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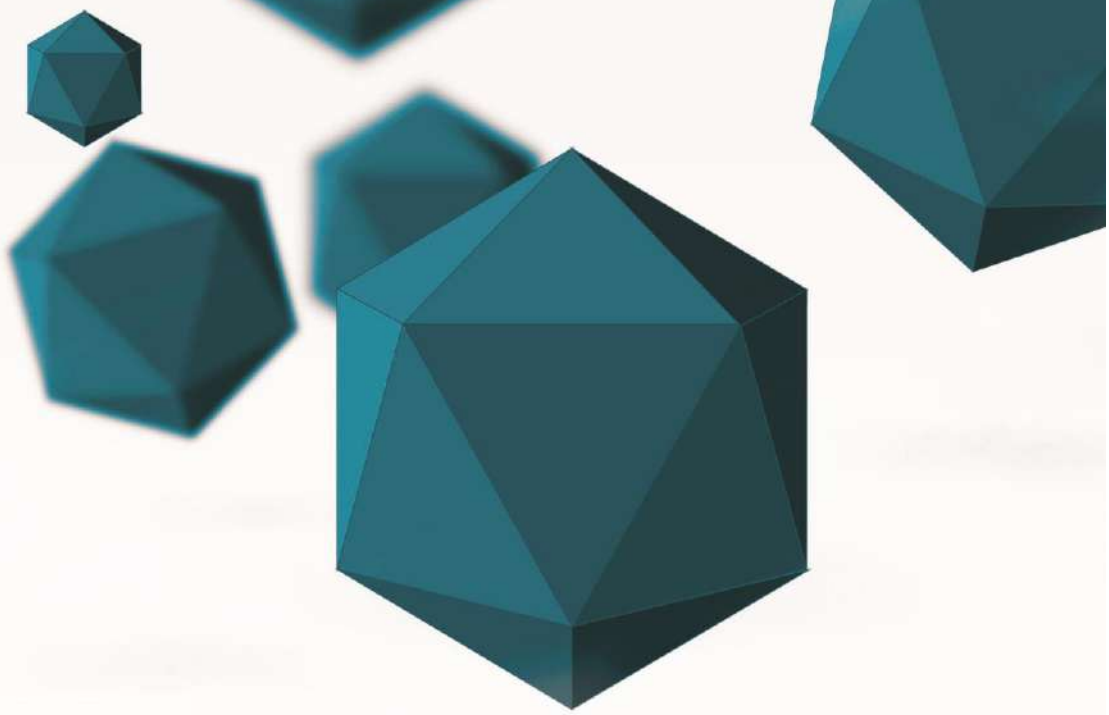

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FOREWORD

I am pleased to put into the hands of readers Volume-7; Issue-1: 2020 (Jan, 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
Editor-in-Chief
Feb, 2020

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Banking Industry Specific and Macroeconomic Determinant of Credit Risk

Hazimi Bimaruci Hazrati Havidz, William Obeng-Amponsah

School of Management, Wuhan University of Technology, P.R. China

Abstract—*This study analyzes the determinants of bank's credit risk from macroeconomic and bank-specific perspective in Indonesia. The analysis use panel data analysis by employing fixed effect, different GMM and system GMM approach to accommodate lagged determinant variable used in the model. The use of lagged variable in the study is used to analyze the delayed response of bank's credit risk to its determinant because of the persistence nature in bank's credit risk. The result shows that bank-specific variable have stronger influence to credit risk compare to macroeconomic variable. Additionally, the study found that banks in this study maintain a prudent management in managing its credit risk thus further explain why bank-specific variable have higher significant compare to macroeconomic variable resulting to bank have more resistance to macroeconomics changes.*

Keywords—***Credit risk, Non-performing loans, Macroeconomic factor, bank-specific factor, panel data***

I. INTRODUCTION

It is a well-known and common understanding that the banking system plays important role in the dynamic of economic activities since banks function as an entity that allocates capital from fund sufficient party to fund deficient party. Banks function to allocate capital follows by inherent risk which is credit risk thus a bank should have a proper criteria and procedure in allocating fund. A well manage risk is a vital instrument that could increase bank's profitability (Öker, 2007). When credit risk is not manages well, event such as financial crisis in 2008 might occur. Financial crisis that happen in 2008 have made many financial institution suffered from bad debt. Cause of the financial crisis was due to bad mortgages that cannot repay their loans that brought credit risk to be higher and since the structure of banking system have change that financial activity could be connected internationally the financial crisis that originate in the US also affected other emerging and advanced economic countries. According to Kuzucu and Kuzucu (2019)the financial crisis had cause a massive increase of bank's credit risk in emerging and advance country. World Bank data indicate that the increase of credit risk is higher comparatively higher than emerging countries.

Rise of credit risk during the financial crisis raise some concern regarding what could build-up credit risk and cause disturbance in the economy. Furthermore, this phenomenon has been confirmed that the crisis originated in the US could spread to other countries since almost all countries are affected. Because of how an increase in credit risk could affect the financial system and economy, it is interesting to understand how credit risk would response to the changes in the economy and variable that originates from bank's activity itself. According to Radivojević et al. (2019) there have been studies that attempt to figure out how credit risk affected by its macro and micro determinants, however there are some contradiction resulted from the study in term of direction and significant of credit risk determinant. To some extent, the difference might be because the differences in the studies data and method applied to analyze credit risk determinants.

According to (Committee, 1999), credit risk is a major source of financial instability in the banking sector. Bank for International Settlement express that bank should manage their credit system properly by establishing an appropriate mechanism to measure, control and monitor the soundness of credit risk. Banks that are struggling with liquidity or insolvency problem by non-performing loan should be concern about their credit risk level as it might bring crisis to the bank.

As described above, banks are highly exposed to credit risk originated from loans bank issue in which loan debtor could not fulfill their obligations to repay the principal and interest charged on time (Altıntaş, 2012). Credit risks are commonly exposed to two kinds of risk which is systematic risk and unsystematic credit risk. Systematic credit risks are risk that essentially comes from the unexpected changes from economics, politics, financial market and other factors that are not in the control of a firm. On the other hand, unsystematic credit risks are risk

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that originated from the management of a firm or the condition of the industry the firm is in (Yurdakul, 2014).

Systematic credit risk of banks could be affected by several variables such as GDP growth, interest rate, inflation, and exchange rate. The capability of these macroeconomic factors to explain the changes of credit risk might differ from one country to another as well from one industry to the other. The unfavorable changes of macroeconomic condition such as GDP, inflation, interest rate and exchange rate might lead to banking crisis (Louzis et al., 2012). Most of the time, bank crisis are caused by bad loans which is why it is necessary to understand the bank's credit risk problem in the form of non-performing loans (NPL) before examining other probable cause of a bank's crisis (Castro, 2013).

Other than macroeconomics condition that could affect bank's credit risk, banks that are not well-managed, might suffer from unsystematic risk. Some bank-specific variable such as credit growth, profitability, and bank size have influence on how banks are manage, thus affect the volatility of credit risk (Ghosh, 2015), (Ahmad and Ariff, 2007). (Ghosh, 2015), in his study argued that the growth of credit risk will increase non-performing loan.

The aim of this study is to examine and obtain an understanding of how Indonesia bank's credit risk responses to changes in macroeconomic variables and bank-specific variables nowadays after the financial crisis have passed. Most of previous studies build a model of how bank's credit risk correlate with the current condition of macroeconomic and bank-specific variables. However since according to Ghosh (2015) and (Kjosevski and Petkovski, 2017) credit risk might have a delayed responses to its determinants thus this study would add lagged variable of credit risk determinants to the model that would be built in this study.

II. LITERATURE REVIEW

There are a number of studies that analyze and explain how some macroeconomic factor and bank-specific factor influence the changes of credit risk in the banking sector. By definition, credit risk is a risk of a default loan, either partially or totally, that probably will not be paid back to the Bank. The analysis of credit risk is important because it can provide a warning in case the banking sector becomes more exposed to crisis (Castro, 2013).

