of reviewed in the value of the potentiality of putting to an end the slave trade and slavery brought many changes in the atmosphere. Some individuals took abolition principles as plight in their hands and inflicted injuries to innocent's citizens, a delight of treating suitors who had been married legally to their wives and had at least six and more children. Families kept asking dowries and victimizing their suitors for no reason.¹ An example of such a situation could be examine or seen in a complain from Wakum, Big Babanki, Bafut area, Bamenda Division, 23rd September 1946 addressed to the Honorable Resident Cameroons Province, Buea through the district officer, Bamenda Division, Bamenda. These lines of the Complain run thus,

... I beg to state that i am a citizen of Big Babanki, Bafut Area, in the Bamenda Division and during the time of the Ex-German Government i married the daughter of the late chief of Bikom and paid full dowry. The amount paid was £12:s and in addition i paid to the family two bags of salt, and the woman in

¹ Walter Rodney, “Europe and the roots of African underdevelopment to 1885” In (ed. Walter Rodney) *How Europe underdeveloped Africa*. Panaf publishing, Abuja, Nigeria, 2005 pp. 108-109.

question was then given to me. When she was then given to me... we then came to big Babanki my native home where we remained and made the family of six children.

I have been living peacefully with my wife and children and in this period when even my children have become men and women i have been taken on a surprise to see that a summons has been issues against me for the native court of Kom by the plaintiff maintaining that i did not pay full dowry. The plaintiff admits that only the sum of £12. - Dowry was paid to the late chief.

When the date for trial arrived i came to the native court and was surprised that i was roughly handled by a court messenger who began to flog me in order to frighten your most humble petitioner to leave the court in order that the right i deserve in this case should be set aside. ...²

Due to the fact that abolition of all forms of enslavement was stipulated and put to effectiveness, some people took it as a delight, means to challenge the laws and their enemies and inflicting harms to some innocent villagers. Mr. Wakum decided to justify his claim as he married rightfully with a full dowry payment during the time of the Ex-German Government to the late Chief of Bikom and have already given birth to six children. Henceforth making a family of six not including him and his wife. From the complain we head nothing about the wife (opinion) which indicate the claim to Mr. Wakum was false. Furthermore, as Mr. Wakum claimed they have stayed for a very long period of time with a family of six children, the suitor and complainer were not given any sum to pay as claim which is not justified by the native law and custom. The children of the complainer in number is claimed without any support reasons, meanwhile the messenger flog him which indicated that it was arranged by his opponent best known to him why.

2.2. Double payment of Marriage Dowry

² BAC File N°, 36/35.Wakum of Big Babanki Request for Residents Review in Kom native court civil suit N°79/46, 1946, P.1. The object of the complain goes thus: Kom Native court civil suit N°79/46. Ngongkule versus Wakum, claim return of dowry (£12 & 4 children.)

Additionally, the summon was a surprise one hence was not legal entirely. If it was justified the court members should have question Mr. Wakum and the messenger for the action but the cold attitude towards such unreasonable oppression such induce practices will only be repeated to other victims who might be accused falsely. Also, on the 10th September 1947 while in Kejom Keku still in the Bafut area, complain to the Bekom (central) court under civil suit N°79/46 the same matter, the native court judgment was modified. The suitor was asked to pay £12:- and retain his legitimate children. This determines the fact that the suitor paid dowry twice. The petitioner hope British justice will triumph over the matter.³ However, there were some case judgments that went ahead to explain the concept of abolitionism. In this case, it was very effective in all entirely as some women became liberated. This could explain the action put or enforced by the United Nations Organisation (UNO) through conventions in the British Southern Cameroons. Some other examples will involve a case held in the native court of Bum on the 19th day of June 1951 before the following members Ful of Laibum, Nanambang, Tateh of Ngunifisy Name of Mulung. It is with Ful of Laibum as plaintiff and Defendant Yoh of Kom. Claim, return of wife Ndum (f) or dowry of £20 taken by defendant 4 years ago. Under (sgd) W.J Griffith verdict: judgment for Plff for his wife Ndum (F) or dowry of £20 in 2 months with costs. The wife is further enslaved forcefully and the husband as he has been placed to pay double dowry, a trick of fostering slavery in another form.

Furthermore, still under (sgd) W.J Griffith Ag. D.O 13:10:51 to 23:2:52, paid; CRN°83718 of 11/11/38. C.S. N°8/38, plff: Ful of Laabum vs. Deft: Fulchunde of Gunabum. "Return of 27 Nkom clothes and 2 guns or £27 being dowry for 3 women and to return 7 small children owed by deft about 3 years ago" claim admitted. "I do not know what the plff summons me for. I know that the women are with me. I did not refuse to give them to him. About the children, they are with me. I did not give any of them to a husband. The 2 guns are with me." Actually, the cost was not paid. Signed by the Bum chief, Misom and Ngwi with mark.⁴

2.3. Women Enslavement (Sold and Resold)

³Ibid. This case rightly showed that the judgment was not rightly meted or given, in this region hardly do you find a family sending or accepting their daughters into marriage to any person without having claimed their full dowry,

⁴BAC. File N° 36/294, date Registered 18:4:52 Mr.Yoh Application for residents Review in Bum native court civil suits N° 22/51, Achieves N° NW/La/d/1952/16, pp.1-2.

In January 1952, Wum division at Kuk village Fungom Area from Nemesikong, petition against Bainan Njang of Aghem claim to have paid dowry to late Njo late uncle Kwafon and later the woman was passed over to Chenegi. This woman was sold and resold in the name of marriage. From one man to another further putting or enslaving the woman as stipulated in the following lines.

That after an interval of one year my late uncle Kwafon wanted the woman and Njo Njang then informed him that the girl Ikai was formerly engaged by one Chenegi who paid 3 goats and that he Njo Njang had refunded the 3 goats to Chenegi who paid same and that Njo Njang had refunded them. He asked that my late uncle should give 3 goats and Kwafon gave 2 goats, 3 yards munchi cloth for one goat to his late uncle. He went on that in one occasion Kwafon sent 24 calabashes of salt for 2 goats and after 1.5 years he sent £121-for 2 goats valued 61-each...⁵

As a consequence after abolition, the woman under dispute was that of his late uncle who married her by dowry following native custom. Due to the presence of the late chief of Kuk, the chief gave her to his sons not only in pretext of servitude of women but as a sign of enslavement. The judgment went in favour of the chief because of his position.⁶ The chief paid actually the dowry to the father but it was not handed or passed onto the petitioner late uncle. With the acknowledgement that the dowry for the woman was not recovered, the Kuk council stands as the main witness sued defendant which he end up cost the case both in court and review and has therefore applied for resident review. Several other matters or cases were brought to court such as the seen below.

The consequences or impact of the abolition of slavery and slave trade was equally applied in another case at the Kom native court between Maricus Chia of Njinikom versus Tobi of Fundong with the claim, return of daughter Ngoinkung or £20 price taken by defendant to Fundong about 20 years ago. The claim was not admitted. But finally the judgment for plaintiff for £15 in 3 months and cost at once. The uncle exchanged 29 years ago and died 23 years ago. The claim came late as such according to the native law

⁵BAC. File no 361/292, NW/La/D: 1952/12, date Registered 1st April 1952, Ngemesikeng-Application for Residents Review in Fungom C/S 67/51.

⁶Ibid [the Woman was brought out of conflict and handed to one raby as such his right obtained, end slavery]

and custom which it was expired. The decision of the native court and the distinct officer was that, claim dismissed.⁷ Also, MrKubensum of Tunfombii at Kom claimed £100 bride price on 2 daughters taken by defendant 11 years ago by Tohru Teji Ngwaa. According to Astom-Smith's confirmatory judgment (P.156 of C.R.B 10/42_ in which the court passed instruction to sue Akoni for the Dowry or bride price, which the plaintiff did not do this. Akoni was reported dead as also is the mother of the girls. The Fon at this moment of the case is late Akoni's son and successor as such the claim was dismissed and signed by the (sgd) Francis Prestom Potts. D.O and (sdg) B.N Ntane C.N.C.⁸

Moreso, in Aghem native court another case on marriage was heard. The parties involved were Awa Djembong of Zongetu versus Mfensen of Su, claim refund of £25 maternal bride price paid on behalf of wife, Mbi Nsen. The following decision was taken and upheld under Mr. R.T Elkerton at Wum on 8th October, 1957. Neither dowry nor bride price was paid by plaintiff to defendant, and therefore there is no justification for claiming a refund. During the German times, a small girl in the compound of Tega Nko was given to Kukai as wife, because of "ill-treatment" and "badly beaten" she was hospitalised, while plaintiff was imprisoned. Finally the plaintiff admits that he paid neither dowry, no bride price to defendant. This claim should have been in respect of a refund of bride price alleged to have been paid by him to the mother of Mbi Nsen, who was also mother of the defendant. Here it is noted that defendant's mother is now dead. The property of mother was not claimed hence case was dismissed.⁹

2.4. United Nations Methods to end the aftermath Calamities

In The Supplementary Convention on Slavery, Slave Trade and institutions and practices similar to slavery. Adopted by a conference of plenipotentiaries convened by Economic and Social council resolution 608 (XXI) of 30th April 1956 and done at Geneva on 7 September 1956, entry

⁷BAC. File No 361/399/, Date registered 25/05/1954, NW/La/d. 1954/10, Tobi of Fundong, Application for residence review in Kom N.C Civil suit No 29/52 [The native courts ordinance Cap.142 laws of Nigeria in the review jurisdiction of the resident Bamanda, Westmacott, Ag resident, Bamenda] p.15

⁸BAC. File No 361/524. Mr.Kubensum of Funfombi, Application for resident review in Kom native court civil suit No 65/55, NW/La/d.1958/3, date open, 25/03/56.

⁹BAC. File No 361/668/NW/La/d, 1957/12, date registered 12/08/57, Residents Review in Aghem Native court Civil suit No101/57. Review in Bum Civil suit No. 67/51, p.11

in to force: 30 April 1957, that was promulgated by the United Nation in 1957.

Preamble: The States Parties to the present convention considering that freedom is the birth right of every human being...

Section I, Institution or Practices Similar to Slavery.

Article 1: Each of the States Parties to this convention shall take all practicable and necessary legislative and other measures to bring about progressively and as soon as possible the complete abolition or abandonment of the following institution and practices where they still exist and whether or not they are covered by the definition of slavery contained in article 1 of the slavery convention signed at Geneva on 25 September 1956:

(a) :-...

(b) :-...

(c):-Any institution or practice whereby:

- (i) A woman, without the right to refuse, is promised or given in marriage on payment of a consideration on money or in kind to her parents, guardian, family or any other person or group: or
- (ii) The husband of a woman, his family, or his clan, has the right to transfer her to another person for value received or otherwise; or
- (iii) A woman on the death of her husband is liable to be inherited by another person:

(d):-Any institution or practice whereby a child or young person under the age of 18 years is delivered by either or both of his natural parents or by his guardian to another person, whether for reward or not, with a view to the exploitation of the child or young person or of his labour.

Article 2: With a view to bringing to an end the institutions and practices mentioned in article 1(c) of this convention, the states parties undertake to prescribe, where appropriate, suitable minimum age of marriage, to encourage the use of facilities whereby the consent of both parties to a marriage may be freely expressed in the presence of a competent

civil or religious authority, and to encourage the registration of marriage.¹⁰

The effectiveness of the convention put in place under the United Nations was means that brought about methods and procedures to end the social calamities that at the time were perpetrating the communities of British southern Cameroons. Still in the southern Cameroons a case was presented in the court of the Resident Bamenda province holding at Wum on the 18th of March 1953 before J. Brayne-Baker, Esquire acting resident between Wanyang of Su versus Mbala of Fin with claim return of £30 taken about three years ago on daughter Yunga (F). In this case, Mr. Tumenta was the interpreter and the District officer Mr. W.T Griffith confirmed the judgment of the native court, an adjournment order was signed on the 22nd of October 1952¹¹. In the case, Wambang inherited Yunga (f) from his late brother which she late got married to one Keban after having received dowry of £9 awarded to him whom he did not accept due to the long duration and it is noted his brother had paid a much larger sum to Mbala the daughter's father. Evidently, at this moment, it is clear that the several conventions organised went effective and put things in order as many cases of marriage divorce were regulated and some dismissed to avoid slavery in marriage.¹²

From Neng Ewe, We village, Fungom area, Wum Division, Bamenda, 13th October 1954 to the honourable province Bamenda through the district officer. Fungom native court. A case between Sadras Boubiwo of We versus Neng Ewe, of We claim refund of thirty pounds being dowry of his late sister alleged owed Nine years ago from date of summons in the native court. It was paid to his father and mother.¹³ At the final analysis the woman was accused for having committed adultery, the wife was returned to the husband, which he escaped. She admitted that her mother received bride price from the plaintiff as such she was highly responsible for the payment of the dowry by soft installments. The married was divorced which the court said if she was to marry to anybody else the plaintiff had the right

¹⁰ The Supplementary Convention on Slavery, Slave Trade and institutions and practices similar to slavery enforced on 30 April 1957.

¹¹ BAC. File No 361(308) NW/La/d, 1952/15, date registered 6/10/52, subject Wanyang of su Application for Residents.

¹² Ibid. [The emptiness of the court case is due to the UNO enforcement of abolition principles]

¹³ BAC. File No 361(415) NW/La/d/1954/6, Fungom NC Civil, p.1

to sue that person for his dowry to be refunded.¹⁴ This case was witnessed this 13th day of October 1954 and written by H.J.S. Ngongi, writer for the Honourable Resident, C/O D.O Wum Division at Wum.¹⁵

A means or methods that often engaged many people into slavery were marriages in either forms on the man or woman. When the actions were condemned by abolitionists' leaders, people were not sold into marriage, no matter what. They were advised to follow the legal procedures. As such due to the abolition act through juries which they found insufficient evidence, slaves were acquitted under marriage bondages. "Habitual runaway were considered risks to the community and to the slave holder, so they were held in jail until they could be exported."¹⁶ Most women and men ended up during the typical slave period learning their homes but ended up moving into more slavery. So some parents requested the return of their daughters and bride price refunded. Still another case in which the two parties concerned Biam of Usu versus Metangba of Isu in Fugom Native court with claim return of daughter Chia or £40 bride price taken by defendant one year ago. The claim was not admitted and when judged it was dismissed by F. Potts.¹⁷

Another glaring circumstance with proceedings from court, No753 of 5th November 1957 which was headed by the D.O on the 4th of September 1957. Both parties present. Pius Chia Ndum of Wembong as Plaintiff versus Suo Bi (m) of Jikfun defendant which the claim was dismissed by I. Griffin, (sdg) ADO and the claim was refunded of 3 daughters. The judgment of the court held continued and gave liberty to pursue his claim in the usual manner (sdg) M.N.H Milne at Laikom, 3-corner on the 06/12/1958. Furthermore, another episode or case took place in 1959 between Kang Ntumba V.H of Nundabili versus Kume of Mbuk-Bum with claims refund of £100 B.P or Nte Ndeh Bong taken by defendant 2 years ago. The suit was head by the district officer on the 18th of March 1959 and head on May 19th 1959 (D.O, J.H Beeley Esg). Decision arrived at was that the plaintiff daughter Nte Ndeh is already an adult and has married Jam and has a child 1.5 month old

and the defendant has admitted that he has received £30 dowry from Jam if he consider what he received is not sufficient, he can take action against Jam.¹⁸ Many of such situation occurred in the Mamfe, Kumba, Victoria Divisions in British southern Cameroons.

III. POLITICAL IMPACT IN THE ABOLITION OF SLAVE TRADE IN SOUTHERN CAMEROON.

3.1. Ex-slaves, slaves participation in Politics.

Politically, due the abolition of slavery and slave trade, slaves became integrated in to political affairs of the Kingdom. Bafut became an entity in the grassfields involving others, some few villages with an organised political system raised slaves to talk within political issues in different ways, directly and indirectly as similar as the freeborn citizens. The slaves were military soldiers protecting the political figures such as the Fon who played glaring role internally as Mathias L. Neba emphasized;

The army was summoned in the past by the appropriate signal by use of a slit wooden drum "kwin" which was ensconced in a shed in the plaza of the palace. When the army assembled, it was briefed on its objectives. Each soldier provided his own arms, spears, clubs, cutlasses, bow and arrow. When guns became available around the middle of the nineteenth century, it became a mark of prestige to have one and people exerted every effort to get them. With the availability of guns, the Fon supplied the gun powder. The Bafut went to war, not only to ward off attacks, but often to maintain their supremacy over their tributary subjects in particular those to the north. Sometimes the wars resulted from raids and counter raid for slaves, but at other times, the Bafut attacked other people for alleged insults to their Fon. The rationale of different wars determined the

¹⁴ Ibid, P.2.

¹⁵ Ibid.

¹⁶ Wilma A. Dunaway, *The African-American Family in Slavery and Emancipation*, Cambridge, Cambridge University press, 2003, pp .42-43.

¹⁷ BAC. File No361/601, date registered 18th /10/1956, NW/La/d.1956/8, Fugom civil court 59/56.

¹⁸ B A C. File No 9034/3-17, NW/La/d. 1957/5. Pius Chis Ndum of Wombong vs Suo Bi of Jikfon at Kom Native court civil suit, No144/56 and File No 9034/S.33 Kang Ntumba V.H of Mundabiliv Kume of Mbuk-Bum at Bum Native court suit N°28/58 in NW/La/d.1959/3

different weapons, strategies and tactics used.¹⁹

Most war tactics were developed in the entire grass fields of British sphere of influence in Cameroon by ex-slaves and slaves, a case of study at this juncture is Bafut, and the slaves were those who master very well the beating of the wooden drum *Kwinto* to summon the people for meetings of the Fon request. The army constituted the slaves in Bafut. During discussions their opinions count as they give impressive information concerning the clan indirectly or directly, information around the kingdom that the Fon is not current or aware of. They decide if they can go for war or not. They follow strictly the decision of the Fon *Mbeh*. That could have been the reason that made the Bafut slaves were skillful in the fabrication of den guns, knives, cutlasses and other utensils and masks in different categories as their right was giving. The waging of wars during the slave active period had developed the people in its entirety. Also, the Fon was very active as he will supply the army constituting slaves with gun powder. The large kingdom grew larger as a result of the slaves' participation. The *Tikar* slave Bafou Firlo'o who left Bafou Fondong behind, took over from the Fon Nebachi as Fon and controls the Kingdom hence participating in politics. This however made the Fon great and admired due to the number of slave found in his palace and entire village. The Fon was also respected as regard the number of slaves he had and their active participation in political matters. Several honours and gifts were given to successive chiefs, The Fon or Chiefs usually attributed or award medals and red feathers to more slaves who performed their duties efficiently. After the abolition some Fon and chiefs in Bafut still kept and placed duties on slaves, for some slaves to work as errand men or boys in political affairs of the Kingdom from one palace to the other within the Grassfields. Finally slaves help to maintain the political integrity by bringing together via the Fon issues concerning territorial disunity for the intention to make proposals for solutions in the Kingdom.²⁰

3.2. Reactive influence from the Common Wealth of Nations

As regard the abolition result in the Common Wealth of Nations, the British who annexed and colonised Nigeria and British southern Cameroons under the Queen of England (British sphere of influence in Cameroon) has initially decided after the Berlin West African conference in 1884-1885 that slavery and Slave Trade should be abolished in Africa which also involved southern Cameroons. Talks on abolition of slavery and slave trade in later times, under Lord Roseberry Adelaide made the first reference to the British Empire as a "commonwealth of Nations" in 1884 which slave was not taken out of the territory any longer legally. Later, it then became the British Dominion; British southern Cameroons became part of this empire under the mandate era that has expelled slavery and the trade over her dominion. The conferences attended should be noted that in later period it was differentiated as "imperial conferences" not "colonial conferences" attended by countries under British rule and seeking independence thus connectivity found in the two areas or regions hence all malpractices connected to slavery and slave trade was abolished or abandoned. It should be noted that, it was as a result of this, colonisation exercise that Nigeria was let free by The British until on 1st of October 1960, as Nigeria obtained her independence, thus a more advanced method to stay away from slavery and slave trade in Nigeria. Also, British southern Cameroons also follow on 1st of October 1961 under British auspices, a giant step to undo slavery and the slave trade as laid down principles to combat the aftermath practices of slavery and slave trade after the abolition in the British Sphere of influence was introduced.²¹

Additionally, several organizations were formed to end slavery and the slave trade trafficking of women and children and prostitution among which was The Centre for Human Rights and Peace Advocacy (CHRAPA) in the Fight against Child Trafficking with one of her main office at Ghana Street Bamenda, Cameroon was created in June 2006. A Non-Governmental Organization (NGO). This NGO seek to monitor and promote Human Rights through the promotion of a culture of human rights, good governance, gender equality and human dignity. CHRAPA had witnessed and identified with an estimation of about 25% of children from the Boyo division, Donga Matum, and Bui division 17%, Menchum 15%, Ngokintujia 11%, Mezam 10%,

¹⁹ Matthias L. Neba, *The Bafut and the Germans, 1889-1907*. (ed. V G Fanzo and Chem-Laughee) In *Nso and its Neighbours*. Reading in Social History of the Western Grassfield of Cameroon. Edited assisted by M. Goheen and E.M Chilver, Yaounde, 1986, p.89.

²⁰ Ibid.

²¹ Kasali Adeyote and co, *Social studies*, Ibadan, Oxford University press Department, 1978, pp.47-53.

Nigeria 5% more coming from the interior.²² Out of the 22 cases identified, Bamenda central registered zero while Santa had 12, Awing 4, Bali 5 which 80% were 18 years and 20% were over 18 but trafficked below 18 which served their masters while waiting for settlement. This took place before 2011 and has been checked.

3.3. Disgruntlement for no or less payment or settlement of house-help

Many of the house-help did not receive any settlement but left in agony. Some were less paid. From information gotten their conditions like payment, working time, and treatment were not respected. Few of them at least received payment ranges between 5,000 to 10,000 francs per month. This is not even the authorised fixed rate of payment which is 20% accepted receiving this sum. The sum could be received as contract stipulated for a period of 5 to 8 years. Most of them work as house help, sellers and baby seaters. They work as from 5a.m and stop at 10p.m while some starts (sell oils) 7a.m to 6:30p.m. More than 75% complain of constant corporal punishment given to them hence serious beaten, poor feeding, held in captivity. CHRAPA was formed to combat all these mess but much is still to be done as CHRAPA is handicapped financially.²³ Most children who are orphans are sent or exported from Cameroon and Nigeria to Gabon and Congo, Equatorial Guinea as many of these classes of victims are found in the entire territories. There is no complexity about this form of interval trafficking, it is usually for domestic work, even though in some cases, the victims are forced in to prostitution instead of domestic solitude that had been promised to them. Traffickers became more sophisticated when dealing with cross-frontiers especially on crimes on transactions without visas finally led them into farm plantations, Market assistants, catering workers and domestic workers.²⁴

3.4. Constitutional Laws Committees setup included in Government Plans and granting of Jobs

3.4.1. The Role of Constitutional Laws Committee

As a consequence or impact of slavery and slave trade abolition, to end slave trade and slavery in Cameroon the constitutional law committees of the National Assembly examined some bills in 2011 in the political bench, the "Sitting of November 26th 2011 regulated the trafficking in persons and slavery" under the Vice Prime Minister, Amadou Ali in the constitutional laws committee. Among important matters (issues) discussed "The instruments include the Penal Code, United Nations Convention against Trans-national organized crime and its protocol to prevent, suppress and punish Trafficking in persons especially women and children". Also some particular sections like 292 on forced labour, 293 on slavery, 294 on slavery and being in debt bondage. The Government enacted law N° 2005/15 of 29 December 2005 which dealt on the fight against child trafficking and slavery.²⁵

3.4.2 Granting of jobs

More so, it was noted that lack of job availability had course much problems hence another commission sad on the issue of job granting, giving greater right to The President of The Republic as authorized to ratify the Project, under the convention, N° 144,²⁶ on international job that was adopted in Switzerland on the 2nd of June 1976 at Geneva. This was done when the President launch the Recruitment of Cameroonian Youths in 2011, outside and within Cameroon and later other jobs opportunity has come up like the recruitment of two thousand University lecturers in State Universities in subsequent years. Morso, another law deposited before the chambers, No. 155 gave authority to the President of The Republic to ratify the convention on Security of Job and Health of Workers. This was also adopted in Geneva at Switzerland on 12 June 1981. This convention was to be applied to all sectors with no exception. The member of Government represented to this commission was Robert Nkili minister of works and social security, and was assisted by the minister of External Relations In charge of The Islamic World, Adoum Gargoum.²⁷

²²BAC.The U.S State Department "Trafficking in person Report 2006".

²³BAC.Cameroon Human Right Report, March 2005.(Illiteracy, high birth rate, and polygamy often is behind the enormous problems), March 2005.

²⁴BAC.These commonly found within the CEMAC and ECOWAS regions Cameroon Harmonizes Trafficking, slave laws. 26 November 2011.

²⁵Emmanuel Kendemen, "Cameroon harmonizes trafficking slavery laws". In *Cameroon Tribune*, Monday, November 28, 2011 p, 3 [... The bill tabled in parliament is intended to ... regulatory lapses contained in the December 2005 law... fight against child trafficking and slavery. It has three chapters divided into eight sections.]

²⁶BAC.law project that authorized the President of the Republic to ratify the convention N° 144"

²⁷ Jean Francis Belibi, " Deux Projets de loi déposes Vendredi" Sécurité, Sante et normes du travail. In *Cameroon Tribune*, 2011.

IV. CONCLUSION

In the nutshell, the two major aspects, the social impact and the political impact of the Abolition of Slave Trade in Southern Cameroon have been explained. This abolition of slavery and slave trade started when the British came reasoning that it will be important to stop this brutal life as they saw the millions of people who are dying all over the world. As a result, slaves were to be set free such as the case of James Summerset in England.²⁸ In Africa, the inhabitants were the culprit or prey to be enslaved. Before the proclamation of the abolition by European countries, many had prayed very seriously to “break the chains” following resistances and advocacy, the legacy of the abolition was also felt in British southern Cameroons under the British. Converts out with the fact that the transatlantic slave trade that had once loaded more than 100,000 Africans per year was abolished. Between 1935 and 2011 the vast trans-oceanic extension of slavery created, was dismantled and dislocated above seventy percent, before 1950. The main warehouse, by the 1960 when French Cameroon gained her Independence and 1961 when southern Cameroon gained her Independence by joining French Cameroon, it has wantonly decreased. By 2011 laws have been effectuated to take care of this act that perpetrated the societies and British southern Cameroons.²⁹

The Political institution under The League of Nations Reports and Conventions after slavery and slave trade abolition in the 1930s, the British imperial domination operated under the banner of antislavery, not slavery. By the first half of the twentieth century, the institution, universal status of human existence had been revised as an institution fated for inexorable extinction a world with limited crime against humanity was accepted. People got “free air”, “free soil” at home on which all seats and nations have agreed from the time of Adam” no seats and nations disagreed on the subject, its acceptability required no more demonstration than the light of day, the existed “cruel failure” emanating from diverse action groups and personalities against the slave

trade. These laws abide in the entire British southern Cameroon. Therefore, what are some of the Emigrational, Private and other International laws made to combat and forbade the impact of the abolition of slavery and the slave trade in British Southern Cameroons?

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The use of personal protective equipment by nurses during consultations with leprosy patients

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Abstract— *Leprosy is caused by Mycobacterium leprae, which has tropism through peripheral nerves. Although there are leprosy control programs implemented in Brazil with effective treatments and specific health policies the country was unable to stabilize epidemiological indicators and nurses are part of a collective process of this work. The objective of this work is to identify the use of Personal Protective Equipment by the professional during consultations with leprosy patients. This is a descriptive exploratory research with qualitative approach, field research, carried out in the Family-FHS Health Strategy of the Guanabara neighborhood in the municipality of Ananindeua/Pará. Data Analysis was used. The best way to understand this process is to verify the strategies exercised in the FHS being the best scenario for the professional to develop health actions. It is observed that fhs nurses are a professional who always needs to seek knowledge, because at all times he finds several situations related to the education and training of professionals under his supervision.*

Keywords— *Leprosy, Treatment, Nursing.*

I. INTRODUCTION

One of humanity's oldest evils is Hansen's leprosy or disease, which is also known as Leprosy, Lazarus Evil and Morféia. An infectious disease is considered, which presents chronic evolution, being granulomatous and mutilating in nature, and may also be curable (if diagnosed early and treated properly), or not (VIDERES, 2010).

Leprosy has as an etiological agent *Mycobacterium leprae*, or Hansen's bacillus, which has affinity for peripheral nerves, especially Schwann cells. Mainly affecting shallow nerves of the skin and peripheral nerve trunks (located in the neck, face, middle third of the arm, below the elbow and knees), in addition, can affect the eyes and internal organs (liver, mucous membranes, bones, testicles and spleen) (BRAZIL, 2017).

Transmission occurs through the upper airways by daily contact with patients not treated with lepromatosa leprosy and active borderline. Daily contact between healthy and infected relatives increases the risk of developing the disease by 3.5 times compared to the general population. Extradomiciliary contacts (neighbors, school, work) with daily interactions with multibacillary patients also increase the risk of contracting the disease. After infection, the incubation period is long and variable, and clinical manifestations occur on average 2 to 10 years later. (Marciano, et al, 2018).

The Family Health Strategy (FHS) treats health promotion and disease prevention practices, but a fundamental issue here when talking about the resolution of the population's most common problems prioritizes several specific areas of as a control of hypertension and diabetes, tuberculosis control, prevention of cervical cancer, and others. Based on these points, we can highlight leprosy control, a disease that has increasingly been configured as a public health problem and a challenge for health professionals and managers due to its high prevalence and the negative impact it causes in health of the population. (RODRIGUES, et al., 2015).

Although there are leprosy control programs implemented in Brazil with effective treatments and specific health policies the country has failed to stabilize epidemiological indicators and are still among endemic countries. It is then necessary to review the actions currently carried out to plan effective changes to disease control (BRASIL, 2009).

In the Family Health Strategy (FHS), nurses are part of a collective work process, acting directly in leprosy control actions whether individually with the carrier, family or community; professionals work in disease prevention, search and diagnosis of cases, treatment and follow-up of patients, prevention and treatment of disabilities, management of control activities, system of registration and epidemiological surveillance and research (Son, et. al, 2010).

Therefore, the objective of this work was to identify the use of Personal Protective Equipment by the professional during consultations with leprosy patients.

II. METHODOLOGY

This study is characterized as a descriptive exploratory research with qualitative approach, field research, conducted in the Family-FHS Health Strategy of the Guanabara neighborhood in the municipality of

Ananindeua/Pará, in this place three strategies work and works a multidisciplinary team.

The sampling consisted of three FHS nurse professionals working in consultation with leprosy patients. The participants were instructed and informed about the research and were only included after reading, approving and signing the Free and Informed Consent Form.

In the data collection, a research instrument composed of seven categories with open questions was used, to which for this work, only three categories were used, whose appeal was elaborated by the authors of the research.

A visit was made to the basic health unit of Guanabara in Ananindeua, where the family health strategy of the Guanabara neighborhood also operates, to schedule the days and times to conduct the research with the three nurses that make up the FHS team at the time there was an opportunity for interaction between the probable researchers and the researchers favoring the opening of both parties, and thus creating a link of mutual trust. At the time the project was presented to the research participants with the intention of clarifying the purpose, objectives and relevance of the study in question, to the professional and scientific environment, and trying to sensitize them of the importance of participation and volunteering in said research.

The participants were instructed in relation to the guarantee of anonymity through the pseudonymous codification used for each member of the study, being named as nurse1, nurse2 and nurse3, thus preserving the identity of the respondents. Later, we attended on the days and times scheduled to collect data through delivery of the interview script for nurse1 and 2 in the morning shift and to nurse3 in the afternoon shift, with an average time of 20 minutes for the return of the script, without harming your work routine.

Nurse professionals, who work in leprosy nursing consultations with a minimum time of 6 months, of both sexes and who agreed to participate in the Research after reading and signing the TCLE were included.

Thematic Analysis was adopted in order to examine the meaning of the information of the declarants (or meaning nuclei), contextualizing them. According to Minayo (2012), the pre-analysis stage, study of the content or coding and treatment of the results obtained/interpretation are processed.

This research was submitted to the evaluation of the Ethics Committee on Research with Human Beings of

the Paulista University and approved under CAAE No. 22928819.1.0000.5512, Approval Opinion No. 3.677.044.

This research poses low risks in relation to the exposure of participants. In case of embarrassment when answering the questions, withdrawal in the research through being working hours. The benefit is given as a subsidy for nursing professionals and future professionals to better understand the importance of consultation with leprosy patients, in addition to clarifying information to the community to demystify the prejudice that is still with the disease that may have cure. Not least, make the study available for future research in the college library.

III. RESULTS AND DISCUSSIONS

1 IDENTIFICATIONS OF THE PROFILE OF RESEARCH INSTRUMENTS

Table 1 shows the identification of the profile of research instruments in relation to Age, Gender, Time of Service in the Place, Specialty and Master's degree.

Table 1- Identification of the Profile of research classes in relation to Age, Gender, Service Time, Specialty and Master's, year 2019

NURSE	AGE	SEX	SERVICE TIME	SPECIALIZATION	MASTERS
NURSE 1	47	F	13 Years	Intensive Care, Epidemiology and Higher Education Unit	No
NURSE2	56	F	28 Years	Public Health, Gynecology and Obstetrics	No
NURSE 3	50	F	8 Years	Public Health	No

Source: Authors of the research, 2019.

We sought to construct a comparison of the data obtained with the theoretical framework used in the research, with the purpose of basing in scientific evidence the answers obtained in order to achieve the objectives proposed for the beginning of the research.

2 CATEGORIES ANALYZED

The application of the script with semi-structured questions the nurses offered us subsidies for more accurate analysis and comparison. After the analysis of the acquired data, 7 (seven) categories emerged, described below:

Category 1 - professional performance in consultations for the treatment of leprosy

It is clear that the nurse's actions provide guidance that pass the promotion and prevention of diseases making the patient aware of their health condition

Three nurses participated in the study, obeying the inclusion criteria. The age group of the interviewees is between 47 and 56 years, with a mean age of 51 years, it is observed that 100% (the total of 03) are female; in relation to the length of service in the Health Institution, an average of 16.3 years was obtained.