The literature of bank's credit risk determinant are generally divided into two which is systematic credit risk that are usually represented by macroeconomics determinant and unsystematic credit risk that are usually represented by bank-specific determinant.

Macroeconomics factors are usually used to describe how well one country condition is performing. Economic condition in one country could significantly influence how credit risk changes (Kraft and Jankov, 2005). Most literature agrees that changes of GDP growth have influence on bank's credit risk. When the economy is declining, GDP decreases and bank's credit risk rise (Tanasković and Jandrić, 2015). GDP growth theoretically means that people's income are getting better which could improves borrower's capability to pay their loans, thus banks would be exposed to fewer credit risk. The negative correlation between GDP growth and credit risk explain that credit risk will decrease because the borrowers capacity to repay their loans will be better along with the development of the economy (Kuzucu and Kuzucu, 2019). Kuzucu and Kuzucu (2019)in their research to analyze the influence of macroeconomic variable that drive bank's non-performing loan in emerging economy country and advance economy country found that GDP have significant influence to bank's non-performing loan before the financial crisis in 2007 and after the financial crisis after 2008. Similarly to Kuzucu and Kuzucu (2019), Klein (2013) also found that GDP have significant negative relation to bank's credit risk.

Inflation is expected to have a positive influence to bank's credit risk (Tanasković and Jandrić, 2015). However, inflation correlation to bank's credit risk is ambiguous according to some researcher. Higher inflation could reduce real value of outstanding loan, thus ease borrower to pay off their loan, or reduce the real value of their earning, thus borrower will have more difficulty to pay off their loan (Castro, 2013 , Ghosh, 2015 , Kuzucu and Kuzucu, 2019). Kuzucu and Kuzucu (2019) in his research proved that inflation could have positive relation to bank's credit risk in advance economy country and negative relation to bank's credit risk in emerging economy country. Škarica (2014) analyze the determinant of non-performing loan in selected European emerging market (Bulgaria, Croatia, Czech Republic, Hungary, Latvia, Romania and Slovakia) by means of fixed effect estimator and find that an increase of inflation would be followed by an increase of non-performing loan. Contrary with studies that have significant result, Radivojević et al. (2019) in his study of non-performing loans determinants by employing one-step GMM estimator found that inflation does not have significant influence to non-performing loan.

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Table 1 Variable Description

Variable	Definition	Expected Sign
Non-performing loans	Non-performing loans/Gross Loans	
Loan Loss Provision	Loan Loss Provision/Gross Loans	-
Capital Adequacy Ratio	Capital to Asset Ratio	-/+
Return on Asset	Net Income/Total Asset	-
Earning Power	Earning Before Interest and Taxes (EBIT)/Total Asset	-
Credit Growth	Percentage change in Gross Loans	+
Inflation	Inflation rate	-/+
GDP Growth	Percentage change of GDP	-
Lending Interest Rate	Rate on loans for working capital	+
Exchange Rate	Currency exchange rate	-/+

According to Castro (2013) and Nkusu (2011)exchange rate could have positive or negative impact depending the nature of economic activity in the country. A positive correlation could happen when an appreciation in exchange rate weaken export oriented firms because they could not pay their debt and a negative relation is possible when a loans was made in foreign currency thus a currency appreciation improve borrower ability to service their debt.

Other than macroeconomics condition that impact bank's credit risk systematically, some researches also bring their attention to study bank's management and operation to understand unsystematic factor that might affect bank's credit risk. Under bad management hypothesis, bank's low cost efficiency could signals poor management practices that cause poor loan underwriting, monitoring, and control which in turn would likely increase bank's credit risk. However, under skimping hypothesis, banks with high cost efficiency might imply there are limited resources allocated to monitor lending risk thus result in higher bank's credit risk(Berger and DeYoung, 1997). These hypotheses was support by Podpiera and Weill (2008) that extend Granger-causality model by applying GMM panel estimator and Williams (2004) that agree to bad management hypothesis while Rossi et al. (2005) support the skimping hypothesis. Study by Ghosh (2015) shows the importance of bank-specific factors to be considered when assessing the impact of these factors to bank's credit risk. ¬By applying

fixed effect and dynamic estimation model, the study proved that 'too big to fail' and bad management hypothesis to be true along with other factor such as credit growth to have positive relation to credit risk. However, moral hazard hypothesis is rejected in this study since loan loss provision has positive relation to bank's credit risk. The result of bad management hypothesis is also found to be in line with Kjosevski and Petkovski (2017) that found bank's profitability have negative and significant influence to bank's credit risk.

The implications of bank-specific factor on credit risk are also explored by Rachman et al. (2018) by employing fixed-effect panel regression found that higher profitability and credit growth would lower bank's credit risk as the bank could afford better management practices and credit management system. Klein (2013) found similar result regarding bank's profitability influence to bank's credit risk. However, contrary to Rachman et al. (2018), Klein (2013) study shows that higher credit growth contribute to higher bank's credit risk. These results is also supported by Vouldis and Louzis (2018) research that employ the quasi-AIM approach that shows profitability and inefficiency are good predictor for bank's credit risk.

III. DATA AND METHODOLOGY

3.1. Data

This study uses an unbalanced panel data of 40 banks in Indonesia. The macroeconomics and bank-specific data that obtained are based on quarterly frequency from the first quarter of 2014 to the first quarter of 2019. Bank-specific data are obtained from Bankscope database of Bureau van Dijk. The financial information was derived from balance sheets and income statement from quarterly financial report. The Bank-specific data that are used in this study are loan loss provision, capital adequacy ratio, net interest margin, return on asset, earning power and loan growth. Macroeconomic data that consist of inflation, GDP, lending interest rate, and exchange rate were obtained from the world development indicators database. In this study, the dependent variable that is used to measure bank's credit risk is non-performing loans to gross loans. Description of all variable used in this study as well as its expected sign to bank's credit risk is detailed in Table 1.

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Table 2 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
NPL	537	3.983	6.950	0.003	96.806
LLP	540	2.486	2.107	0.063	22.493
CAR	538	20.979	7.623	8.010	76.420
NIM	550	5.505	2.270	-5.398	18.425
ROA	550	0.792	2.477	-30.631	3.825
EP	550	2.144	1.878	-8.098	6.019
CG	518	0.018	0.049	-0.157	0.290
INFL	800	0.046	0.017	0.030	0.080
GDPG	800	5.033	0.133	4.752	5.251
LIR	800	11.753	0.861	10.430	12.817
EXRT	800	13351.650	868.573	11404.000	14929.000

Source: Author's calculation

Table 2 presents summary descriptive statistics for variables used in this study. There were some missing observation data for bank-specific data variable due to unreported figures in some bank's quarterly financial report. Bank's credit risk level has a mean of 3.98% with lowest and highest value is 0.3% and 96.8% respectively. This shows that there are bank that maintain their credit risk very prudently and there are banks that have problems with loans that they have distributed to borrowers. Several bank-specific variable values such as net interest margin, ROA, earning power, and credit growth show negative value which means at some point in time banks might have suffer a loss from their activity