Regarding the specialty, it is perceived that of this total: 66.66% (2 in total) are specialist in Public Health; 33.33% (1 in total) in gynecology and obstetrics and 33.33% (1 in total) specialist in intensive care unit, specialist in epidemiology and specialist in Education for higher education. None of the professionals interviewed have the degree of master's degree, the interviewees are enumerated and arranged from 1 to 3 and identified as nurse (referring to the nurses who participated in the interview) in the table below.

favoring them to participate more seriously in consultations.

Below we highlight the statements of each nurse:

"Through the systematization of nursing care, where nursing processes (data collection, nursing diagnosis and nursing evaluation)" (Nurse 1).

"Clarification on the disease, treatment and prejudice that still exists" (Nurse 2).

"The measures of promotion people with leprosy follow the same as the general population, with special attention the conditions of housing, sanitation, leisure, food and work and others" (Nurse 3).

Also on this issue according to Vinicius (2016), the professional in the midst of the attributions conceived by the State and Federal Council of Nursing, administers, educates and offers assistance, which aim to strengthen the bond in the search to contribute to the improvement of

the quality of health and life of the individual in the family environment.

Category 2 - training for professionals

It is observed that fhs nurses are a professional who always needs to seek knowledge, because at all times he finds several situations related to the education and training of professionals under his supervision.

It is clear that for Porto (2007), the level of information of the professionals who make up the FHS on general and specific aspects of leprosy must be satisfactory, so that there is excellence of services and quality in care.

We highlight the speech of each nurse:

“YES, 1^o semester of 2018” (Nurse 1).

“YES, there 6 Years” (Nurse 2).

“YES, about 5 years ago” (Nurse 3).

With regard to what was presented, it is necessary to train health teams in order to eliminate the disease, in order to diagnose and treat cases early, guide contacts and direct the population in search of health services (LANA et al., 2008).

According to Paschoal et al (2006), it is of fundamental importance for the professional belonging to a nursing team to reflect on the education process within a health unit, because it should understand and understand the practices, the essence of work in the face of users, the performance in the face of an exercise and the reasons for this realization; it is up to the professional to understand all these devices for a complete and correct performance of activities, seeking a full effectiveness and professional competence.

Category 3 - use of ppe during consultation

It is of paramount importance the use of personal protective equipment not only by the nurse, but by the entire professional team of the unit, it is always necessary to organize all the materials that will be necessary to use in the procedures. It was noticed that the PPE most used by the professionals in the consultation are the glove and the coat. In addition, they assumed that they do not often use PPE as a mask and goggles.

The answers of each nurse are described below.

“When we have we use yes, the N95 mask and procedure gloves” (Nurse 1).

“Sometimes gloves” (Nurse 2).

“Yes, gloves” (Nurse 3).

Regarding what was displayed according to Melo (2014), the most important thing is adherence to use

together with proactive attitudes on the part of each professional in order to comply with accident prevention measures and seeking the protection of the patient, of co-workers and of himself. For this, it is necessary that trust in the work routine, its internalization and mastery of the technique do not trivialize the risks existing in health work.

IV. CONCLUSION

It is concluded that professionals have sufficient notions about the treatment and control of the disease. The best way to understand this process is to verify the strategies exercised in the FHS being the best scenario for the professional to develop health actions. Nurses' actions contribute preventing incidence, controlling the disease through tests, evaluation of signs and symptoms and mainly treatment guidance for the patient and his family with comprehensive and humanized care.

It was also observed the relevance of the patient in being well received and never discriminated soon it is necessary to have a satisfactorily trained team encouraging the client to the treatment offered.

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IOT based Coal Mine Safety Monitoring and Controlling

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Abstract— At this moment are shifting through an IoT (Internet of Things) screen, prosperity tries for excavators which is commonly fundamental in underground mining spaces. At this moment, system is making using explicit sensors sort out subject to MEMS used to screen the ecological variables parameters of underground mine place and drives each and every perceived parameter/ascribes to/characteristics to ARDUINO based ATmega2560 Microcontroller Unit (MCU). The MCU unit is used to make a totally robotized investigating structure with high exactness, smooth control and consistency. Decisively when a fundamental condition is seen alert is given by the structure and comparative estimations is given to webserver by beginning ESP8266 module subject to Wi-Fi correspondence. The apparent assortments in the characteristics are appeared on webserver page that makes less referencing for the underground control network to screen and to make critical quick move to hinder genuine mischief. At the same time using NRF24L01 handset module to transmit data from the mine fragment which can be used to screen and brief move to be made.

Keywords— AP ordering, information extraction, ready framework, fracking sand interface, GRNN convention.

I. INTRODUCTION

As overall essentialness use additions and customary oil resources decay, breaking development is one of the noteworthy progressions to improve the maltreatment of oil and gas resources. It is unprecedented vitality for the improvement of low-vulnerability stores and the instigation of low-yield wells. In light of the capriciousness of the stratum, various perils will be looked during the time spent breaking improvement, especially sand plug, which is the most notable, causing financial disasters and natural tainting, pummeling spillage in the course of action, and scraps the advancement well, etc. At present, the Internet of Things (IoT) has been commonly used in different fields, which makes huge data assessment stacked with challenges. Definite data examination is basic to develop reasonable logical models. The oil business is a little bit at a time moving towards knowledge. Different sensors presented at the well site which can assemble data set up an IoT circumstance. The examination of the data assembled at the well site is made arrangements for removing key information by using data mining development, which can recognize data designs, and direct peril desire. Right now, use of data mining advancement to the early notification of splitting improvement is of uncommon immensity for

avoiding the sand plug setback that occurs during the breaking technique.

II. RELATED WORK

The paper proposes an early advice system for the threat of sand plug subject to twofold logarithmic curve. Directly off the bat, the coupled time region assessment and GRNN figuring are used to envision the oil weight and bundling pressure parameters in the twofold logarithmic curve slant sand plug risk advised. Also, a while later the inclination change is applied to perceive and condemn the sand plug, which can comprehend the early caution of sand connection of breaking. Finally, to improve the precision of twist incline figuring, the improved AP gathering estimation is used to segment the oil weight and weight twist followed by twist fitting, at the same time find out the inclination of the fitted curve. The standard duties of the paper are according to the accompanying: (1) An early reprimand model for the twofold logarithmic curve of sand connection of separating is worked in the paper. (2) The time game plan examination computation is proposed which can be foresee the oil weight and bundling pressure in the early notification model, and the GRNN estimation

is used to update the desire realizes the time region assessment. (3) Improved AP gathering computation is used to bundle the checking data to improve the precision of risk notice. The rest of the paper is formed as follows. Region 2 gives four numerical models which joins twofold logarithmic twist model, time plan model, GRNN, improved AP clustering. Fragment 3 depicts a perceptive model for coupling time plan time space examination with GRNN. Section 4 blueprints the improved AP gathering early advice model. Fragment 5 gives building application examination

III. LITERATURE SURVEY

1. “Capacitive Interfacing for MEMS Humidity and Accelerometer Sensors”, Norliana Binti Yusof, Norhayati Soin, Siti Zawiah Md.Dawal, 2010, IEEE.

The paper proposes an early reprimand procedure for the risk of sand plug subject to twofold logarithmic twist. Directly off the bat, the coupled time region examination and GRNN figuring are used to predict the oil weight and bundling pressure parameters in the twofold logarithmic curve slant sand plug chance caution. What's more, a while later the inclination change is applied to perceive and condemn the sand plug, which can comprehend the early reprimand of sand fitting of breaking. Finally, in order to improve the precision of twist slant tally, the improved AP gathering computation is used to divide the oil weight and weight twist followed by twist fitting, at the same time figure the inclination of the fitted curve. The essential duties of the paper are according to the accompanying: (1) An early counsel model for the twofold logarithmic twist of sand connection of making is constructed laugh hysterically in the paper. (2) The time course of action examination count is proposed which can be envision the oil weight and bundling pressure in the early notification model, and the GRNN estimation is used to update the desire realizes the time space assessment. (3) Improved AP gathering computation is used to pack the watching data to improve the precision of risk notice. The rest of the paper is sifted through as follows. Region 2 gives four logical models which fuses twofold logarithmic twist model, time game plan model, GRNN, improved AP gathering. Portion 3 portrays a perceptive model for coupling time plan time zone examination with GRNN. Territory 4 diagrams the improved AP packing early reprobation model. Section 5 gives building application assessment.

2. “A Wireless Home Safety Gas Leakage Detection System”, LuayFraiwan, KhaldonLweesy, AyaBani-Salma, Nour Mani, 2011, IEEE.

A remote security contraption for gas spillage recognizable proof is proposed. The contraption is made arrangements for use in nuclear family prosperity where mechanical assemblies and radiators that use combustible gas and liquid oil gas (LPG) may be a wellspring of danger. The structure moreover can be used for various applications in the business or plants that depend upon LPG and combustible gas in their undertakings. The structure setup involves two essential modules: the distinguishing proof and transmission module, and the tolerant module. The ID and transmitting module perceives the distinction in gas center using an extraordinary distinguishing circuit worked thus. This module checks if an alteration in gathering of gas (es) has outperformed a certain pre-chosen edge. In case the sensor recognizes an alteration in gas center, it impels and differing media alert and gives a sign to the authority module. The authority module goes about as a flexible alert device to allow the convey ability inside the house premises. The system was had a go at using LPG and the alert was impelled as a result of progress in center.

3. “MQTT Based Environment Monitoring In Factories for Employee Safety”, Ravi Kishore Kodali and Aditya Valdas, 2017, IEEE.

Prosperity of laborers, in any industry, especially at the creation line level is one of the most noteworthy edges to be considered by associations. This is of focal importance, both for the flourishing of the delegates and that of the organization all things considered. In preparing plants where working conditions are unforgiving and agents need to take staggering caution while moving toward their work, it is typical for episodes to occur. With numbers going as high as into the thousands it is noteworthy that there is an extent of security for the agents from any possible risky conditions. As a response for this issue, we propose a checking structure to be presented in mechanical offices. With this structure, we will have the choice to screen fundamental security parameters of the work environment in these mechanical offices so we are particularly mindful of the prosperity condition and the possibility of occurrence of any misfortune. For the structure of this system, we use an ESP8266 Wi-Fi chip engaged microcontroller Node MCU. To this are related three sensors - one to screen temperature and suddenness (DHT sensor), a ultrasonic sensor (HC-04) and a smoke sensor (MQ2 sensor). These sensors constantly screen the earth in the workplace and move the data onto the Losant IoT Platform, which is one of the most amazing cloud stages which help screen data by different portrayals and further game plans.

4. "Safety of Underground Mine Coal Worker", Mrs. R.R. Thorat, Dr. L. K. Ragha, Prof. R.D. Patane, 2014, IJAEM.

To be productive, security best practices in any affiliation must be significantly pervaded into the corporate culture and maintained from top organization on down through the positions. Prosperity is actually everybody's movement. This is especially huge in mining and other high-chance endeavors where prosperity care and consistency are essential in helping with thwarting disasters, wounds and fatalities. Mine chiefs and individual diggers need to hold quick cautiously to operational prosperity strategies. Directors need to give the right contraptions and getting ready to every agent to guarantee the life, prosperity and security of the workforce, similarly as to guarantee significant worksites and assets. As driving mining affiliations certainly know, making a secured working environment infers a dynamically useful and productive mining movement. It moreover prompts progressively noteworthy degrees of worker certainty and occupation satisfaction, which subsequently improves laborer upkeep. Taking a sweeping point of view toward improving pro security preparing and safe work practices is a sound undertaking that conveys benefits for long stretch accomplishment.

5. "A disposable flexible humidity sensor directly printed on paper for medical applications", D Barmpakos, A Segkos, C Tsamis and G Kaltsas, 2017, IOP Publishing.

The present examination shows an inkjet – printed interdigitated cathode group on paper substrate and its appraisal as soggy sensor. Inkjet dot course of action assessment has been acted in order to achieve repeatable results regarding made dots, in perspective on the driving pulses applied on the inkjet piezoelectric segment. Dot plan has been watched using stroboscopic sway. Three assorted paper substrates, to be explicit high sparkly inkjet photo paper, brilliant inkjet photo and matte inkjet photo paper have been surveyed to look at closeness with the ink. Relative tenacity estimations have been done in a controlled circumstance. Material corruption, long stretch response and memory sway are a segment of the viewpoints which were considered inside the edge of the present work. The proposed sensor allows to novel biomedical applications given the versatile substrate nature and the low – cost, single – step produce approach.

IV. EXISTING SYSTEM

In existing method, there is no data transmission from mine territory to watching station for checking the status of

excavators and the environment. Difficult to screen each and every person to the barometrical status. There is no fast wellbeing endeavors available at the hour of emergency.

V. PROPOSED SYSTEM

In our proposed structure we are going to screen the status of workers and the data invigorated to cloud using IoT similarly as send data remote to the watching station.

Speed response. Fast move to be made. Screen also control without a moment's delay

VI. MODULES

1. FIRE SENSOR
2. GAS SENSOR (MQ2)
3. ACCELEROMETER
4. RELAY (2)

1. FIRE SENSOR:

This fire sensor circuit mishandles the temperature distinguishing property of an ordinary sign diode IN 34 to recognize heat from fire. At the present time it recognizes heat, an uproarious alarm reproducing that of Fire separation will be made. The circuit is unnecessarily unstable and can distinguish a climb in temperature of 10 degree or more in its locale. Ordinary sign diodes like IN 34 and OA 71 shows this property and the inside restriction of these contraptions will lessen when temperature rises.

The fire sensor circuit is exorbitantly sensitive and can recognize a rising in temperature of 10 degree or more in its locale. Standard sign diodes like IN 34 and OA 71 showcases this property and within restriction of these devices will lessen when temperature rises. In the pivot uneven mode, this effect will be progressively basic. Ordinarily the diode can make around 600 mille volts at 5 degree centigrade. For each degree rise in temperature; the diode makes 2 mV yield voltage. That is at 5 degree it is 10 mV and when the temperature rises to 50 degree, the diode will give 100 mille volts. This voltage is used to trigger the remainder of the circuit. Transistor T1 is a temperature controlled switch and its base voltage depends upon the voltage from the diode and from VR and R1. Commonly T1 conducts (as a result of the voltage set by VR) and LED sparkles. This shows run of the mill temperature.

2. GAS SENSOR (MQ2):

Fragile material of MQ-2 gas sensor is SnO₂, which with lower conductivity in clean air. Right when the goal burnable gas exist, the sensor's conductivity is progressively higher close by the gas center rising. You should use clear electro circuit, Convert change of

conductivity to look at caution sign of gas obsession. MQ-2 gas sensor has high affectability to LPG, Propane and Hydrogen, also could be used to Methane and other burnable steam, it is with negligible exertion and suitable for different application. Sensor is delicate to flammable gas and smoke. Smoke sensor is given 5 volt to control it. Smoke sensor show smoke by the voltage that it yields. More smoke more yield. A potentiometer is given to change the affectability. In any case, when smoke exist sensor gives a basic resistive yield reliant on union of smoke. The circuit has a hotter. Power is given to hotter by VCC and GND from power supply. The circuit has a variable resistor. The check over the pin depends upon the smoke in air in the sensor. The deterrent will be cut down if the substance is more. Besides, voltage is extended between the sensor and weight resistor.

2.1 WORKING PRINCIPLE

The MQ2 has an electrochemical sensor, which changes its impediment for different assemblies of vacillated gasses. The sensor is related in course of action with a variable resistor to outline a voltage divider circuit (figure showed up underneath), and the variable resistor is used to change affectability. Right when one of the above vaporous segments cooperates with the sensor resulting to warming, the sensor's resistances change. The alteration in the block changes the voltage over the sensor, and this voltage can be examined by a microcontroller. The voltage worth can be used to find the block of the sensor by knowing the reference voltage and the other resistor's restriction. The sensor has differing affectability for different sorts of gasses.

3. ACCELEROMETER:

The MQ2 has an electrochemical sensor, which changes its impediment for different assemblies of vacillated gasses. The sensor is related in course of action with a variable resistor to outline a voltage divider circuit (figure showed up underneath), and the variable resistor is used to change affectability. Right when one of the above vaporous segments cooperates with the sensor resulting to warning, the sensor's resistance changes. The alteration in the block changes the voltage over the sensor, and this voltage can be examined by a microcontroller. The voltage worth can be used to find the block of the sensor by knowing the reference voltage and the other resistor's restriction. The sensor has differing affectability for different sorts of gasses.

4. RELAY (2):

Moves are the fundamental protection similarly as trading contraptions in a huge bit of the control strategies or equipment. All the exchanges respond to at any rate one

electrical sums like voltage or stream with the ultimate objective that they open or close the contacts or circuits. A hand-off is a trading device as it endeavors to confine or change the state of an electric circuit beginning with one state then onto the following.

Gathering or the sorts of moves depend upon the limit with regards to which they are used. A part of the classes consolidate cautious, reclosing, coordinating, right hand and checking moves.

Protective exchanges diligently screen these parameters: voltage, current, and power; and if these parameters harm from set cutoff focuses they make alarm or detach that particular circuit. These sorts of moves are used to guarantee equipment like motors, generators, and transformers, and so forth.

VII. FIGURES AND TABLES

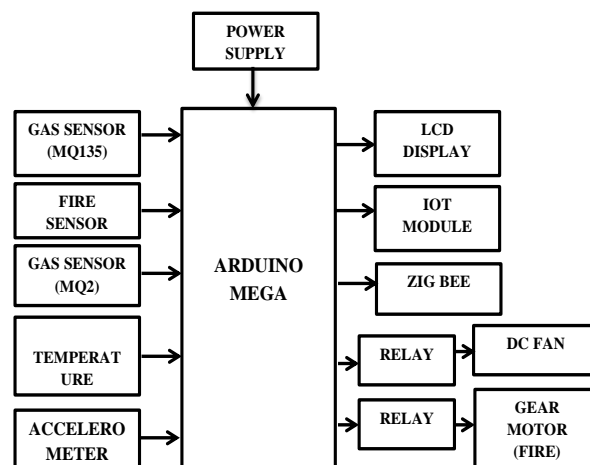


Fig 1: block diagram of transmitter

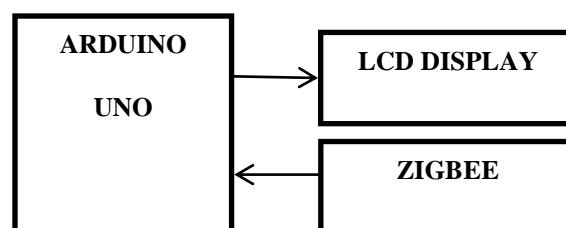


Fig 2: block diagram of receiver

Framework game plan is the applied model that depicts the structure, lead, and more perspectives on a structure. A structure graph is a proper layout and delineation of a framework, shaped with an authoritative objective that supports considering the structures and practices of the structure. Framework organizing can consolidate structure parts and the sub-structures made, that will take energy to execute the general structure. There have been attempt to

formalize vernaculars to delineate structure plan; everything considered these are called making plot tongues.

VIII. FUTURE ENHANCEMENT

Later on investigate, intellectualization is an issue territory. Despite smart early rebuke of risks, examination of quick control after the occasion of threats worth uncommon centrality.

IX. CONCLUSION

Recently, the well site has a little bit at a time went to savvy change, and sensor contraptions are generally placed in the well site to assemble a great deal of checking data. This examination needs to process and analyze the data accumulated from the well site page reliant on the Internet of Things and enormous data correspondence. Directly off the bat, a twofold logarithmic curve slant breaking sand danger forewarning model is developed, and it couple time game plan time zone examination figuring and GRNN computation. Furthermore, the time game plan examination procedure is applied to anticipate the oil weight and bundling pressure. The time desire for the breaking sand square reprimand is ensured by the advancement estimate. The GRNN computation is used to improve the time course of action examination count for oil weight and set the serendipitous occasion pace of the foreseen results. Finally, the improved AP gathering estimation is used to improve the twofold logarithmic curve slant breaking sand chance caution model. From the data precision viewpoint that the exactness of breaking sand plug chance caution is improved. Gotten together with field application, the improved sand plug danger alerted model appears, apparently, to be logically definite and snappy, and has a respectable current application prospect. The early exhortation model proposed is embedded in the remote system improvement to engage the city office staff to remotely screen.

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Job satisfaction: Servers of Regional Hospital Gurupi — Tocantins

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Abstract—The investigative balance of this research comprised the macro theme of satisfaction in the work of employees who work directly in the health care team. The cozy locus was the Regional Hospital of Gurupi (RHG), located in the south of the state of the Tocantins, from which we seek to identify and analyze the level of work satisfaction of the professionals who make up the functional staff of the unit. Methodologically, it is configured in a case study of the exploratory-descriptive type, with a qualitative and quantitative approach, whose data collection was performed from March to June 2018 with 160 servers crowded in the referenced unit and selected by simple random sampling. A structured questionnaire was used as a data collection instrument, made available through the “FormSus” web platform, composed of 15 objective questions and 2 open questions, divided into 4 sections, namely: Section A - Data collection sociodemographic; Section B - Professional data; Section C - Work Satisfaction Scale; Section D - Interference of Satisfaction in the services provided. In the analytical stage of the collected data, the descriptive statistic (mean) method was used in sections A and B of the questionnaire, section C was analyzed following the guidance of Siqueira (2008) establishing the means of the scores in each dimension, and for section D qualitative analysis of the participants' statements in conjunction with the theories previously addressed was used. The results indicated that the servers surveyed are generally dissatisfied with the performance of their tasks, with existing relationships, with the salary received and with the policies of encouraging employees of the unit. With the constant movement in search of excellence in providing health care with quality and safety, it is necessary to keep servers satisfied, fulfilling the mission of the state and public management that is to meet with excellence to social demands.

Keywords—Job satisfaction, Public Service, Public policies, Quality of life at work, Tocantins

I. INTRODUCTION

The population requires the state for the public

health care service to work well. However, for this service to be provided satisfactorily, it is necessary for the

involvement and dedication of the servers. Providing a quality service to the community is essential and public hospital employees are of fundamental importance in this context, be considered agents of transformation of the public service, contributing significantly to growth and development of the municipality, state and country [1, 2].

Studies that address job satisfaction have gained relevance in recent years because work-related physical and emotional exhaustion can be considered an epidemic among workers from various professions [3].

There are numerous factors related to job dissatisfaction, such as the lack of growth opportunities in the organization, remuneration, poor working conditions, relation problems of the multidisciplinary team and the power of decision-making actions related to the activity carried out. It is noteworthy that the level of satisfaction can increase or decrease productivity, improve or worsen the quality of service, and can also generate greater or lower profit for organizations [2, 4].

In the area of public health, studies involving the perception of servers and professionals about the services provided to the community can offer evidence about facilities and/or difficulties of these services in achieving the expectations and needs of users. Analyzing the levels of satisfaction in the work of public servants is essential because surveys such as these can be used to base management decision-making, the well-being of people and also contribute to the enrichment of the literature, seeking to understand the factors that influence such perceptions [5]. The present research aimed to know the level of satisfaction at work of the servers of the Regional Hospital of Gurupi — Tocantins (RHG). In this sense, we understand the adherence of the theme proposed since studies in this context are not known, and the subject is still challenging in the organizational sphere, which can be perceived by the high number of workers still unmotivated and dissatisfied in their professional environments in various fields of activity.

II. MATERIALS AND METHODS

The research unfolded in a descriptive exploratory case study, with a qualitative and quantitative approach. The study was carried out at Regional Hospital Gurupi (RHG), in Gurupi — TO southern region of the

Tocantins, a unit of size III within the hospital classification of the unified health system, which performs high complexity care and is a reference center for 18 municipalities in the region.

Data collection took place between March and June 2018. The participating population consisted of 598 (five hundred and ninety-eight) employees directly linked to the health care area, distributed in the following positions/functions: Hospital Administrator, Social Development Analyst, Health Services Assistant, Social Worker, Nursing Assistant, Health Services Assistant, Dentist, Nurse, Work Nurse, Pharmacist, Physiotherapist, Speech Therapist, Physician, Nutritionist, Psychologist, Nursing Technician, Laboratory Technician, Radiology Technician, and Therapist Occupational.

The RHG servers that acted directly in the health care team with at least 12 months of work in the unit and who agreed to voluntary participation in the research and signed the TCLE were included; servers that refused to respond to the search or partially responded were excluded. By simple random sampling, the selected servers, among the universe of participants (598 servers), were the ones who first accepted the invitation, accessed the Datasus platform and agreed to the terms of the TCLE.

The sample size was calculated according to Barbetta's (2008) [6], reaching the number of 160 servers, obtaining a 7.9% sample error.

Data collection was performed through the FormSus web platform, with a questionnaire containing 15 objective questions and 2 open questions, divided into 4 sections, which was made available in physical and digital materials, in addition to access via QR Code.

Section A of the questionnaire traced the respondents' sociodemographic profile and Section B identified the professional profile of the server. To assess job satisfaction in Section C, the Work Satisfaction Scale was used, constructed and validated by Siqueira (2008) [7], which is a multidimensional measure that assesses the degree of worker contentment in front of five dimensions of his work, being: satisfaction with salary, satisfaction with co-workers, satisfaction with leadership, satisfaction with promotions, satisfaction with the nature of work according to Table 1 [7].

Table 01- Dimensions, definitions, items, and est accuracy indexes in its complete form with 25 items. Source: Siqueira (2008, p. 269)

Dimensions	Definitions	Items	Est accuracy indexes
Satisfaction with colleagues	Contentment with collaboration, friendship, trust and relationship with their co-workers.	1, 6, 14, 17, and 224	0,86
Satisfaction with salary	Contentment with what he receives as a salary compared to how much the individual works, with his professional capacity, with the cost of living and with the efforts made in carrying out work.	5, 8, 12, 15 and 21	0,92
Satisfaction with the leadership	Contentment with the organization and professional capacity of the boss, with his interest in the work of subordinates and understanding between them.	2, 9, 19, 22 and 25	0,90
Satisfaction with the nature of work	Contentment with the interest aroused by tasks, with the ability to absorb the worker and with the variety of them.	7, 11, 13, 18 and 23	0,82
Satisfaction with promotions	Contentment with the number of times you have received promotions, with the guarantees offered to those who are promoted, with the company's way of conducting promotions and waiting time for promotion.	3, 4, 10, 16 and 20	0,87

In the fourth and last part of the questionnaire, Section D was composed of two open questions, which aimed at the perception of the servers regarding the satisfaction and interference of the individual productivity of the worker and the quality of their services provided. The editing of the collected data was performed with the help of the Microsoft Excel program. The analysis of the data from sections A and B was - formed through descriptive statistics. In section C, because EST is a multidimensional measure with five dimensions, the score was initially calculated for each dimension and later calculated a multidimensional mean score. The calculation of each score was obtained by adding the values indicated by the respondents in each of the items that integrate each dimension and then this value was divided by the number of items in the dimension. Thus, for the complete form of EST, the sum has always been divided by five. For the interpretation of the results of the mean score, it is emphasized that the result should always remain between intervals 1 and 7. Thus, 5 and 7 tend to indicate satisfaction. On the other hand, values between 1 and 3.9 tend to signal dissatisfaction, while values between 4 and 4.9 report a state of indifference [7]. Therefore, the higher the value of the average score, the greater the degree of contentment or satisfaction of the employee with that dimension of his work.

Section D data were analyzed qualitatively from

"ordering, classification, and analysis", according to Minayo (2001) [8].

The impacts on the degree of satisfaction of the server and its influence on public health and society were analyzed through the reasons of the scientific literature on the subject, sought by descriptors in specialized journals indexed in the bases of data BVS, Bireme, Lilacs, Scielo, portal of Capes journals and textbooks, finally enabling the end to point out the main points that generate dissatisfaction at work, seeking as a consequence to support the improvement of public policies existing.

III. RESULTS AND DISCUSSION

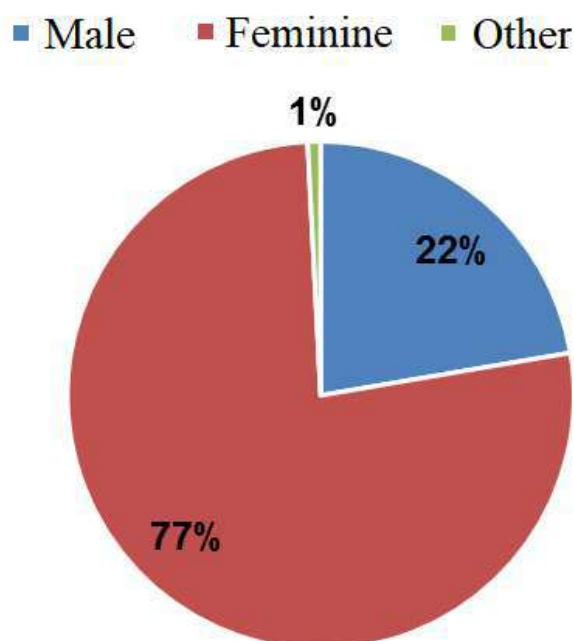
Of the 160 questionnaires answered, 30 servers did not agree with the objectives and conditions of participation in the survey and declined their free participation, 9 questionnaires were incomplete and 121 were completed correctly and with acceptance of the terms of the TCLE. The final number of participating servers linked to the care area account for 26% of the total servers crowded in the Unit that hosted this research.

1.1. Sociodemographic profile of servers crowded in Reginal Hospital Gurupi (RHG)

When considering the data regarding the gender, it was found that of the 121 of the respondents, 22% are

male, 77% are female, and 1% another, observing predominance of female professionals (Graph 1).

Graph 1 - Distribution, by gender, of the servers crowded at Regional Hospital Gurupi (RHG)



In surveys in the various regions of the country, it can be found that the population of health employees is composed mostly of female professionals [9–11]. Santos and Santos (2018) [12] conducted satisfaction survey with employees of a private hospital in the city of Campina Grande — PARAÍBA (PB) and observed the same characteristics as those found, in which, of the 34 employees, 91% were female and only 9% of the sex Male. These studies confirm the findings in this research regarding the gender of the participating servers.

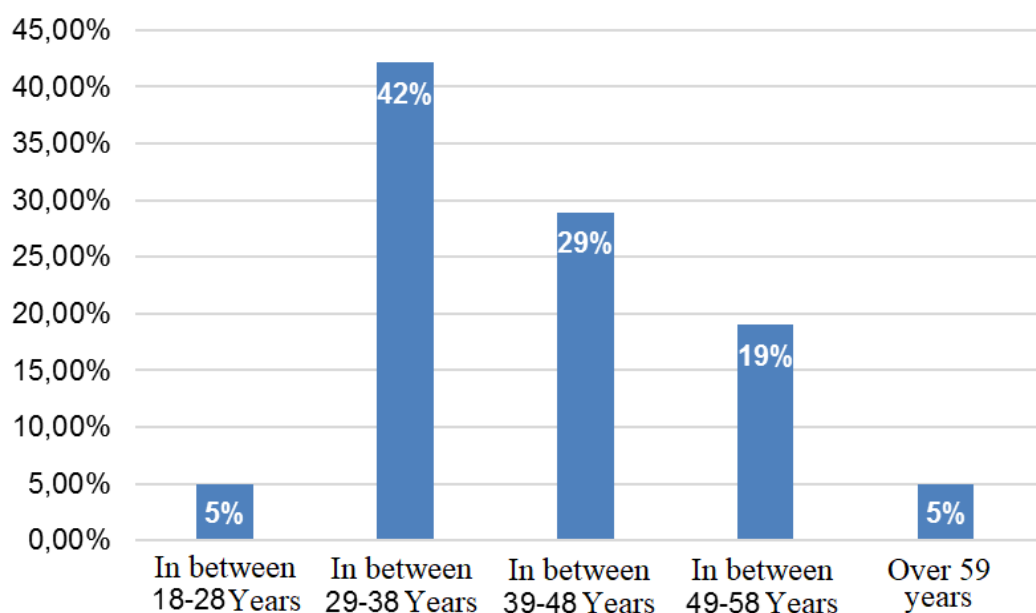
Historically, nursing is known to be an activity associated with the female universe, another point that can be highlighted is that although gender inequality is something very present in organizations, the findings portray the rise of women in the labor market, especially

in the area of health care.

Regarding the age of the interviewees (Graph 02), the majority are in the range of 29 to 38 years, representing 42% of the servers, 29% between 39 and 48 years, 19% between 49 and 58 years and with a lower proportion of 5% of servers aged between 18 and 28 years and aged 59 years or older.

The most frequent age group among respondents (between 29 and 38 years) indicate a young server staff operating in the unit, and when the frequencies between 18 and 38 years represent 47% of the total participants. This staff of professionals shown with youth profile shares experience with 53% of professionals between 39 and 59 years old.

Graph 2 - Distribution, by age, of the servers crowded at Regional Hospital Gurupi (RHG).



The married marital status (Table 2) was predominant (50.41%), followed by singles with 29.75%, divorced 15.70%, and stable union 3.31%.

Table 2. Marital status and number of children of health care employees stationed at Regional Hospital Gurupi (RHG).

Sociodemographic Characteristics	N	%
Marital status		
Married	61	50,41%
Single	36	29,75%
Divorced	19	15,70%
Widower	1	0,83%
Stable union	4	3,31%
Children		
Yes	79	65,29%
No	42	34,71%

The study by Santos and Santos (2018) [12] in a study that addressed servers of a private hospital identified that there is a predominance of singles that totaled 57% of the respondents, and only 43% of the interviewees were married. In the same sense, Tambasco et al. (2017) [10] observed in their survey that the number of single participants (40%) was close to the number of married (37.5%). Other authors cite in their studies that most of those interviewed in research with health professionals are married or maintain stable union [13, 14].

Regarding children, the results of the survey 79 (65.29%) answered yes and 42 (34.71%) answered not having children, which resembles other studies, such as Moreira et al. (2016) [15] and Ferreira et al. (2015) [16]

Silva et al. (2018) [17] report that of the servers participating in their research, 80.5% have children.

1.2. Professional profile of the servers crowded at Regional Hospital Gurupi (RHG)

Among the employees who answered the questionnaire, 7 were health service assistants (5.79%), 1 social worker (0.83%), 15 nursing assistants (12.40%), 1 health services assistant (0.83%), 36 nurses (29.75%), 3 pharmacists (2.48%), 7 physiotherapists (5.79%), 4 physicians (3.31%), 1 speech therapist (0.83%), 3 nutritionists (2.48%), 2 psychologists (1.65%), 38 nursing technicians (31.40%), 2 radiology technicians (1.65%), 1 occupational therapist (0.83%), thus totaling 14 areas professionals participating in the research.

Among the different areas that make up the body of hospital employees, there was greater participation of technical servants in Nursing, totaling 31% of the respondents.

This is an expected phenomenon since the largest number of health employees in the hospital unit is composed of these professionals. Nursing technicians and nurses are health professionals who deal directly with patients and know the problems they present because they perform most hospital actions and primary care.