3.2. Methodology

This study will adopt panel data analysis to analyze the determinant of bank's credit risk, which in this case is expressed as non-performing loans/gross loans. Panel data analysis is used because it offers better efficiency forecast individual outcomes in the model. Capture and measure that are undetectable in cross-section time-series (Hsiao, 2014). This study will attempt three different estimation methods. First, fixed effect model will be utilized to control unobserved heterogeneity between different banks. The fixed effect model to be estimated will be:

$$CredRisk_{i,t} = \alpha_i + \beta B_{i,t} + \beta M_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where $CredRisk_{i,t}$ denotes the value of non-performing loans/gross loans, $B_{i,t}$ denotes bank-specific,variables, $M_{i,t}$ denotes macroeconomic variable, and $\varepsilon_{i,t}$ is the error term. However, fixed effect approach is quite intuitive, simple and as becomes more consistent with larger thus might raise the possibility of dynamic panel bias. Furthermore, bank's credit risk is expected to persist over time for two reasons. First, bank's credit risk could have delayed time before it responses to macroeconomics changes (Klein, 2013). Second, bank'snon-performing loans that denote credit risk is expected to stay in bank's balance sheet for some time because it cannot be immediately written off thus bank's credit risk could be influence by its previous value. To address this problem this study would try to add laggedvalue of bank's credit risk into the right hand side of the equation as follows:

$$CredRisk_{i,t} = \beta_0 CredRisk_{i,t} + \beta_i B_{i,t} + \beta_i M_{i,t} + \varepsilon_{i,t} \quad (2)$$

However, (2) could create other problem which makes the lagged dependent variable correlate to the fixed effect error term. To address this situation, applying difference GMM would be a valid solution. Difference GMM application could fix fixed effect problem by transforming the first order difference and use lagged dependent variable at the right hand side equation model as instruments(Arellano and Bond, 1991). Next, the application of difference causing parameter bias because the lagged dependent variable still correlates with observed specific error.

Second problem that arise from (2) is endogenity problem from independent variables with the error term. By applying different GMM endogenous variable is predetermined to solve the correlation problem with the error term. Current variable values as well as its lagged value are valid instrument even for weak predetermined and exogenous variable(Louzis et al., 2012). However, variables that is close to random walk causes a problem for lagged variable because it could be poor instrument for the first difference(Arellano and Bond, 1991). Furthermore different GMM could magnify gap in unbalance data set that it is possible that a data could disappear in the first difference (Roodman, 2009). Data set with persistence could have lower precision estimation because it causes the lagged level to be less correlated with its following changes thus it becomes weak instruments (Blundell and Bond, 1998).

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To obtain better estimation from the different GMM, system GMM will also be applied by using forward orthogonal deviations propose by Arellano and Bover (1995) because it propose an assumption concerning non-correlation of fixed effect and first difference in instruments variables. The use of system GMM could improve efficiency and transform the instrument variable to be uncorrelated with fixed effect. Lastly, it is assumed that credit risk is closely related to its previous value because previous credit risk value could be carried over to the current credit risk since it cannot be immediately be write off from the balance sheet and might remain for several periods in the Bank's balance sheet(Dimitrios et al., 2016 , Kjosevski and Petkovski, 2017). These imply that credit risk is typically persistent over time which could be interpreted that credit risk might have a delay to response to the changes of its determinants(Klein, 2013). As a consequence of credit risk persistence, the lagged value of bank's credit risk determinant (in this study second lagged value will be used) will be included as an independent variable on the right hand side of the model equation. Therefore, the equation of the model will be express as follow:

$$CredRisk_{i,t} = \beta_0 CredRisk_{i,t-2} + \beta_i B_{i,t-2} + \beta_i M_{i,t-2} + \varepsilon_{i,t} \quad (3)$$

IV. EMPIRICAL RESULTS

The result presented in table 3 report the estimation result of (1) , (2) and (3) in Indonesia banking industry from 2014 to 2018 by employing fixed effect regression, difference GMM, and system GMM panel estimator. The result confirms that macroeconomic and bank-specific factors play a role in influencing bank's credit risk. Even though some bank-specific factor does not significantly affect bank's credit risk, most of bank-specific factor does have significant influence to bank's credit risk. The model shows that the estimators are efficient and consistent given that the residual did not show serial correlation of second order even though negative first order autocorrelation is found. However, the negative first order autocorrelation does not mean that the model were inconsistent because inconsistency would be implied if second order autocorrelation is found(Arellano and Bond, 1991), which in this research is rejected by the test result of AR(2) errors.

The first lag of nonperforming loan is proven to have statistical significances in one-step difference and system GMM estimator model. However, the second lagnonperforming loans shows weaker significance level in one-step difference GMM estimator. Loan loss reserve is shown to have a positively strong significant influence to credit risk. This means the moral hazard theory is not accepted in this study because loan loss provision is used as a tool to anticipate loan losses for banks' loans. The positive significant influence also suggest that Banks in Indonesia practice prudent loan loss provisioning policy by adjusting their loan loss provision according to their credit risk.

The estimation of net interest margin variable shows mix relation to credit risk. Net interest margin have significantly positive relation on credit risk at time t that indicate higher risky loan with bigger margin is expected to compensate with higher risk of default. However, the lagged value of net interest margin at t-2 shows negative relation. This could be interprets in two ways depending on Bank's management during the observed period. Fist, Banks are performing better compare to their previous operation because it could improve its loans quality while increasing its interest margin. Second, banks are performing worse compare to their previous operation because its loan quality becomes poorer by indicating higher credit risk while having lower net interest margin.Bank's profitability which represent by earning power variable have expected significant negative correlation at time *t*. However, Bank's lagged earning power has positive significant correlation. The negative correlation of Bank's earning power explains that an increase of Bank's profitability will lower Bank's credit risk. It is assumed that Banks are engage in a more prudent lending according to the result of positive relation of Bank's loan loss provision to credit risk thus entail that Banks with stronger profitability is less likely to conduct risky activities and able to lower their credit risk. The reason

Table 3 Fixed effect and GMM estimation

Variable	FE	System GMM		Diff GMM	
NPLR (-1)		0.137**		0.145***	
		(0.367)		(0.448)	
NPLR L(-2)			0.037		0.042*
			0.053		0.071
LLP	0.189***	8.723		11.824	
	0.679	(8.909)		(6.936)	

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LLP(-2)			2.062		1.961
			(1.83)		(1.426)
CAR	0.058	1.571		3.855	
	(0.048)	(0.759)		0.016	
CAR (-2)			0.872		1.06
			(1.018)		(0.655)
NIM	0.567	6.385**		5.589	
	0.051	14.554		8.053	
NIM (-2)			4.619		2.457**
			(5.442)		(5.867)
ROA	0.183	1.476		2.771	
	(0.117)	(1.029)		(1.492)	
ROA (-2)			2.343		2.516
			(2.025)		(2.47)
EP	0.413***	4.815***		6.343*	
	(1.565)	(12.991)		(12.168)	
EP (-2)			3.13**		2.626***
			6.793		8.57
CG	4.885*	53.751*		59.12	
	(8.551)	(105.649)		(74.364)	
CG(-2)			39.837*		39.019
			69.677		60.421
INFL	17.37	235.337		204.514	
	(5.64)	(272.715)		(245.647)	
INFL (-2)			36.307		37.383
			(18.665)		(1.803)
GDPG	2.2	23.175		9.563*	
	0.272	(30.647)		(18.653)	
GDPG (-2)			5.046		6.207
			(0.745)		3.43
LIR	0.63	12.2612*		9.833*	
	(0.24)	(20.692)		(18.043)	
LIR (-2)			3.644*		3.728
			(6.455)		(4.233)
EXRT	0.001	0.003		0.004	
	(0.001)	(0.004)		(0.005)	
EXRT (-2)			0.003**		0.003*
			(0.006)		(0.005)
R-Square	0.3496				
AR(1)		0.059	0.067	0.131	0.056
AR(2)		0.308	0.604	0.375	0.871
Hansen		0.332	0.839	0.247	0.946

Note: ***, **, *, indicate significance on 1%, 5%, 10% respectively.

why lagged earning power shows opposite relation to credit risk could be because Bank's earning power at time t is comparatively better to lagged Bank's earning power. In other word, Bank's profitability performs better than its previous performance and could lower Bank's credit risk.

Unexpectedly, unlike most previous research, credit growths have significant and negative influence to credit risk at time t which means an increase of credit growth will not increase credit risk and able to minimize risk taken by Banks when creating new loans. This proves that Banks do not lower their credit standard by taking more risk when issuing more credit and maintain their credit

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issuing in a prudent manner even though they increase their credit. The lagged credit growth shows significant and positive impact to Banks credit risk. It explain that previous credit loans created by Banks was riskier compare to time t credit loans thus higher lagged credit growths could potentially contribute to higher loans default.