Santos and Santos (2018) [12], in their research, had as most technical respondents in nursing (79%), data that resemble RHG data.

In observation the professional profile of the respondent servers, it is perceived that most have only technical course, totaling 47% of the professionals; then the experts, who add up to 32%; graduates with 14%, the masters with 6% and with doctorate only one professional (1%).

Table 3. Professional characteristics of health care servers crowded at Regional Hospital Gurupi (RHG).

Professional features	n	%
Degrees		
Technical	57	47,11%
Graduate	17	14,05%
Specialist	39	32,23%
Master	7	5,79%
Doctor	1	0,83%
How long has the specialty		
Less than 1 year ago	5	4,13%
Between 1 and 2 years	8	6,61%
Between 2 and 5 years	18	14,88%
More than 5 years	48	39,67%
I have no specialty	42	34,71%
Does it provide service essentially in the context of specialized care?		
Yes	97	80,17%
No	24	19,83%
Working Day		
40 Hours	17	14,05%
Exclusive Dedication	2	1,65%
Other	102	84,30%
How long have you been working in this institution		
1 to 2 years	9	7.44 %
2 to 5 years	28	23.14%
5 to 10 years	39	32.23%
More than 10 years	45	37.19%
Family Income		
1 to 3 minimum wages	47	38.84%
4 to 6 minimum wages	43	35.54%
7 to 10 minimum wages	16	13.22%

10 to 15 minimum wages	11	9.09%
Over 15 minimum wages	4	3.31%
Has Administrative Position		
Yes	14	11.57%
No	107	88.43%
Works elsewhere		
Yes	46	38.02%
No	75	61.98%

Santos et al. (2018) [18] observed in his research that approximately 41% of the 32 participating nurses had specialization and 38% master's degree, data that distance themselves from the reality observed in the RHG. The high number of professionals with training at the technical level can be explained by the fact that the positions of nursing technician and nursing assistants add up to the majority of the employees of the unit, because these are responsible for direct care to the patients, requiring a greater number of professionals to end in any health care unit. Regarding how long the specialty has been (Table 3), the majority, 39.67%, reported acting in the specialty for more than 5 years, 14.68% between 2 and 5 years, 6.61% between 1 and 2 years, 4.13% less than 1 year. 34.71% reported having no specialty, which can be directly linked to the fact that technical level servers do not have such training and have greater representatives in numbers in front of other servers.

Qualification is an important issue for the execution of the work because it can provide the professional with a new critical look, adding skills and values that enable him to interact and transform the environment in which he works, increasing the level of quality service and consequently satisfaction with the service provided. In addition to encouraging qualification is a way to value the knowledge of public servants.

The majority of respondents (n= 97, 80.17%), indicated in their response that they work exclusively in the field of specialized care, while only 24 (19.83%) reported having other non-specific activities of specialized health care.

Regarding working elsewhere, the majority of 61.98%, reported that they had no other activity, while 38.02% reported that, in addition to RHG, they perform their duties elsewhere.

When asked about the time of service to unit, most respondents, 37.19%, reported working for more than 10 years; followed by servers with service time between 5 and

10 years (32.23%); those between 2 and 5 years (23.14%) and those who have been in the Unit for less time, between 1 and 2 years.

The working day was also one of the questions evaluated in the identification of the professional profile. Table 3 shows that 14.05% of respondents reported working for 40 hours per week, 2 of them claim to have an exclusive dedication journey and 102 (84.30%) report having another workday.

The double working day significantly influences the quality of the service provided, because, with the exhaustive workload, the professional is exposed to sources of stress and is subject to greater physical and psychological fatigue. Most often, activities performed in hospital units require physical strength from professionals, which generates exposure to occupational diseases, directly influencing workers' health and the quality of patient care.

Workers with health problems, physical or mental, transfer their problems and concerns to their work activities, which leads to several difficulties ranging from delays and absences to work, carelessness with materials, decreased quality of work and a drop in the quality of care provided.

Also, in relation to the working day, the option "other" obtained an expressive number among those available, a fact that can be explained, because, since August 1, 2010, nurses, auxiliaries and nursing technicians at the Tocantins work only 30 hours per week. This workload was defined after the approval of Bill No. 42/2010, which changed Law No. 1,588, of June 30, 2005, reducing the workload from 40 to 30 hours per week.

The family income was divided into 5 categories, which 38.84% of respondents reported family income between 1 and 3 minimum wages; 35.54% between 4 and 6 minimum wages; 13.22% between 7 and 10 minimum wages; 9.09% between 10 and 15 minimum

wages and 3.31% reported higher income above 15 minimum wages.

In the diagnosis of motivation and satisfaction in the work performed by Santos and Santos in 2018 [12], it was found that most employees had lower remuneration or up to 3 (three) minimum wages, data that corroborate those found in this research.

Of the 121 questionnaires analyzed, 107 respondents reported not having an administrative office, while 14 performed administrative activities, whether in the management, leadership or direction of some department of the hospital unit.

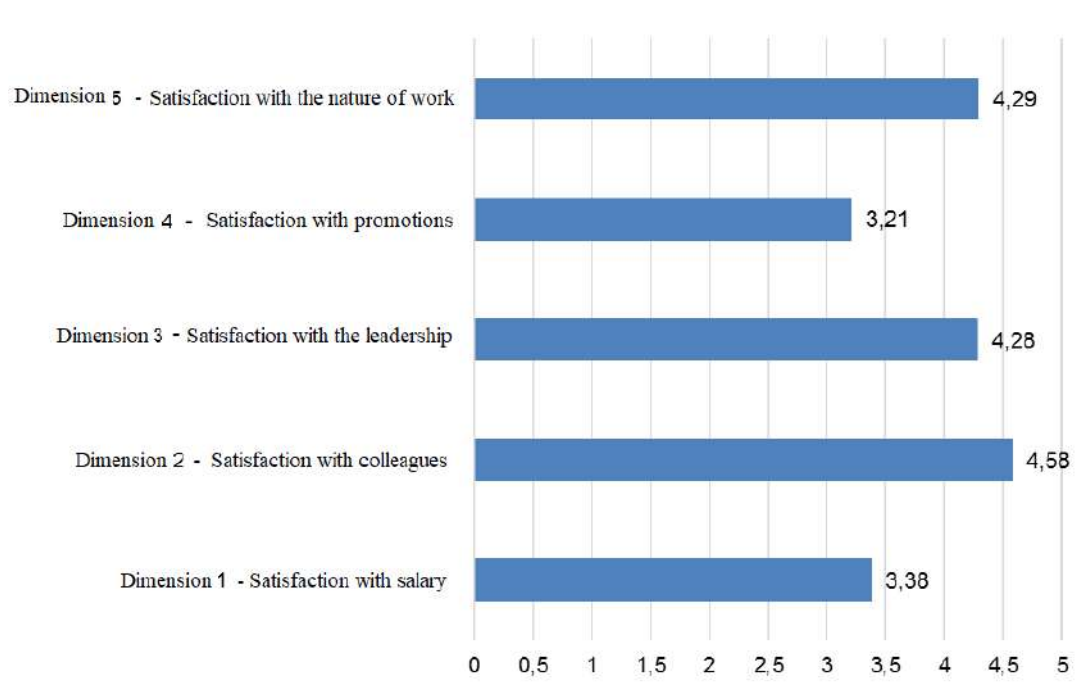
These servers hold positions known as "commissions or trust function", by which the server is removed from its origin activities and appointed to perform provisional

positions, intended for the assignments of management, leadership, and advice.

1.3. Level of satisfaction at work according to the dimensions of the Work Satisfaction Scale

Analyzing Graph 3 it can be observed that after obtaining the average of the scores of the five dimensions present in the Satisfaction Scale it is concluded that the dimension of satisfaction with the salary that has an average score of 3.38, while dimension 2 that deals with satisfaction with colleagues had an average score of 4.58, already the dimension that measures satisfaction with the leadership score of 4.28, while the dimension of satisfaction with promotions obtained the lowest score of 3.21, and dimension 5 that deals with the nature of the work with a score of 4.29.

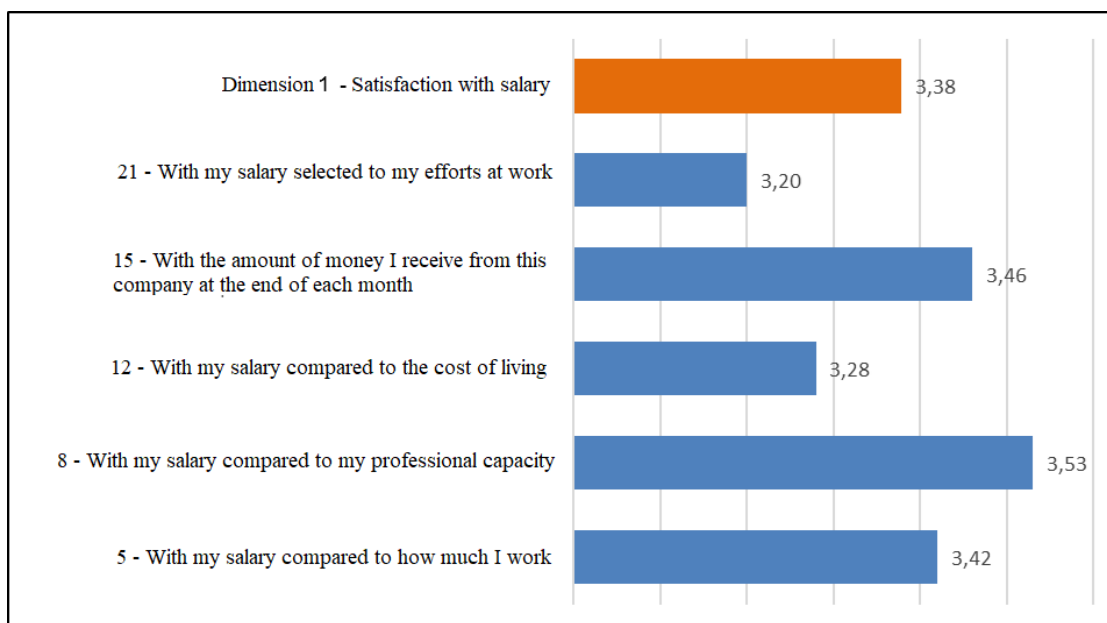
Graph 3 - Average scores - Dimensions of the Satisfaction Scale



1.4. Satisfaction with salary

As Graph 4 points out regarding salary satisfaction, a score of 3.38 can be observed, which indicates dissatisfaction on the part of the servers in relation to the amount of money they receive each month.

Graph 4 - Satisfaction with salary

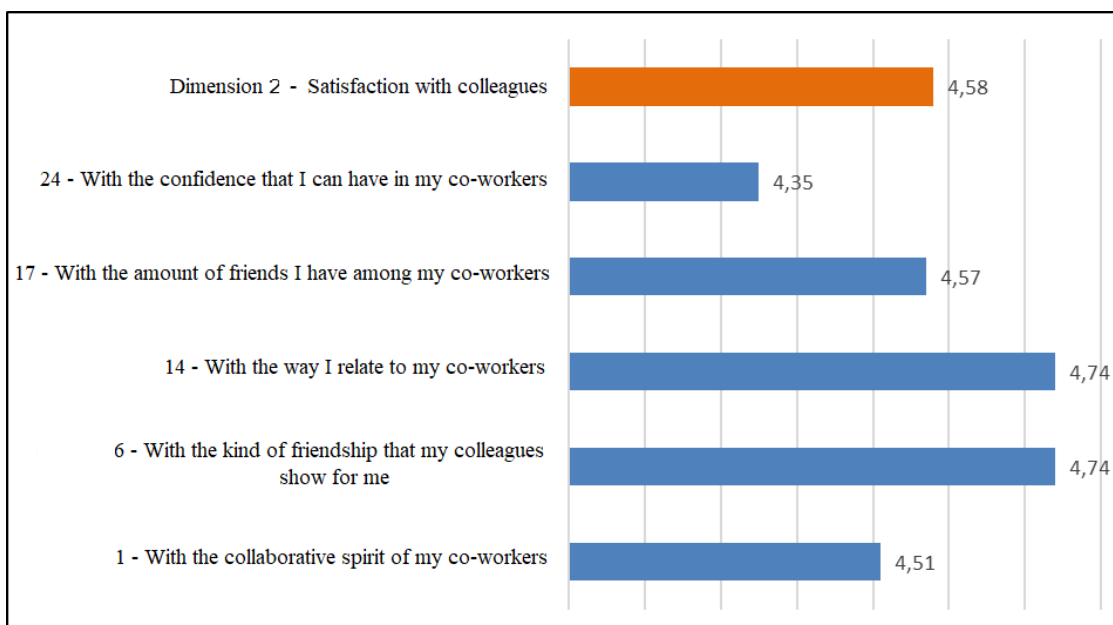


The issue of EST dealing with salary compared to work efforts presented the lowest satisfaction rate. During the approach and data collection, the servers reported this situation in which the number of calls is increasing and the number of servers has fallen constantly, generating overload and greater efforts in activities.

1.5. Satisfaction with co-workers

As far as dimension 2 is concerned, which deals with the relationship with co-workers, the servers are generally indifferent. With scores of 4.35 satisfaction in relation to trust in co-workers, then 4.74 with regard to the relationship with the type of friendship, 4.74 to the relationship with co-workers and 4.57 concerning the number of friends, and with 4.51 in relation to the spirit cooperation of co-workers.

Graph 5 - Satisfaction with co-workers



A good relationship between co-workers is a primary factor so that coexistence does not become exhausting, always maintaining a positive environment, since there are working regimes in the case of shifts where

professionals can work for up to 24 hours with the same team. Activities in hospital environments already become exhausting and, if there is no good conviviality between the team, these become even more exhaustive.

The organization must promote interaction activities so that such people who are not satisfied can relate to others, thus increasing their degree of satisfaction and contributing to maintaining the feeling of those who are already considered satisfied.

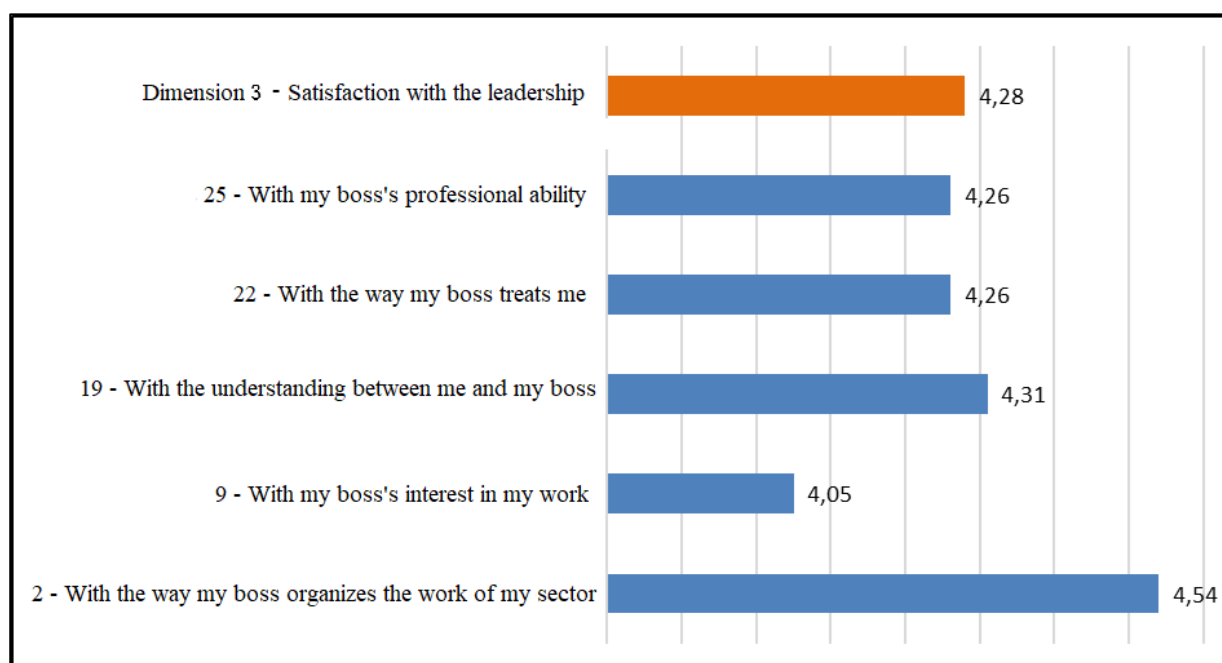
In the research by Affonso and Rocha (2010) [9] were found during the interviews some servers who reported that they assume a peaceful coexistence with other colleagues to avoid conflicts. That is, there is dissatisfaction with co-workers, but for the improvement

of the work environment, the servers hide or even ignore the differences.

1.6. Satisfaction with the leadership

Graph 06 shows the average of scores obtained in the questions raised in dimension 03, which are: the professional capacity of the boss 4.26, the way they are treated by the boss 4.26, regarding the understanding with the boss 4.31, the interest of the boss for his work 4.05 and the way the chief organizes the work of the sector 4.54, 4.31 and 4.26, respectively.

Graph 6 - Satisfaction with the leadership



It is possible to observe through the indexes the level of the indifference of the servers in relation to the head, where even if it does not present satisfaction index, the way in which the head organizes the work had the highest index among EST questions.

The manager of a hospital unit or department must act as a point of trust of the servers under their supervision because, in addition to organizing the activities, they must directly influence his team. Motivation is a primary factor for excellence in the execution of an activity, and it is up to it to set goals, plan the activities of the team, fairly and egalitarian.

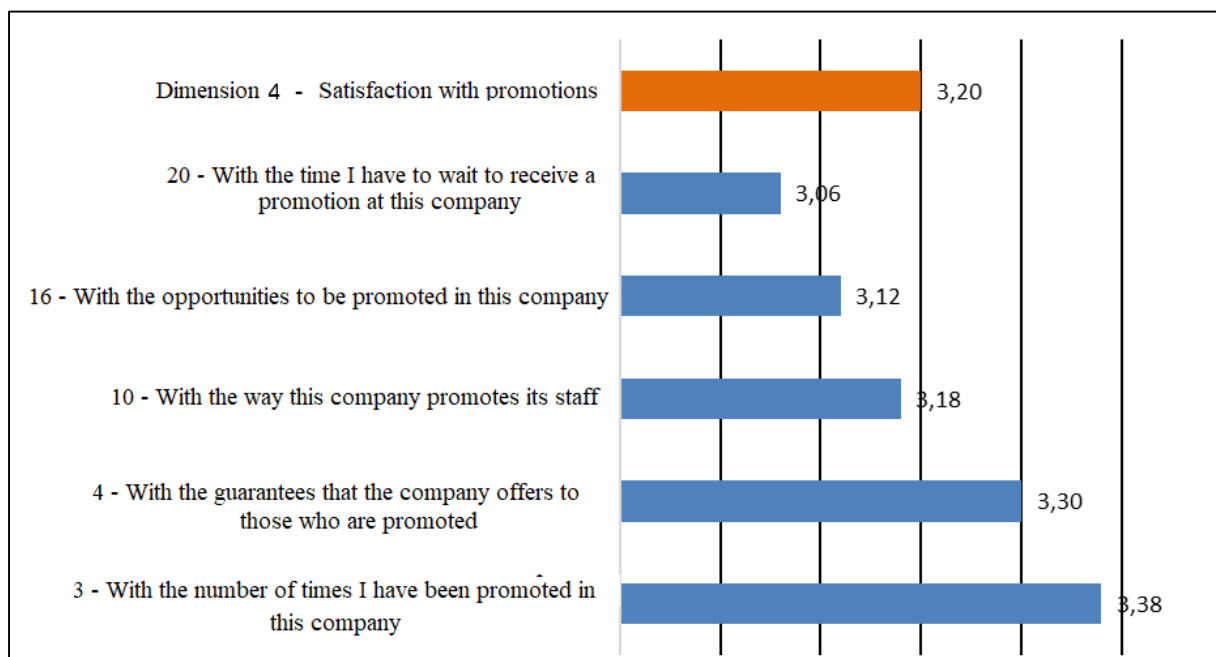
The hospital environment already has hostile characteristics, dealing with pain, sufferings of others is a constant challenge for health professionals, a qualified

manager, with strategic thinking, able to identify and solve problems, using the creativity, awareness and ethical posture in the face of everyday situations contributes significantly to the best performance and increased quality of services provided.

1.7. Satisfaction with promotions

When we observe issues that encompass this dimension in Graph 07, it appears that in the issue that deals with the number of times it has already been promoted, the score is 3.38, with the guarantees that the company offers to those who are promoted 3.30, with the way the company conducts promotion 3.18 with opportunities to be promoted 3.12 as waiting time to be promoted 3.06.

Graph 7 - Satisfaction with promotions



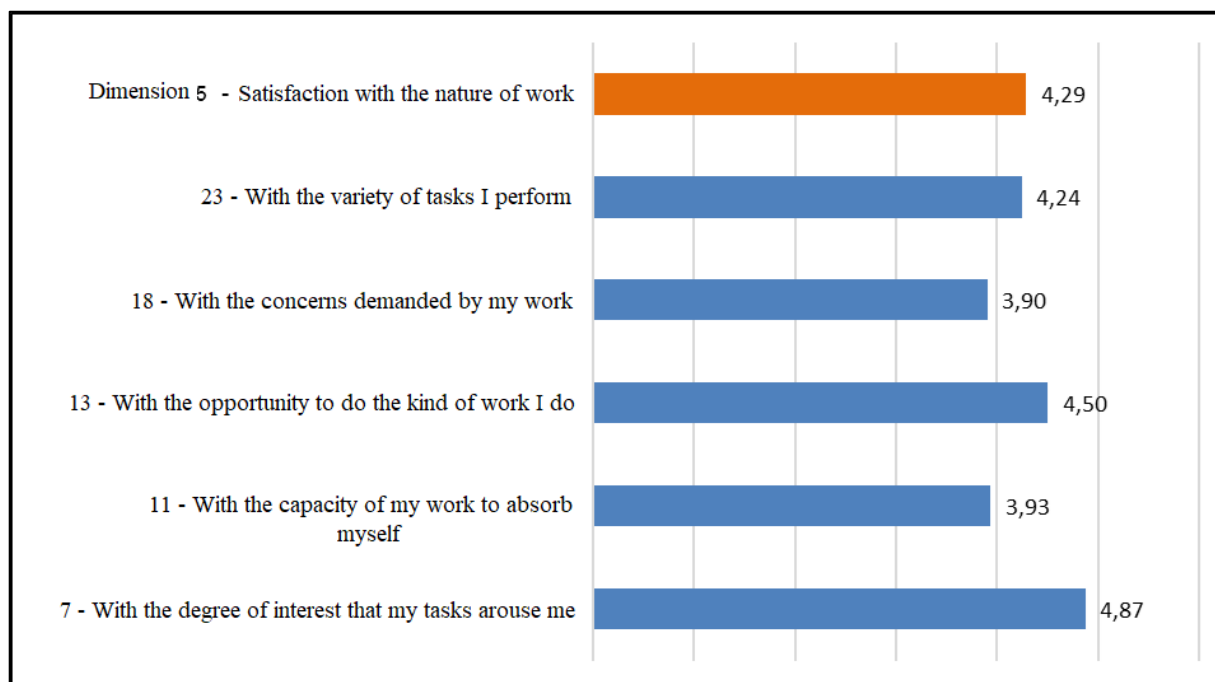
Perhaps these indices can be explained by the fact that in the Hospital unit there is no promotion policy by deserving, promotions are carried out by indication of superiors.

1.8. Satisfaction with the nature of work

In the last dimension of the scale deals with server satisfaction with the nature of its work, Graph 08 shows a score of 4.29, which according to Siqueira (2008) [7] indicates indifference. When answering the questions that

deal with this dimension, the scores presented were 4.24 in relation to varieties of tasks, 3.90 with the concerns required by the work and 4.87 with interest in tasks. It is also observed that when asked if they are satisfied with the ability that the work absorbs, with the opportunity to do the type of work they do, they have scores of 3.93 and 4.50 respectively.

Graph 8 - Satisfaction with the nature of the work



In the question that deals with the degree of interest that the activities arouse, the servers presented the highest scores of all 25 questions raised by EST, although this index presents indifference, presupposes that even with all the limitations raised by the servers (lack of materials, inadequate working conditions, poor pay and non-compliance with the Office, Careers and Salaries Plan) they still have a certain degree of interest in work.

This interest in the activities developed can be considered with the motivation factor of the server, and can be the starting point for actions that seek motivation strategies generating benefits not only for the organization also bad for the server. The interpretation of the results considered that the higher the value of the mean score, the greater the degree of contentment or satisfaction of the

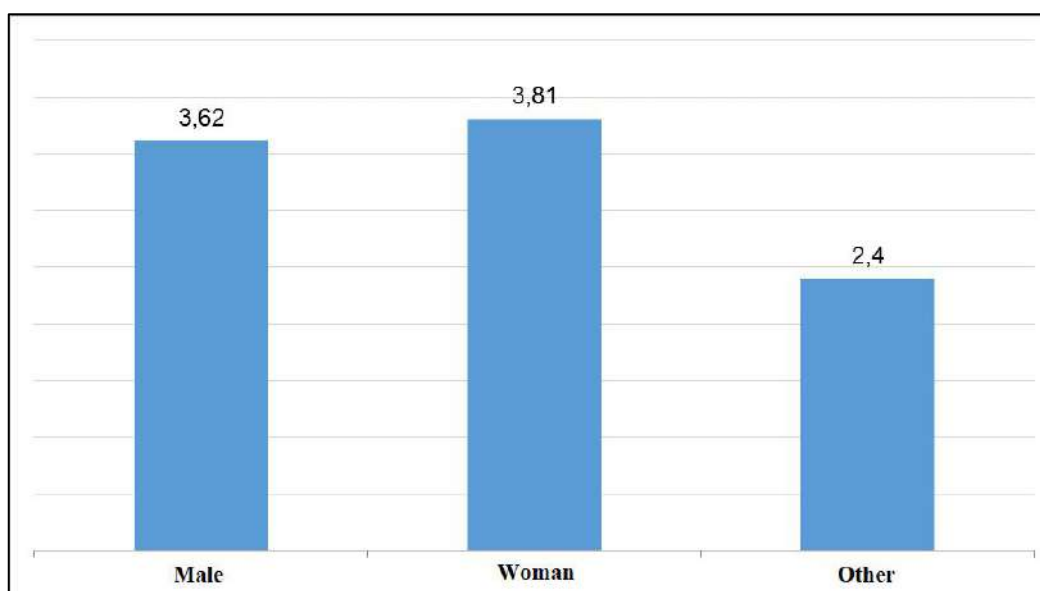
employee with that dimension of his work.

Thus, in none of the dimensions, an average score was obtained from 5 to 7, which indicates that there is no satisfaction of the servers in any of the questions. In dimensions 03 and 04, which deal respectively with the relationship with the head and promotions, a score was obtained between 4 and 4.9 which indicates that RHG servers show indifference to these points. In the dimensions related to salary and the nature of the work, an average score was obtained between 1 and 3.9 which indicates dissatisfaction.

1.9. Satisfaction in the work evaluated by gender

Among the interviewees, women were more satisfied with the work, as shown in Graph 9.

Graph 9 - Level of satisfaction at work according to gender



In the study by Carrillo-García (2013) [19] the relationship between the gender of the participants and the level of satisfaction at work was observed, and women expressed being more satisfied, which coincides with the data observed in this study.

In other studies, the authors observed that women constituted two-thirds of the study participants and were more dissatisfied. The most likely hypothesis for this result is the "double journey" assumed by women who, being the majority in the group, contributed to this result [20,21].

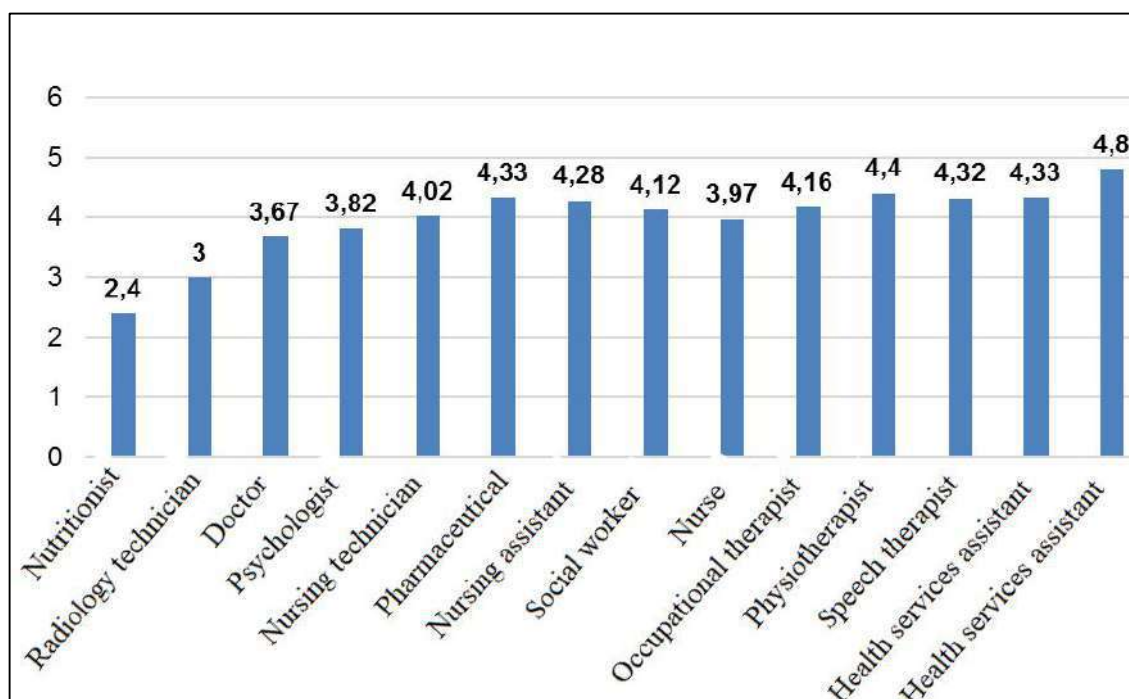
Even when women are employed in the same

occupations as men, as is the case with this study, one might think that they still have a perception of less appreciation or feel pressured by the double working hours, which may imply a feeling of greater effort spent at work.

1.10. Job satisfaction assessed by profession

When it comes to the level of satisfaction evaluated by profession/position, it is perceived that most professionals present indifference, scores between 4.0 and 4.8. While nutritionists, radiology technicians, and physicians are dissatisfied with scores between 2.4 and 3.6.

Graph 10 - Level of satisfaction at work according to the general perception of each profession



A study conducted by Albuquerque et al. (2018) [22], which specifically addressed the satisfaction of medical professionals, she reports that in general, the physicians interviewed are still satisfied with the work, they affirm that they can take care of the population that needs the most, the feeling of doing the best for these people, the doctor-patient bond and stability in employment are causes of satisfaction.

1.11. Global Satisfaction

In summary, it was found that RHG does not offer a level of satisfaction in the dimensions analyzed and evaluated according to the perception of its servers. When calculating the overall arithmetic mean of the results obtained in each dimension, an overall index of 3.94 was observed, which indicates that the level of server satisfaction is low, evidencing dissatisfaction.

Table 4 - Overall satisfaction of the servers of the Regional Hospital of Gurupi - Tocantins

Dimension	Average Score
Dimension 01 - Satisfaction with salary	3,38
Dimension 02 - Satisfaction with colleagues	4,59
Dimension 03 - Satisfaction with the leadership	4,28
Dimension 04 - Satisfaction with promotions	3,20
Dimension 05 - Satisfaction with the nature of work	4,28
Global Score	3,94

As observed, RHG servers are dissatisfied with the way promotions are carried out, as criteria such as deserving and qualification are not respected to perform certain functions.

1.12. Server satisfaction and its interference to the productivity and quality of the services provided

Society in general, regardless of social class, color, age, gender, and other factors, lives in search of

satisfaction, satisfaction is understood as a feeling inherent to each person and considered as a starting point of motivational behavior. When asked about satisfaction with the services provided, it was possible to learn that the servers evoke a dissatisfaction with actions related to management and remuneration. The following statements demonstrate this dissatisfaction:

Suj. 96: Not because you should make better.

Suj. 61: Not because every day changes the rules of the industry coordinator. It does not accept the employee's opinion.

Suj. 6: No! Because here management is not committed to the servers.

Suj. 21: "No, because unfortunately our rulers never continue the services that are working"

It is perceived that the servers evaluate that managers are fundamental parts for the efficiency, productivity, and quality of the services provided, because they are responsible for the actions developed in the work environment, and these should be chosen not by indication, but by capacity and merit for the skills and skills demonstrated for the exercise of positions.

Generally, a dissatisfied employee is more often absent and may present diseases such as stress, disrupt the work of other employees and become a burden for the organization [23].

When asked if satisfaction interferes with the quality of the services provided, servers report situations such as large quantity and poor division of work, lack of materials. Situations such as lack of resources and poor working conditions contribute significantly to server dissatisfaction and the quality of service provided because the good performance of activities depends on the availability, conditions, and offering of materials necessary for the execution of the services.

Suj. 19: "There are no investments on the part of the employer in the training of the server, working conditions, in the improvement of the work environment (physical structure and Human Recourse) and the replacement of inputs and materials essential for the performance of my functions".

Suj. 16: "Resources are lacking so that I can perform my work in a resolution."

Improve the organization's infrastructure, create wellness environments for rest and rest, create the week of Quality of Life at Work (QLW), to give individual attention to the server, as well as a channel to listen to their needs and promote integration organization, collaborate for a positive environment [24].

Suj. 77: "No, we always work on improvisation"

Suj. 45: "No! Because we're always working on improvisation."

Suj. 13: "No, working conditions are bad"

Servers also report the lack of appreciation, from the recognition of the service provided to the progressions that are not met within the stipulated period, and also the lack of incentive and appreciation for the search for qualification:

Suj. 83: No, the government's instability is lacking greatly hinders. Suj. 35: "No, I promotion here only with politics."

Suj. 60: "No. We are not valued".

Suj. 22: "No. There is no recognition of the work by the Hospital Board. People are discarded when they are not part of the political summit."

This deficient organizational climate can negatively influence work performance, destabilizing the environment and impairing the development and production of the individual.

According to Pontes (2007) [25], organizations are increasingly lacking qualified staff and motivated to meet their objectives. One of the strategies in this sense is the generation of opportunities for professional development, through a plan of professional progression.

Suj.88: "Here you never get a promotion; the rights of progression and benefits are always behind".