The result on macroeconomic level shows that all variable have significant impact to Bank's credit risk except for inflation. GDP variable shows low negative significant level on model 4 only. This result is in line with most previous research which argue an increase in GDP indicate better macroeconomics development and improve borrowers capability to service their debt thus lowering credit risk. Interestingly, Interest Rate shows opposite result with most previous studies that because interest rates have negative and significant influence on credit risk that shows on model 2, 3, and 4. The opposite result in this study is probably because the interest rate used in this study is lending interest rate. Higher lending interest rate means Banks are applying higher standard in granting loans for borrowers. Borrowers which are given loans would be those who have less probability to default thus lowering Bank's credit risk. Exchange rate variable have negative relation to Bank's credit risk, a decrease in exchange rate will increase Bank's credit risk. This result shows that the economic activity is influenced by exchange rate which in turn affect borrowers to service their debt.

V. CONCLUSION

This study uses three different approaches to examine the determinants of bank's credit risk from 40 banks in Indonesia. Fixed effect was employed to control the unobserved heterogeneity across different banks but since this effect might lead to dynamic panel bias because of becomes more persistent with larger t in the model, different GMM and system GMM is utilized. The use of GMM method allows the use of lagged dependent variable on the right hand side of the model equation since bank's credit risk which proxy with NPL does not immediately written off in the next period of bank's balance sheet. Additional to the use lagged dependent variable, the use of GMM enable to use of lagged determinants variable to examine whether delayed response of credit risk to its determinants exist.

According to the result of the study, half of the determinants of credit risk have significant influence to credit risk across fixed effect, different GMM, and system GMM method. Those determinants are GDP growth, lending interest rate, and exchange rate for macroeconomic variable and loan loss provision, net interest margin, earning power, and credit growth for bank-specific variable. The result shows that bank-specific determinant have higher significance compare to macroeconomics determinants because most of bank-specific determinants have one percent level of significance while most of macroeconomic determinants have ten percent level of significance. The result also shows that bank's credit risk is persistence to its previous value since lagged value of credit risk show significant level to its current value. However, it could be assumed that the correlation of credit risk lagged value will be weaker as time goes.

All macroeconomic variables except inflation are proven to influence the changes of bank's credit risk. GDP growth shows negative influence to credit risk that translates better economic condition will lower bank's credit risk.. Unexpectedly, interest rate shows opposite result compare to most previous studies. The explanation for this result is that because the interest rate used in this study is lending interest rate for capital lending and higher interest rate means debtor will have difficulty to apply for loans since the bank have higher standard to approve their loans. Exchange rate variable also shows negative correlation to bank's credit risk which means an appreciation in currency value improve debtor ability to pay loans. The significant of macroeconomic lagged value to credit risk only shown from lending interest rate and exchange rate which means it could be concluded that bank's credit risk have delayed response to these two variables.

Overall, the result of bank-specific variable shows that banks in Indonesia manage their loans in a prudent manner and reject theory such as moral hazard theory. The prudent risk management of credit risk could be indicated from the positive and negative correlation of loan loss provision and earning power respectively to bank's credit risk. Bank's earning power also proved to have a delayed influence to bank's credit risk. Net interest margin variable however shows mix result between its current value and lagged value. The interpretation could be that bank's loans quality are better comparatively to its previous value while having higher interest margin and vice versa. The result on credit growth also shows that bank in Indonesia always maintain prudent manner in managing their risk.

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The impact of the economic recession on hospital quality indicators in Tocantins

Warly Neves de Araújo*, Geovane Rossone Reis, Jefferson Rodrigues de Souza, Sávia Denise Carlotto Herrera, Taiany Neves de Araújo, Marcella Soares Carreiro Sales, André Peres da Silva, Janne Marques Silveira, Cassia Alves de Carvalho, Anny Pires de Freitas Rossone, Edilane Floriano da Silva, Lucas França Marra, Aktor Hugo Teixeira

*Corresponding Author: warlyneves@outlook.com (Warly Neves de Araújo)
Emails: georossone@hotmail.com (Geovane Rossone Reis); jefferson_rodrigues09@outlook.com (Jefferson Rodrigues de Souza); saviadenise@hotmail.com (Sávia Denise Carlotto Herrera); taianyaraujo93@gmail.com (Taiany Neves de Araújo); marcellacarreiro@bol.com.br (Marcella Soares Carreiro Sales); andrekazzy@gmail.com (André Peres da Silva); jannefisio@yahoo.com.br (Janne Marques Silveira); cassiaalvescarvalho@hotmail.com (Cassia Alves de Carvalho); edilanesul@hotmail.com (Edilane Floriano da Silva); lucas_fisio2012@hotmail.com (Lucas França Marra); aktorhugoteixeira@hotmail.com (Aktor Hugo Teixeira)

Abstract**—***Introduction: Indicators refer to measures used to portray an existing situation, analyze changes or trends over a period of time and evaluate, in terms of quality and quantity, the health behaviors performed. Objective: To verify whether the recession in the Brazilian economy experienced from 2012 to 2018 generated changes in the in-hospital quality indicators of the state of Tocantins. Materials and Methods: This is a retrospective documentary study with data with patients admitted to the main public hospitals of Tocantins, located in the municipalities of Palmas, Araguaína and Gurupi from 2012 to 2018, available from the SUS Department of Informatics (DATASUS), correlating health indicators with financial indicators taken from the Brazilian Institute of Geography and Statistics (IBGE) and the National Confederation of Industry (CNI) in relation to the variation in Gross Domestic Product (GDP) and the unemployment rate at national level. Results: About the correlation, it was evidenced in the GDP with the unemployment rate, mortality rate and average cost per hospitalization. The unemployment rate correlated significantly with the mortality rate and length of stay. Conclusion: The scenarios presented during the years analyzed, regarding health-economic development, show the impact generated by the negative performance of Brazil's gross domestic product in the state of Tocantins.*

Keywords**—Economic recession, Public health, Intensive care unit, Tertiary healthcare.**

I. INTRODUCTION

Indicators are indispensable assessment instruments when talking about health care quality control [1]. Indicators portray existing situations, analyze changes or trends over a period of time and evaluate, in terms of quality and quantity, the health behaviors performed [2]. When well specific they help to monitor the quality of health care, opportunities for improvement, implement measures, monitor their evolution over the years and are applied to assist in quality management [3] [4].

Regarding, the effectiveness, effectiveness, efficiency, optimization, acceptability, legitimacy and equity became known as the "seven pillars" encompassed by Donabedian. These concepts helped to better understand about quality in health [5].

According to the National Health Surveillance Agency (ANVISA), in Brazil, Normative Instruction (IN) number 4, of February 24, 2010, which regulates the evaluation of the performance of the overall operating pattern of the Intensive Care Unit (ICU) and identifies the events that may point to the need to improve the quality of care, highlighting specific indicators that should be monitored monthly as absolute and estimated mortality rate; length of stay in the ICU and rehospitalization index in 24 hours [6].

When it is tertiary care, the ICU is actually a system of high complexity to the user, due to the need for care with more advanced technology, and because it presents one of

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the scenarios of greater complexity in care. In this context, this level of attention generated an expenditure of 24 billion between May 2011 and April 2016 in Brazil. In the same period, spending reached 325 million in Tocantins [7].

The recent financial recession of the Brazilian economy has led the country to the largest and longest fall in GDP in history and high unemployment rates [8]. Some of the causes of decline in the Brazilian economy are Inflation, Unemployment, Corruption and the lack of effective fiscal adjustment measures [9]. In these moments of economic crisis, there is a limitation in the availability of resources and an increase in demand for public services when it comes to public health [10].