Suj.118: "Here alone and valued who has a political friend, promotion only in politics".

The influencing factors in motivation and quality of life are personal and professional appreciation, so there should be respected and possibilities for the server to expand its knowledge; ascending position and career plan; have autonomy and integration with the work team; develop good interpersonal relationships; have unity; communication; democratic leadership and participatory management [26, 27].

The factors presented in the literature that affect QLW and cause dissatisfaction of workers is the stress caused by overwork due to reduced teams; low-wage and few benefits; excessive pressure and supervision charges; poor infrastructure, such as lack of equipment and inputs; inhuman working conditions and poor quality of hygiene and cleaning of the environment [5, 28].

Human performance depends on the complexity of factors that act by interacting with each other in an extremely dynamic way. It is a consequence of

motivational state and individual effort to accomplish the task and achieve the objectives, it is believed that when the company has a good organizational climate its productivity can be higher [23, 29].

When an employee feels satisfied and recognized within the organization tends to have less need to look for another job.

The majority, which corresponds to 83% (n= 100), said that satisfaction significantly interferes in the quality and productivity of services:

Suj.81: "I believe that working satisfied is much better"

Suj.46: "Of course, satisfied professional performs with pleasure and motivation his work activities."

Suj.2: "Surely the work leaves to be desired. The hungry server does not yield."

Another point to highlight concerns about food. Some servers complained about the supply and poor quality of food served to the unit's employees. Several authors report that the quality of nutrition offered to servers is a factor that contributes to well-being and strengthens the feeling of its importance to the organization [24, 30].

The structure of the place, materials, and working conditions were also heard in the manifestations of the servers:

Suj. 03: "Generally lacks support from our rulers in managing and structuring our hospitals better"

Suj.25: "Lack of support for carrying out the work. Both the physical and personal structure"

It is known that for the good performance of any activity and necessary assistance of equipment, in the case of the health service in addition to equipment is necessary materials and medicines. The lack of any of these items already generates a loss of productivity and efficiency of the service provided, consequently, a poor-quality service.

For the server, this lack of structure generates dissatisfaction, where even with technical capacity and availability to develop a good job, it cannot do so, because it does not have support from the organization.

The present research described the sociodemographic, professional characteristics and level of satisfaction of RHG servers.

RHG servers do not have a level of satisfaction in the dimensions analyzed and evaluated in this study. When calculating the overall arithmetic mean of the results obtained in each dimension, it was observed that the level of server satisfaction is low, evidencing general dissatisfaction among the population sample participating in the research, thus it is concluded that the RHG servers are dissatisfied in their work.

Thus, the results demonstrate that there is a need to review the management of the unit, with the addition of measures that object to the motivation of the servers in the organizational environment.

The need for attention on the part of the organization's management was made clear, especially with regard to the expansion of human resources and compliance with acquired benefits, because these were indicated by the servers as factors that contribute to the satisfaction at work and the high impact on productivity.

The server is the pillar of public administration, and its satisfaction is a great challenge for public policies. With the constant movement in search of excellence in providing quality and safety health care, it is necessary to keep servers satisfied, making them able to increase their productivity, their self-esteem, their willingness to work and consequently an increase in the quality of service provided, fulfilling the mission of the State and public management that is to meet with excellence the social demands.

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IV. CONCLUSION

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Cases of Chronic Chagas Disease in the State of Piauí according to the Public reference Laboratory in Health in the Period of 2013-2017

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Abstract— Chagas Disease (CD) or American trypanosomiasis is a serious infectious disease that presents acute and chronic phases. In Brazil, acute cases of CD are compulsory notification to epidemiological surveillance. Between the years 2013 and 2017, in Piauí state, 350 cases were confirmed in chronic phase, which represent 26.8% of the acute cases registered in Brazil (1304 cases). Therefore, screening of Chagas disease in the chronic phase is of paramount importance for controlling the pathology.

Keywords— Cases Notification, Chagas Disease, Public Health.

I. INTRODUCTION

Chagas disease (CD) is serious infection caused mainly by the flagellate protozoan *Trypanosoma cruzi*, transmitted mostly by Triatomine bugs. Oral contact, organ transplantation, blood transfusion, work accidents and vertical transmission may be other ways to contract the disease¹⁻².

The acute and chronic phases manifest asymptomatically or symptomatically³⁻⁴. Acute phase takes

around 4 to 12 weeks, when the parasite might be found in the blood. The parasite multiply inside macrophages in spleen, liver, lymph node, myocardium and tissues, and may cause inflammatory reactions⁵. Chronic phase emerges after acute phase with decrease of IgM and increase of IgG antibody levels. In that moment the body already suffers great damage and treatment is compromised, what means less chance of cure⁶.

The World Health Organization⁷, estimates between 6 and 7 million people with CD worldwide,

highlighting 21 countries in Latin-America, mainly Argentina and Brazil. In the latter, epidemiological surveillance acts through the compulsory notification of cases of acute CD, however researchers have brought discussions on improvements in the reporting process, with the inclusion of chronic cases⁸⁻⁹. In regard to the vector, the natural infections rate of triatomines by flagellates morphologically like *Trypanosoma cruzi* was around 183 out of the 22,896 triatomines in captured inside houses in Piauí state in 2008¹⁰. A research about main transmissible infectious diseases in serological screening at Blood Centers from Piauí in 2012, showed that out of 49,829 donations, 1,818 were blocked after serological tests and 177 had positive results to CD¹¹.

According to the described above, it is important to keep control of CD in the state. This study aims to report cases of chronic CD in Piauí state among the years 2013 to 2017, which do not require reporting, based on positive cases detected in a reference laboratory of public health.

II. MATERIAL AND METHODS

For this retrospective study, with a qualitative-quantitative approach, secondary data on the chronic form of CD from the reference laboratory in Public Health of Piauí, Brazil, dating from the years of 2013 to 2017, were used. The data were grouped by year and by the city where the patients were living. To define the distribution of

people infected by CD per city in Piauí state, the software ArcGis was used.

The data were obtained through the records of the laboratory system, after careful analysis and proper authorization.

The ethical and legal aspects related to the phases of the research were respected according to the National Health Council under resolution 466/2012 and its complementary rules with Ethics Presentation Certificate number 2.962.707.

III. RESULTS

Over the years 2013 to 2017 there were 4029 suspected cases of CD in the reference laboratory of Public Health of Piauí, Brazil, and 350 of those were tested positive to the disease. The laboratory received and processed suspected samples of chronic CD, which were analyzed, and the diagnosis was confirmed by methods including ELISA, IFI and Chemiluminescence. The age range that showed the highest frequency of positive cases for both females (40.76%) and males (32.80%) was between 41 and 61 years old. However, among males the frequency was higher between 25-41 years old (25.40%) and above 61 years old (28.57%) compared to female (Table 1). In this study, it was not possible to identify gender and age of 4 patients (data not shown in the table).

Table 1- Frequency of chronic CD according to age and sex in population from Piauí state, Brazil

Age Range	Female	Relative frequency (%)	Male	Relative frequency (%)	Female + Male frequency/(%)
00 --- 11	4	44.4	5	55.6	9/ (100)
11 --- 18	14	82.3	3	17.7	17/ (100)
18 --- 25	14	45.2	17	54.8	31/ (100)
25 --- 41	28	36.8	48	63.2	76/ (100)
41 --- 61	64	50.8	62	49.2	126/100)
61 --- 98	33	37.9	54	62.1	87/(100)
95% CI	3.8 to 48.5		3.9 to 59		
Σ	157	-	189	-	346

Source: produced by the authors

There are 224 cities in Piauí state, in which 49 (21.87%) had positive cases in this study (Fig 1 B).

The Figure 1 (A and B) shows the distribution of CD cases in all state of Piauí with highlight to the cities of Teresina (n= 186; 53.14%) and Riacho Frio (n= 53; 15.14%) with the most of positive tests.

In the Figure 1C it is possible to see the number of cases per year decreasing over time, with the following occurrences: 2013 with 37.71% of cases (132 to 350), 17.71% in 2014 (62 to 350), 14.57% in 2015 (51 to 350), and 2016 10.86% (38 to 350). However, there was a short increase in 2017 with 19.14% of cases (67 to 350).

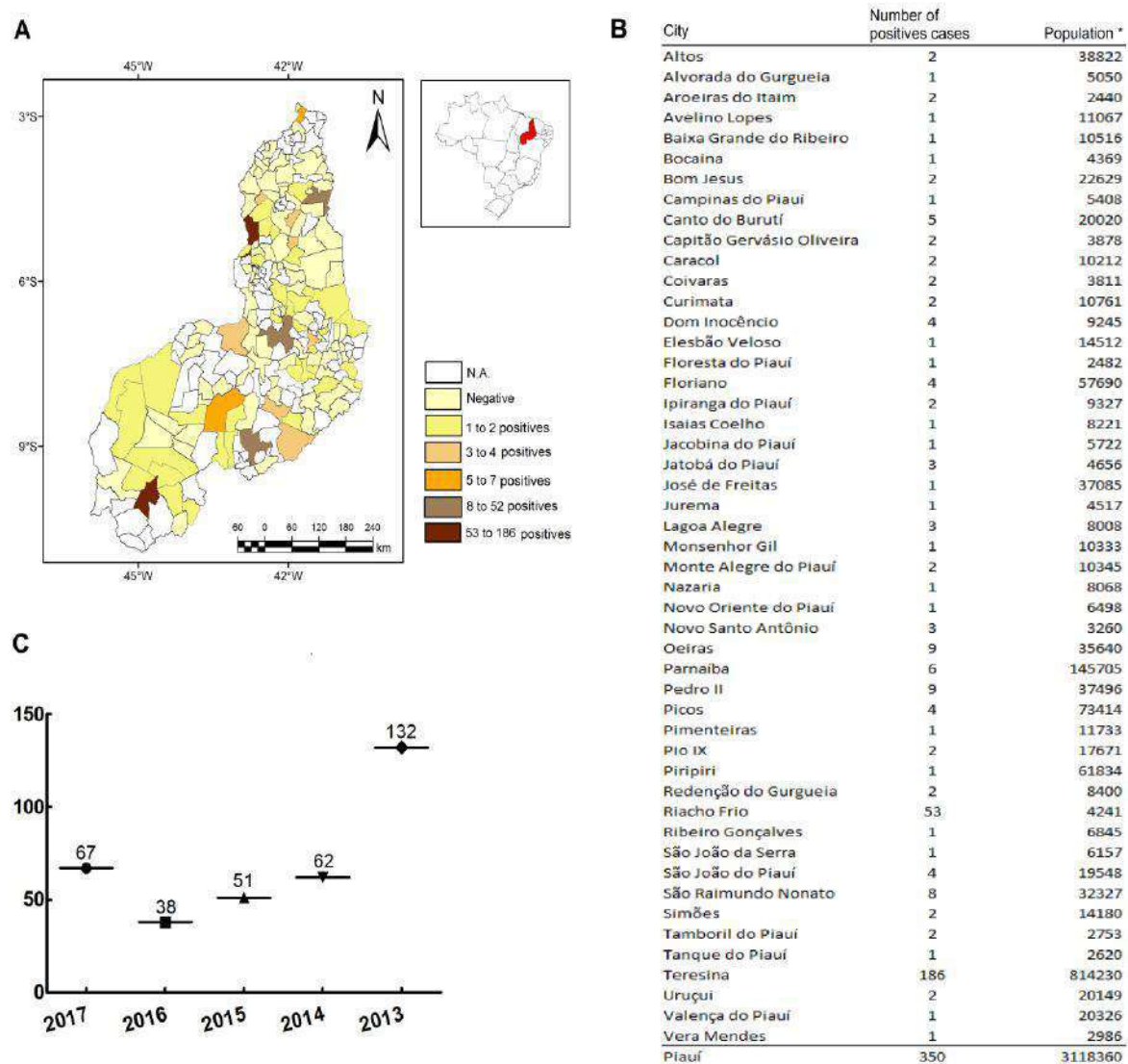


Fig.1: Distribution of CD cases in Piauí state

Source: produced by the authors

IV. DISCUSSION

According to SINAN (Information System of Injury Notification)¹², in the period of this study, 1304 cases of acute DC were notified in Brazil, whereas in Piauí no case was reported. Despite this, the present work shows 350 positive chronic CD cases in 49 cities in Piauí state with the major frequency between 41 and 61 years old, and no significant difference in frequency between female and male. In addition, it is possible to observe that 2.6% of positive cases are of children among 0 and 11 years old. The maternal anti-*T. cruzi* of the IgG fraction can cross the placenta and so all newborns of chronic CD mothers are seropositive until approximately the sixth month of life¹³.

It has been reported that chronic patients (average age of 54 years old; 34% female and 31% male) arising from different geographical regions from Brazil, assisted between 2011 to 2014 at the Chagas disease ambulatory from the Evandro Chagas Infectology National Institute (INI—Fundação Oswaldo Cruz, Rio de Janeiro, Brazil), are mainly immigrants from the northeast region, where Piauí is located¹⁴.

The socioeconomic inequities and the access to the healthcare systems provided to Brazilian population are characteristics that define the differences of mortality rates from CD. In regard to age, the mortality rates increased in patients over 30 years old, with higher occurrence among individuals between 50 and 64 years old; in addition, men

died five years younger than women⁶⁾. CD cases have been reported in various regions of Brazil with a high prevalence of comorbidities. However, there is a tendency to increase the mortality rate in the northern and northeastern regions of Brazil¹⁵⁻¹⁶.

Due to the short duration of the acute phase, chronic cases of CD are more sensitive to epidemiological research. Additionally, reference laboratories apply immunological tests to find only IgG, an antibody characteristically reactive in chronic phase of this disease. There is no specific kit to define the acute phase⁷ in the standards determined by the ANVISA (Brazilian National Health Surveillance Agency).

The acute phase of CD presents high parasite count, Romanã sign or inoculation chagoma in the skin are main clinical manifestations. However, is possible to see systemic symptoms as moderate fever, headache, malaise, anorexia and diarrhea. The diagnostic methods used are direct parasitological study via microscopic examination of fresh anti coagulated blood, thin and thick blood smears, or preferably through the identification of motile trypomastigotes in samples following Strout concentration technique. Also a feasible diagnostic method as Polymerase chain reaction (PCR) with host's peripheral blood or cerebrospinal fluid (CSF) samples. However, is possible to find high incidence of false positives because this method is not fully standardized¹⁷⁻¹⁸.

Generally, chronic CD presents low parasitic load and the patients can manifest digestive form of the disease resulting in the formation of mega viscera, which involves mainly esophagus and colon¹⁹⁻¹⁸. The standards for diagnosis are serological tests, and the strategy recommended by WHO⁷ is to combine epidemiologic information with two different serologic assays since commercial ELISA based tests present heterogenic sensitivity and specificity¹⁸⁻²⁰.

If there is disagreement between the tests, it is recommended to repeat the testing and, persisting the disagreement, a third test with PCR or western blot is recommended¹⁸⁻²¹. Since CD has been a largely neglected disease it is important to report both acute and chronic manifestations. The diagnosis to chronic CD is complex due to low parasitic load, but notifications of the cases are required to monitor disease incidence throughout the country²².

V. CONCLUSION

In this work, we show high frequency of DC in Piauí, mostly in the cities of Teresina and Riacho Frio, in

the period of 2013 to 2017, with a short increase in the latter. The screening of Chagas disease in the chronic phase is of paramount importance for the control of the pathology and the case reports help to keep attention on health education of the population.

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Construction and Legal aspects of a Solar Farm in Brazil

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Abstract— The objective of this article was to show all the necessary steps for the construction of a Solar Farm and the legal procedures that involve this new area, so promising and sustainable, with zero impact on the environment compared to traditional forms. The Solar Farm is not necessarily created on rural properties, contrary to what many people think. In fact, it is a large-scale Photovoltaic Solar Plant, installed in a region with ideal conditions for the generation of photovoltaic solar energy in optimal transmission conditions. The Solar Farm is connected to the energy grid, and starts to generate electricity that can be used by several customers. This is because the energy executed is transformed into credits, which can be practiced anywhere. From then on, it is possible to earn quotas of supply produced by Fazenda Solar, which allows profits to be used to reduce the huge energy bill that takes the sleep of all Brazilians.

Keywords— Solar farm; Photovoltaic; Machining; Electrical network.

I. INTRODUCTION

The photovoltaic system has different capacities for different audiences, in relation to a business or a house, only a few plates will be needed so that the energy generated in the environment is consumed right there, but a solar farm requires thousands of plates, because the energy generated is for consumers.

The solar farm had its prelude in the 90s, in Germany, and it was there that farmers coined the term “solar farm” (in English: “solar farms”).

These “crops” of solar energy had a great growth in Germany due to the incentives that the government promoted around the technology, with that the solar farmers began to use their own land and the generation of photovoltaic energy to earn income.

What differentiates the solar plant from a solar farm is only where it is installed. By definition a solar plant that is in agricultural territory is a solar farm.

A farm or solar plant can be characterized as projects developed to provide lower cost electricity to yourself or others.



Fig. 1: Nova Olinda solar farm.

Source: conexoplaneta,2020

Brazil Bank, by the end of 2019, will be able to exceed 10% of the agreed partners that supply solar energy. In this way, there will be solar energy agencies in the Federal District (30 units), and Goiás (plus 39) and Pará (39). The period of 120 days for the sanction will only be counted from the stage of legal procedures. To date, there are 296 agencies responsible for supplying solar energy, taking into account the Minas Gerais agencies in the first phase.

II. THEORETICAL REFERENCE

Taking advantage of the resources provided by the Sun, the photovoltaic energy system would benefit from

light and heat to create energy. The conversion of light into electricity was due to photovoltaic cells. The system consists of a set of photovoltaic panels and devices that perform the conversion.

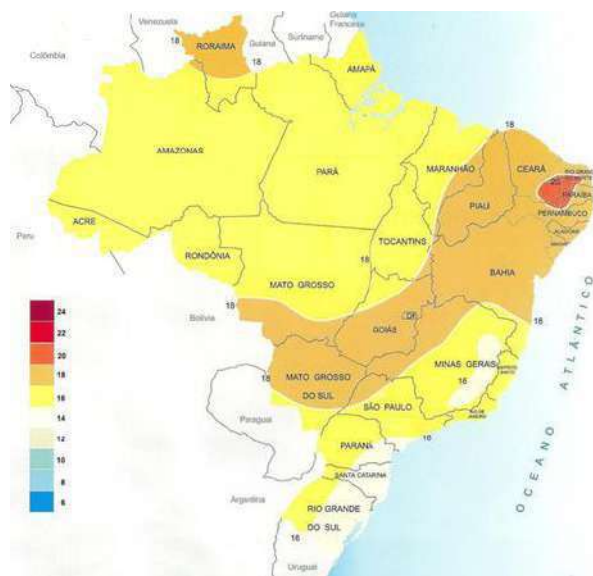


Fig. 2: Solarimetric Atlas of Brazil.

Source: Obeabadosertao, 2020

2.1 Current situation of photovoltaic energy

In the 90s the German government started to encourage renewable energy sources, especially solar energy. Thus, solar farms (set of panels installed in large areas) emerged. It is currently in India that the largest solar farm in the world resides in Kamuthi and has a capacity of 648MW. Another country has also invested in solar farms, such as Egypt, which in 2018 created its first plant and employed 4,000 people and further, in 2019, it will inaugurate a solar farm composed of 30 plants and will have the capacity to generate up to 1.8 giga watts. Even with the excess of territory available for the creation of solar farms, only registered companies are allowed to sell energy to the distributors. However, the law allows licensed companies to negotiate with distributors to remove land, with the aim of developing from solar farms.

In 2012, more specifically in April, ANEEL declared Normative Resolution No. 482/2012, which defined how energy creation would be standardized. With this, an agreement was made through determinations of the compensation system that made the active energy injected into the network with the distribution unit and finally given to the distributor, which was previously compensated.

This process has encouraged numerous countries in Latin America to develop PV systems.

III. MATERIALS AND METHODS

3.1 Construction processes for a Solar Farm.

1 - Process

Prior to the beginning of the development of the solar farm, it is essential to identify the place where it will be generated.

However, the location alone is not enough, legal approval is also essential for the project design.

The environment that must preside over solar photovoltaic plants has to be vast. Since the photovoltaic panels are huge and need sunlight. In addition, the project, belonging to the Solar Farm, requires an authorization requirement before the environmental, health and safety bodies, among others.

2 – Process

The other fundamental procedure for the development of a solar farm is the indication of the connection point to the grid.

Local authorities usually provide the connection point. However, some important issues must be negotiated. This situation occurs due to the high cost of the project, due to the connection points, and billing.

First, the network must have the capacity to absorb the maximum result of the photovoltaic solar station.

After that, the person responsible for the project has to meet the conditions for the cost of delivering power lines to the connection point. It still has the extra expenses that can occur in advances in the network for better energy absorption.

However, with efficient preparation and defined partnerships with the network agents in the regions, these expenses can be reduced or eliminated.

3 – Process

To advance this phase, some relevant achievements are necessary, such as:

- The production of documents, related to the project;
- Obtaining rights to the territory;
- Construction authorization.

It is also during this period that the Energy Purchase Agreement is signed. Thus, the extensive time for the development of the Solar Farm is ensured. In relation to laws 482/12 and 687/15 of the National Electric Energy Agency (ANEEL), responsible for regulating the connection to the grid of photovoltaic systems, it is essential that you have full knowledge about these laws.

Soon after bureaucratic and contractual issues are resolved, infrastructure development begins. When the work is finished and working, there is the need to obtain machinery and logistical assistance.

4 – Process

The real development method, for solar photovoltaic farms, implies the fundamental methods used, normally, for projects of this size.

In the farms, solar panels on the ground, devices that allow a quick installation, are used.

In addition to the floor mounting systems, the device's ease and effectiveness is naturally perceived.

Consisting of stainless steel and aluminum fasteners, the solar panels are built on support made from these elements, thus ensuring greater resistance.

To mitigate development and execution costs, it is common to use stable equipment with a fixed installation angle for photovoltaic panels.

The photovoltaic modules are attached to transverse beams, on which they have aluminum support.

With the addition of "trackers", the panels enable the improvement of solar irradiation, having the ability to supply, on average, up to 45% more energy than a stable system of similar dimensions.

5 – Process

At this stage, according to the contract with the local authorities established during the pre-construction, it is already possible to connect the Solar farm to the grid

Monitoring systems are also used, being placed and ready for remote monitoring, in relation to the power plant. In addition, there is still an opportunity for you to implement behavior indicators, so that the photovoltaic doing can have its performance monitored.

Solar panels are satisfactory systems, in terms of durability and resistance, so the need for more complex maintenance is unusual. A solar farm has, on average, 25 to 30 years of useful life and 10 to 15 years is the average time that solar inverters last.

3.2 Energy Productions in Brazil.

In August 2019 the company Absolar made a bibliographic study in which it determined that there are 93,597 distributed generation facilities in Brazil, capable of generating a total of 1 gigawatt (GW). In this study, the field represents 5.5% of the systems connected to the network in Brazil, lagging behind sectors of commerce, services and residences. And with 9.8% of the installed

capacity, the field is still behind services, homes, shops and industries.

Among one of the main pretexts for the sector to promote this type of energy source, it should thanks to the reduction of the environmental impact, reduction of expenses, variation of the energy matrix and the credit available. According to the study by Absolver, there are more than 70 possibilities for financial contributions from agents, public or private, to numerous areas of the economy in Brazil.

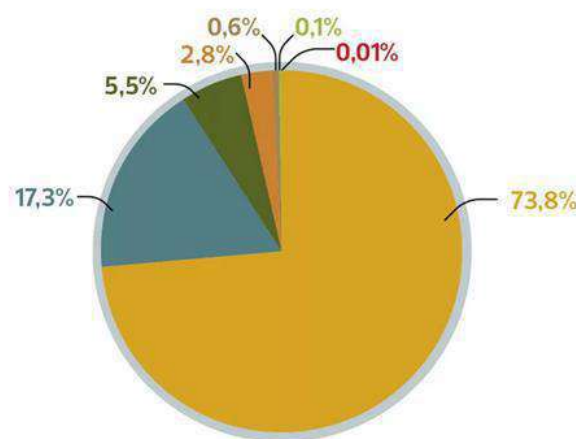


Fig. 3: Number of Systems.

Source: Absolar.

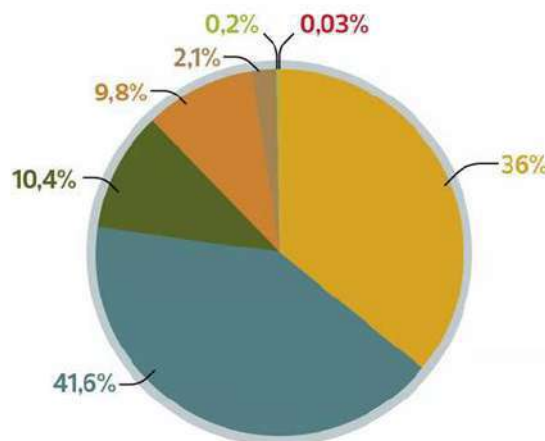


Fig. 4: Installed power.

Source: Absolar.

IV. RESULTS AND DISCUSSION

Being an exceptional choice for the creation of electric energy, photovoltaic solar energy also brings with it clean and sustainable energy, as it does not have CO₂ emissions. And the cleaner energies have been popularized and used, the less will be our need to use sources that can harm our ecosystem. Nowadays, energy

sources such as thermoelectric power plants, which pour CO₂ into the atmosphere, and hydroelectric power plants, which destroy the local ecosystem, are quite common, which in general are anti-ecological practices. With that said, photovoltaic solar energy becomes attractive because it is clean energy and uses one of the most abundant resources in Brazil, the solar wave, especially in the state of Minas Gerais, where the plant that is a reference in Brazil is located. Solar plant waves.

Regarding the regulation on GD - "Generation Distribution" Normative Resolution n° 482/2012, or known as RN 482, of ANEEL - "National Electric Energy Agency" determines the circumstances for the admission of microgeneration and mini-generation to the Electric Energy Compensation, in addition to electric energy distribution. In this way, allowing the consumer to apply the spare energy of their production to the local energy distribution network, producing future credits.

The National Electric Energy Agency (ANEEL) examined and reconsidered the GD rules, using Normative Resolution No. 687/2015 as a justification. Among the novelties it is worth mentioning:

- The permission for the development of generator condominiums, where owners of individual consumer cells share the credits among the various electricity operations. This premise is called: Enterprise with Multiple Consumer Units;
- The adoption of the Shared Generation standard for consumers, which allows a single generation installation to have its credits, of energy, shared by several users;
- The increase in power that allows generators to reach up to 5 Megawatts (MW);
- Credits generated by self-production are valid for up to 5 years (or 60 months);

The innovations determined by RN 687/2015 had a good reception, but undeniably the one that stood out the most was the creation of Shared Generation, since the possibility of distributing a large generating unit and enjoying the school economy has several benefits.

In addition, the norm that determines the generation model in which a group of people (Individuals or Legal entities) joins through a Consortium or Cooperative in order to produce energy is in the fourth paragraph of article 2 of RN 482:

- Art. 2°
- VII - shared generation: characterized by the gathering of consumers, within the same concession or

permission area, through a consortium or cooperative, composed of an individual or legal entity, which has a consumer unit with microgeneration or mini-generation distributed in a different location from the consumer units in which the surplus energy will be offset; (Included by REN ANEEL 687, dated 11/24/2015.

The solar energy farm is characterized by its photovoltaic panels placed in a rural area or field, thus allowing energy users to save energy without having to purchase a particular system. Therefore, in Brazil, it is necessary that the solar energy farm is built in an appropriate area for multiple properties to enjoy.

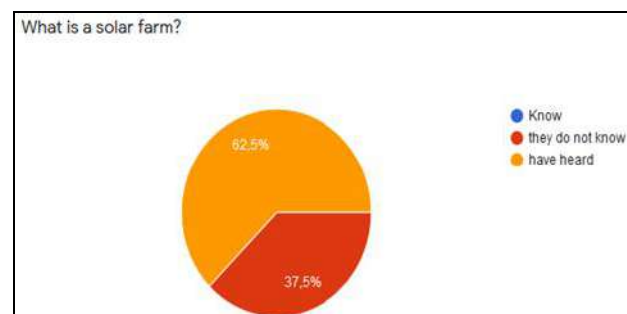


Fig. 5: What is Solar Farm?

Source: Authorship.

First, the area in which it will be determined to build the solar farm must comply with the level of sunshine in the area, as this way the effectiveness of the solar farm will be higher, thereby producing a lot of energy for the dependent units.

In this way, the energy conceived by sunlight will be sent to the public distribution network, where it will start to recapacitate the energy generated so that it can be transformed into credits, valid for 60 months.

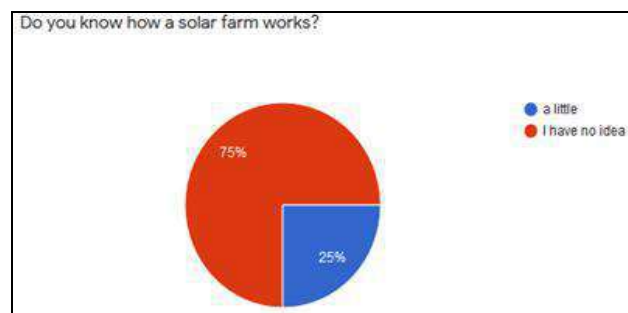


Fig. 6: Knowledge about the operation.

Source: Authorship.

Consuming the energy produced with only part of the solar farm, using solar photovoltaic energy, there will already be a discount on the electricity bill, by your

distributor, due to the energy credits capable of restoring the electricity consumption, which was used.

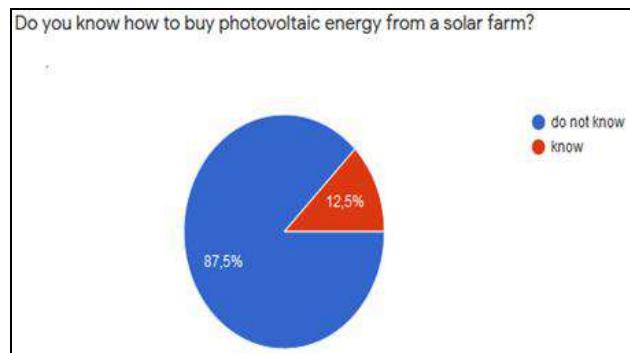


Fig. 7: Knowledge about purchasing energy.

Source: Authorship..

V. CONCLUSION

It can be concluded from this article that clean energy sources, especially solar energy, have become more and more popular, as the demand for sustainable energy has to be becoming a necessity for several nations. In Brazil, the development of photovoltaic energy is still maturing, in other countries. Even if there is a visible capacity for growth. This article also exposes the need to prioritize laws that protect the environment, even if at the expense of large businessmen.

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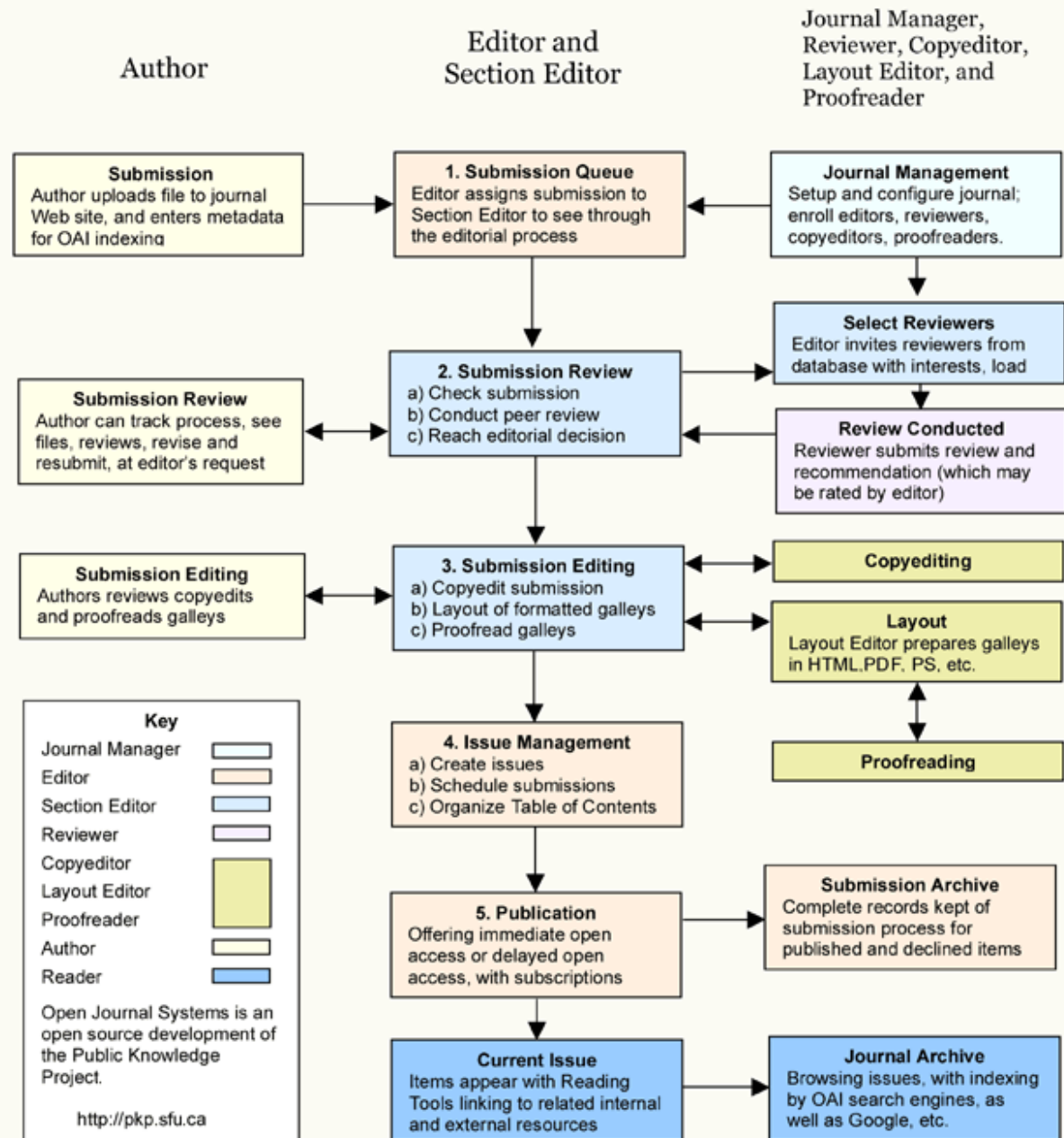
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