The economy was negative with 3,8% in 2015 and 3,6% in 2016, leaving recession only in subsequent years. According to the National Confederation of Industry (CNI), the deepening of the economic crisis led to the loss of the standard of living of a significant part of the Brazilian population, resulting in the exchange of private services by audiences and 34% no longer had health insurance [11].

According to the Department of Informatics of the Unified Health System (DATASUS), when analyzing the indicators of the three largest municipalities (Palmas, Araguaína and Gurupi) it is notorious that the mortality rate from 2012 to 2018 presented variations, however, with high index in 2016, reaching 4,64%. In the following years, the number of deaths decreased to 4,34% in 2017 and 4,25% in 2018, but increased the average stay 6,3 and 6,5 days, respectively, compared to 2013, with 5,1 days [12].

In the last 07 years, the average cost per hospitalization has varied between 2012 and 2018. During the years 2015 and 2016, there was a sudden increase in public spending and the average cost of hospitalization or daily for hospitalization peaked at 1.280,31 reais in 2016, with a reduction in the following years [12]. The same period, according to data from the Brazilian Institute of Geography and Statistics (IBGE) in which the country experienced the economic recession, leading to the decline in Gross Domestic Product (GDP) for two consecutive years [13].

As GDP was moving into recession, the rate of hospitalization in public hospitals increased, reaching 58.413 cases of hospitalizations in 2012 and 2014 with 57.954 cases the highest recorded between the period analyzed [12].

Therefore, this study aimed to analyze whether the recession in the Brazilian economy impacted the indicators of in-hospital quality in the State of Tocantins.

II. MATERIALS AND METHODS

This is a retrospective documentary study using the official data of the Government of the State of Tocantins DATASUS, with information on mortality rate, average length of stay of hospitalization, average cost per hospitalization, total public expenditure and index patients hospitalized in the main public hospitals of the State of Tocantins, located in the municipality of Palmas, Araguaína and Gurupi.

The period analyzed comprises the years between 2012 and 2018. Correlated in a qualitative and quantitative manner with data from the Brazilian Institute of Geography and Statistics (IBGE) and the National Confederation of Industry (CNI) regarding the variation in GDP and the unemployment rate at the national level, in the same time-space.

The inclusion criteria adopted were data from patients admitted to public hospitals in the state of Tocantins from 2012 to 2018. And patients with incomplete or undefined data are excluded.

The present study dispenses with the approval of the Research Ethics Committee, due to being public government data, made available by the Department of Informatics of SUS (DATASUS) and ministry of health.

After data collection and selection of quality and financial indicators to compose the sample, univariate statistics were used to perform descriptive analysis of indicators and variations of them during the analyzed period, with presentation of the minimum, maximum, mean, and standard deviation values. Pearson's correlation was used to verify the relationship between financial indicators and quality indicators. To identify the significance level of each variable, the Student T-test was used, and the percentage was established in all cases of 5% ($P \leq 0,05$).

Data tabulation, correlation, significance test, and graphs were performed from the tabulation in Microsoft Excel® 2010 and with the IBM SPSS Statistics 22® 2013 Program.

III. RESULTS AND DISCUSSION

In this stage, the data collected from the seven indicators are exposed, five of these, are qualitative and two financial, as can be observed in Table 1 that presents descriptive analysis of variables with minimum, maximum, mean and standard deviation. Since for financial variables, the national unemployment rate has, between the years analyzed, a higher rate of 12,73% and less than 6,83%. For annual GDP, the maximum was 3,00%, and a minimum of

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-3,80%.

For the quality variables related to the State of Tocantins, the mortality rate presented a maximum value of 4,64% and a minimum of 3,87%. In the hospitalization index, the maximum number of patients admitted to the units was 58.413 and a minimum of 42.715 cases, with the mean stay of maximum hospitalization verified of 6.50 days and a minimum of 5,10, presenting in public expenses an average cost per hospitalization between R$ 1.097,46 to R$ 1.280,31. Regarding total public expenditure, the highest amount was R$ 65.940.003,84 and the lowest value found was R$ 51.190.309,98. According to table 1.

Table 1. Valores absolutos dos indicadores financeiros e indicadores de qualidade no período de 2012 a 2018.

Variables	Mínimum	Máximum	Average	Standard Deviation
Unemployment Rate	6,83	12,73	9,47	2,59
GDP	-3,8	3	0,02	2,66
Mortality Rate	3,87	4,64	4,23	0,26
Average length of stay of hospitalization	5,1	6,5	5,77	0,57
Average cost per hospitalization	1.097,46	1280,31	1.188,34	64,77
Total public spending	51.190.309,98	65.940.003,84	62.195.264,93	5.217.185,70
Hospitalization Index	42.715	58.413	52.512,14	5.737,96

Figure 1 shows a variation in the country's GDP and Unemployment Rate between 2012 and 2018. In 2012, GDP showed 1.9% in 2013 its highest value, with 3% variation, with a reduced unemployment rate in the same time period analyzed in the period of 2014, GDP fell, with 0,5% without having repercussions on the unemployment due to the indicator presenting the lowest variation found in this study, of 6,83% respectively.

In the following two years, 2015 and 2016, GDP was negative with -3,8% and -3,6%, respectively. And in 2017 and 2018, GDP was stagnant at 1,1%. However, as of 2015, the unemployment rate showed higher values with a maximum of 12.73% in 2017, with a slight reduction in 2018 (Figure 1). The increase in the proportion of unemployed people is a reflection of the economic crisis that began in 2015 and reflected in the following years.

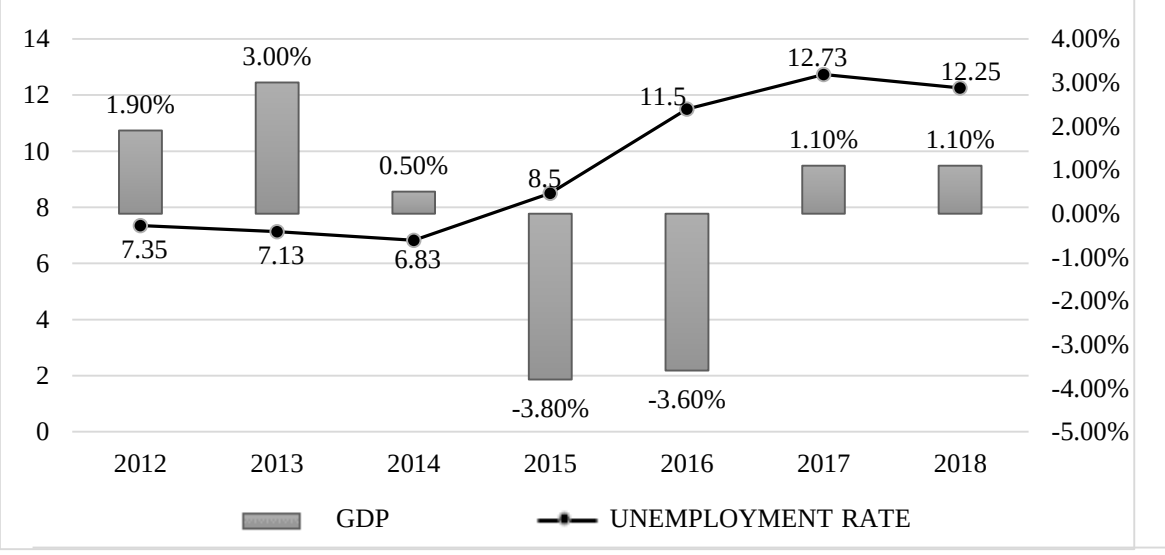

Fig.1. GDP and the Brazilian Unemployment Rate between 2012 and 2018.

Figure 2 shows the evolution of the mortality rate and the average length of stay of hospitalization between 2012 and 2018. Between 2012 and 2014, there was a reduction in the average length of stay in hospital in hospitals in the State of Tocantins, with a slight increase in the mortality rate. After 2015, the average length of stay of hospitalization increased, and the mortality rate varied in the scale of 4% with the highest rate in 2016, and with a slight reduction in the following years.

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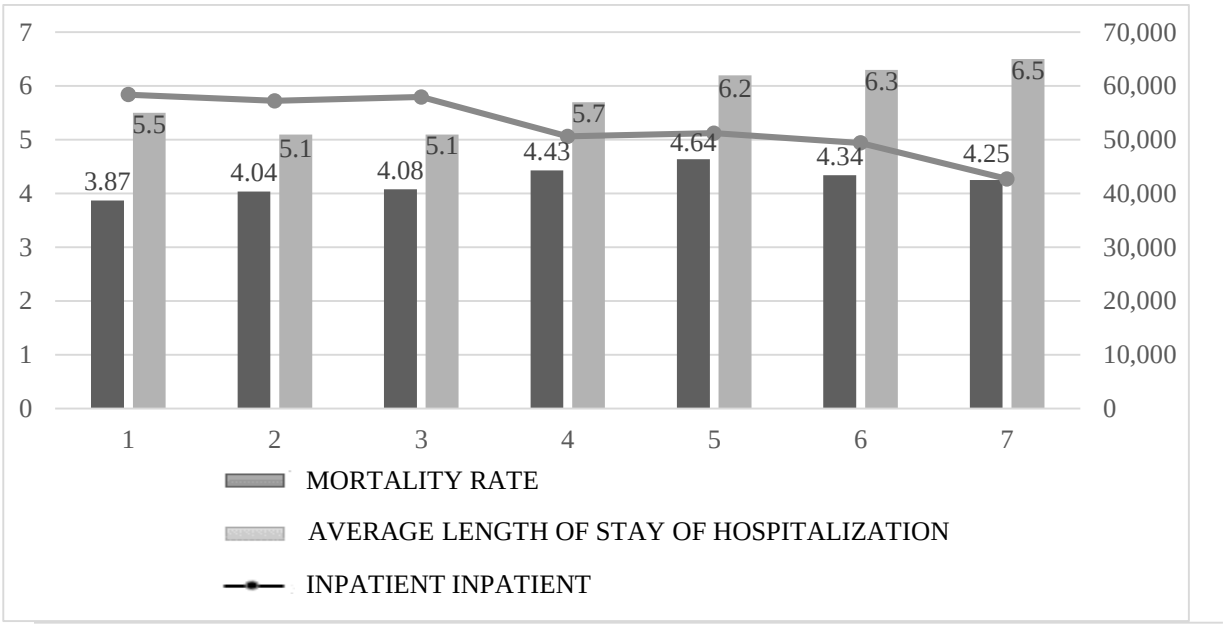

Fig.2. Evolution of mortality rate, Average Length of Stay of Hospitalization and Hospitalization Index between 2012 and 2018.

Between 2012 and 2014, the highest Hospitalization Index was verified in the main public hospitals in the state. After 2015, there was a decrease, followed by a slight increasing variation in 2016, a reduction in 2017, and in 2018 the lowest value of the series was recorded, with 42.715 cases of hospitalization. As shown in figure 2.

As observed in Figure 3, total public health spending in the State of Tocantins showed increasing values between 2012 and 2014, with 65 million in 2014, followed by a reduction in 2015, an increase in 2016 and a fall in 2017 and 2018, followed by a reduction in 2015, an increase in 2016 and a fall in 2017 and 2018, being recorded the lowest value in the last year of analysis, with 51 million.

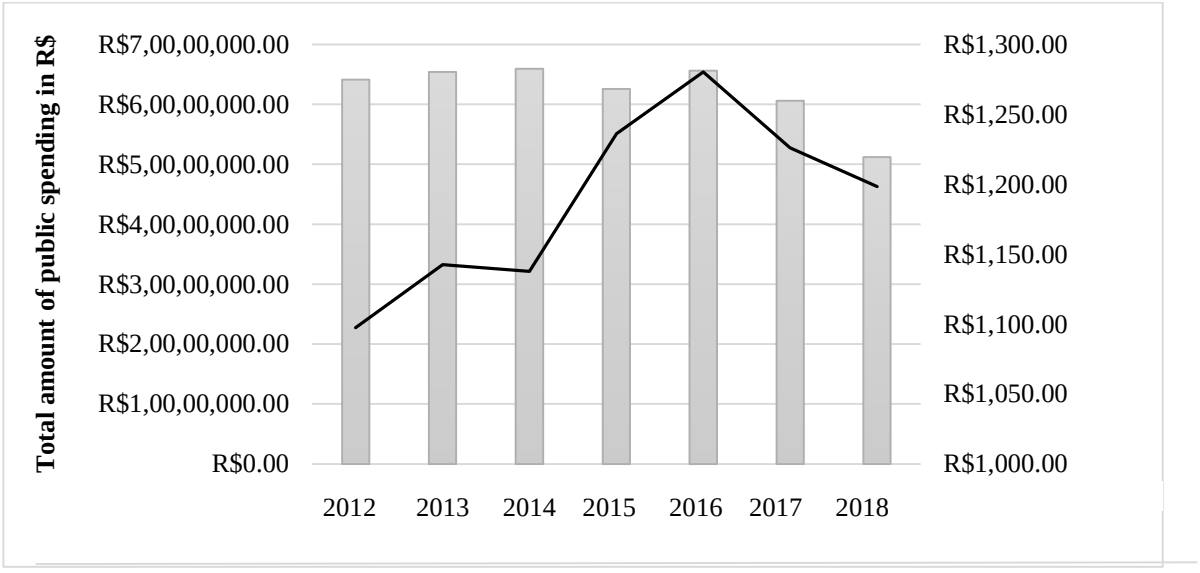

Fig.3. Evolution of average Cost for Hospitalization and Total Public Expenditure between 2012 and 2018.

On the other hand, the average cost per hospitalization, the years 2012 to 2014 were the ones that presented the lowest values for this indicator. After 2015, there was an increase in cost, with its maximum value verified in 2016, and showing a drop in 2017 and 2018. That is, compared to total public expenditure, the two indicators coincide only in the last three periods analyzed. As figure 3.

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Table 2. Correlation between financial indicators (GDP and Unemployment Rate) and quality indicators.

	Unemployment Rate	Mortality Rate	Average length of stay	Average cost per hospitalization	Total Public Spending	Hospitalization Index	GDP
Unemployment Rate	1	0,654 0,111	0,964** 0,000	0,719 0,069	-0,625 0,133	-0,852* 0,015	-0,225 0,627
Mortality Rate	0,654 0,111	1	0,624 0,134	0,992** 0,000	-0,096 0,838	-0,587 0,166	0,820* 0,024
Average length of stay	0,964** 0,000	0,624 0,134	1	0,685 0,090	-0,703 0,078	-0,892** 0,007	-0,300 0,513
Average cost per hospitalization	-0,719 0,069	0,992** 0,000	0,685 0,090	1	-0,173 0,711	-0,651 0,113	0,768* 0,044
Total Public Spending	-0,625 0,133	-0,096 0,838	-0,703 0,078	-0,173 0,711	1	0,860* 0,013	-0,150 0,749
Hospitalization Index	-0,852* 0,015	-0,587 0,166	-0,892** 0,007	-0,651 0,113	0,860* 0,013	1	0,280 0,543
GDP	-0,225 0,627	-0,820* 0,024	-0,300 0,513	-0,768* 0,044	-0,150 0,749	0,280 0,543	1

GDP: gross domestic product.
(*) (**) p<0,05

Table 2 shows Pearson's correlation between financial and quality indicators.

The results of the present study show that the health indicators, length of stay of hospitalization, cost per hospitalization and mortality rate of Tocantins changed according to the change of financial indicators. Similar results were found in the study by Abel Smith and Catalano [14] [15] that found evidence that the economic recession generates significant liabilities in health indicators.

Regarding GDP, a negative correlation with the unemployment rate, average cost per hospitalization and mortality rate between the years analyzed is notorious. That is, when GDP shows lower variation, there is an increase in the national unemployment rate, an induction in the increase in the cost per hospitalization of patients in the hospital and a tendency to increase the number of mortality rates (Table 2).

Economic crises directly affect the unemployment rate due to reduced investments, generating low admission rates and increased number of employees layoffs [16]. Roy and Cobas et al have shown that demographic, cultural and socioeconomic aspects are influencers that drive for spending when it comes to health [17] [18].

Regarding mortality is cited in the study of Falagas et *al* [19], that in periods of economic crisis, an increase in the mortality rate, especially in less developed countries, among the main causes are cardiovascular diseases, respiratory infections, and liver diseases.

Regarding the unemployment rate, there was a positive and significant correlation with the mortality rate of 0,654, and average length of stay of 0,964, showing that as a factor in the economic recession, the increase in the unemployment rate generates an increase in the length of stay of the hospitalization of patients and in the in-hospital mortality rate (Table 2). The fact is reported by Brenner; Mooney and Carlisle [20] [21], in their study, they show that the high unemployment rate comes as a reflection of the economic crisis and individuals who are unemployed during this period are more likely to worsen in the state of health compared to those who remain with their vacancy of Job.

Accordingly, the correlation between mortality rate and mean length of stay was 0,624, being considered as a moderate correlation and with a significance level of 1% statistically very significant. Thus, the longer the average length of stay, the more likely the patient will die and raise the mortality rate (Table 2). Therefore, the length of hospitalization is a binding factor for mortality, in this aspect, in a study by Junqueira *et al* [22], held in the Federal District (DF), the factors that lead to local hospital mortality were analyzed, including the chance for death increases by 1,0% each day that the patient remains hospitalized.

Patients in long periods of hospitalization are more exposed to risks such as depression, fall, decline in physical conditioning, deep venous thrombosis (DVT) and hospital

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infections [23]. In the case of hospital infection, Reis [7], in his study, he analyzed two groups of patients, one with cases of ICU-acquired infections and another group, with no cases of ICU-acquired infections, comparing variables such as permanence and mortality, the results confirm that patients without cases of infection in most were discharged, while those who had infection, most of them died, raising the group's mortality rate.

Regarding the financial quality indicator, there is a positive correlation between hospitalization index and total public expenditure of 0,860, relevant at level 0,05%, presenting that the higher the number of patients hospitalized, the higher the expenditure generated in public expenditure health (Table 2). The fact is stated in the study by Piuvezam et *al* [24] when the demand for health services rises, and hospitalization among them occurs, there is an increase in public health expenditures.

It is verified for the correlation between average cost of hospitalization and mortality rate, with a correlation of 0,992, statistically significant at the level of 1%, showing that the higher the value of the average cost of hospitalization, the higher the mortality rate (Table 2). As observed by Silva et *al* [23], when the patient remains hospitalized for more days, generates high costs mainly in the ICU. Abelha e*t al* [25], in his study, he cites that prolonged hospitalization is one of the factors that increases in-hospital mortality.

Table 3. Significance level of financial indicators and quality indicators.

Variables	T	Df	Sig (2 ends)	Average difference	95% Difference Confidence Interval	
					Bottom	Top
GDP	0,28	6	0,978	0,028	-2,437	2,495
Unemployment Rate	9,661	6	0	9,47	7,071	11,868
Mortality Rate	42,945	6	0	4,235	3,994	4,477
Average length of stay	26,62	6	0	5,771	5,241	6,302
Average cost per hospitalization	48,542	6	0	1.188,34	1.128,44	1.248,25
Total Public Spending	31,541	6	0	62195264,93	57.370.172,91	67.020.356,94
Hospitalization Index	24,213	6	0	52.512,14	47.205,41	57.818,87

GDP: gross domestic product.

In Table 3, the Student t-test showed significance to measure the quality of the sample, with a level of $P \leq 0,05$. With the exception of GDP, the other variables were significant, showing that the sample is relevant in the description of the results since p-values close to zero show lower probabilities of error.

IV. CONCLUSION

The scenarios presented during the years analyzed, regarding the health-economic development relationship, evidence the impact generated by the negative performance of Brazil's gross domestic product on health indicators in the State of Tocantins. With the results of this study, it is notorious that financial indicators, GDP and unemployment significantly influence the increase in length of stay, cost per hospitalization and patient mortality rate. However, the same was not observed in public spending and hospitalization index.

As a complement to the study, in the correlation between quality indicators, the increase in cases of patients requiring hospitalization reflects in public health expenditures, and the higher the cost of hospitalization, the greater the tendency to raise the rate of mortality.

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Patient Safety Protocols in Overcrowded Environments: in the context of nursing

Luana Conceição Cunha[1], Andreia Fernandes de Almeida[2], Maria Celestina Santos do Nascimento[2], Daniele Melo Sardinha[3], Nancy de Souza Felipe de Nazaré[4], Juliana da Silva Carvalho[4], Ana Paula Loureiro de Brito[5], Ana Karla Almeida Gomes[2], Pricila Costa Cavalcante[2], Eimar Neri de Oliveira Junior[6], Virgínia Mercês Lara Pessoa Oliveira[7], Gabriel Fazzi Costa[8], Juliana Conceição Dias Garcez[9].

[1] Nurse, Coordinator of the Family Health strategy of the municipality of Ponta de Pedras, Pará. Brazil. ORCID: http://orcid.org/0000-0002-9639-5945
[2] Nurses, Metropolitan University Center of Amazon (UNIFAMAZ). Belém, Pará, Brazil.
[3] Nurse. Master Student in Epidemiology and health Surveillance by Institute Evandro Chagas – PPGEVS (IEC/SVS/MS). Ananindeua, Pará. Brazil. ORCID: http://orcid.org/0000-0002-2650-2354
[4] Nurses, University of the Amazon (UNAMA). Belém, Pará, Brazil.
[5] Nurse, University of the State of Pará (UEPA). Belém, Pará, Brazil.
[6] Nurse. Specialist in urgency and emergency. Assistance nurse at the Metropolitan Hospital of Belém. Ananindeua, Pará. Brazil.
[7] Nurse. Master Student in Health Sciences. Coordinator of the internship in hospital care at the Metropolitan University Center of Amazon (UNIFAMAZ). Belém, Pará. Brazil.
[8] Nursing Academics. Metropolitan University Center of Amazon (UNIFAMAZ). Belém, Pará. Brazil.
[9] Nurse. Master in Nursing, University of State of Pará (UEPA/UFAM). Coordinator of the nursing course of the Metropolitan University Center of Amazonia (UNIFAMAZ). Belém, Pará. Brazil. ORCID: http://orcid.org/0000-0002-5849-1573

Corresponding Author: Luana Conceição Cunha
Daniellevianna20@gmail.com
Travessa timbo 1411A, Pedreira, Belém, Brazil.

Abstract*— *Objective: to identify if the nurses of an overcrowded hospital in Belém do Pará performed the patient's safety protocols. Material and methods: the research is descriptive of a field study with quantitative approach, conducted with 16 nurses from a reference public hospital in the care of high-risk pregnant women, located in the municipality of Belém, state of Pará, held in October and November 2018. A self-applicable form containing socio-demographic and labor data of the nurse and questions about the basic protocols of patient safety was used. The analysis and statistical comparisons between the variables were made using the GraphPad Prism 8, the categorical variables were tested with the bilateral Fisher's exact test, the continuous variables were tested through Pearson's correlation. Results: 12 (75%) nurses were mostly female, with a mean age of 45.5 years, most of them with training between 10-19 years 6 (37.5%). The protocol least performed by the participants is that of patient identification (56%). Less than half (37.5%) of the nurses responded positively to more than 75% of the form assertions. It was identified that the non-performance of the pressure injury protocol, which may be related to the lack of institutional continuing education on this subject (p = 0.0345). The longer the working day of the nurse, the lower the number of correct procedures performed (r = -0.3037). Conclusion: This article concluded that the basic patient safety protocols are being performed in overcrowded environments, and that the workload can negatively influence these results.

Keywords*— *Patient Safety; Nursing Care; Protocols.

I. INTRODUCTION

Patient safety has permeated several debates on the global health scene, being one of the main concerns of health organizations to improve the quality of their services (Cestari et al., 2017). The National Patient Safety Program (NPSP), instituted in Brazil by Ordinance MS No. 529 of

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April 1, 2013, demonstrates the government's commitment to contributing to the qualification of health care in all health facilities in the national territory, promoting greater safety for patients, health professionals and health care environment (ANVISA, 2017).

Among the regulations created by the National Health Surveillance Agency Anvisa, (2015), it is worth mentioning the publication of the Resolution of the Collegiate Board of Directors (RDC) nº 36, of July 25, 2013 (BRASIL, 2013), which aims to "institute actions for patient safety and quality improvement in health services". The RDC establishes the obligation to implement the Patient Safety Center (PSC) in health services.

In order to consolidate safe assistance with quality, in September 2013, with Ordinance No. 2,095, the Ministry of Health instituted basic patient safety protocols, including: fall prevention protocols; patient identification protocol; safety protocol in prescribing and using and administering medication; safe surgery protocol, hand hygiene practice and pressure injury (Silva, Alves, Sanches, Terra, & Resck, 2016). These protocols have the purpose of instituting actions for patient safety in health services and quality improvement on a national basis (M. da S. Brasil, 2014).

The development of the actions and strategies foreseen in the NPSP is the responsibility of the PSC, which plays a fundamental role in the entire process of implementing the Patient Safety Program (PSP). Thus, knowledge about risk management tools, safety protocols and other instruments that favor the incorporation of indicators and promote the culture of patient safety is of great value (ANVISA, 2014).

It is known that from four to seventeen percent (4% to 17%) of all patients who are admitted to a health service suffer from a health care related incident that is not related to their underlying disease and may affect their health and recovery. In some cases, these failures may even lead to the patient's death. In response to this problem, the World Health Organization (WHO) has created the PSP that focuses on the prevention of preventable Adverse Events (AE) (ANVISA, 2017).

According to WHO, (2016), patient safety is a serious public health problem and its estimates are that one in ten patients in hospitals is subject to AE. The decrease in the number of infections acquired in hospitals, the decrease in the number of hospitalizations, medical costs and expenses and disability or loss of productivity are some benefits provided by patient safety in these institutions.

And among the problems that interfere in the accomplishment of the patient's safety, the overcrowding of Brazilian services stands out, which are often characterized as an overcrowded environment and with insufficient conditions of attendance, which arouse several kinds of feelings both in the users of the service and in the multiprofessional team that attends them (SANTOS, 2015). According to Bittencourt & Hortale (2009), overcrowding in health services is a worldwide phenomenon and ultimately indicates low performance of the health system as a whole and of the hospital in particular, and induces low quality care, which may affect the applicability of nursing care systematization. Already for Santos & Santo, (2014) overcrowding is a contemporary phenomenon, with certain causes and consequences.

Being the systematization of nursing care, an instrument for the applicability of care based on science, and which will have a direct impact on the quality of the service provided and consequently minimizing adverse events, and valuing the safety of the patient (Sardinha, Silva, Carvalho, Aguiar, & Simor, 2019). A study also shows that the applicability of the systematization of nursing care ensures that the nurse applies his care according to practices based on evidence, improving the service, and is also a way of promoting patient health, since the evaluation is thorough, to identify the problems from the theories of nursing, and for each problem to draw a diagnosis of nursing and from it various interventions that are applied and evaluated daily (Sardinha, Costa, et al., 2019).

For this reason, the present work was chosen in view of its relevance in line with the current reality of hospitals, from the point of view of the challenge of carrying out patient safety protocols for adequate assistance in the face of overcrowding.

Thus, being of interest to health professionals and hospital managers involved in the system to seek improvement in the quality of care. Thus, the question that guided the research was established: Nurses of an overcrowded hospital in Belém do Pará perform the patient safety protocols?

Thus, with the elaboration of this study it was hoped to bring relevant information regarding the execution of the patient safety protocols by the nurses and the main objective was to identify if the nurses of an overcrowded hospital in Belém do Pará performed the patient safety protocols and as specific objectives describe the socio-demographic and work profile of the nurses, identify if the basic patient safety protocols were being performed effectively and verify the knowledge of the nurse about the patient safety protocols.

II. METHOD

This is a descriptive field study type research with a quantitative approach. The study was conducted with 16 nurses working in the Prepartum, Childbirth and

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Puerperium (PCP) and Obstetric Center (OC) of an overcrowded hospital located in the municipality of Belém, State of Pará, through the application of a form that was prepared by the authors based on the manual of strategies for the realization of patient safety of REBRAENSP in 2013(REBRAENSP, 2013).

It is divided into two parts: the first one on the extraction of socio-demographic and labor characterization of nurses, and the second one on information regarding patient safety protocols. It should be noted that in what concerns the basic protocols of patient safety, the safe surgery protocol was not included in the form because it was not the profile of the place studied.

The data collection was carried out in October and November 2018. We emphasize that the survey was submitted to the analysis of three hospitals in the metropolitan region of Belém, among them public and private, however, because it is a subject that brings significant answers about qualified assistance in hospitals in overcrowding, only one public hospital allowed the study.

The inclusion criteria adopted were to be nurses of the institution, both genders, professionals who had been working for at least 30 days in the sector in a situation of overcrowding and those excluded were nurses of the institution who were not working at the time of data collection, whether due to vacation, maternity leave, health leave, unpaid leave or dismissed from office for other reasons, nurses who refused to participate in the collection and nurses working in sectors where overcrowding is not a reality.

The descriptive statistics consisted of obtaining the means for the quantitative data and for the qualitative data, an absolute frequency was performed by means of direct counting, followed by the relative frequencies. For the descriptive statistics tabulation and data presentation the Microsoft Office Excel 2007 program was used, and the obtained results were used frequency, percentage and mean.

Statistical comparisons between variables were performed in GraphPad Prism 8 (*GraphPad Prism8 [Programa de Computador]*, 2018), and the categorical variables were tested with the bilateral Fisher's exact test, more appropriate for the small sample size, was considered alpha value = 5%. The continuous variables were tested using Pearson's correlation, using the value of $r > 0.25$ for weak correlation and the coefficient $r > 0.75$ considering strong correlation.

The categorical variables concerning the questions on the application of the safety protocols, were converted into continuous ones by counting the number of "yes" answers in a set of 18 questions. The objective of this analysis was to evaluate the influence of socio-demographic variables on the correct execution or not of the protocols in a global way and not specifically each conduct. For this analysis, the comparisons performed were tested by Pearson's correlation.

As for the risks, the research brought minimal risks considering that the study was carried out by means of an individual response to the proposed form, where each participant was assigned a numerical code, corresponding to the sequencing of the application of the forms. The act of answering the form could cause some kind of discomfort to the research participant, however, all participants were made aware that they could stop answering the evaluation form at any time.

As for the benefits of the research, the study contributed to enrich scientific knowledge in the area of patient safety in an overcrowded environment, as well as bringing subsidies to nurses, users and managers, providing relevant information as to the importance of their action in promoting patient safety. These benefits should be observed by managers, considering that when safety protocols are effectively performed, there is cost reduction as to the patient's permanence in case of patient safety failure or in cases of adverse events, there is greater credibility of the institution and there is return of the population as to the efficiency of the institution. To the academic community and teaching institutions, the study brings information about the scientific nature that is adopted, which can be used during theoretical classes and used in concomitance with active methodologies.

This study follows Resolution 466/2012 of the National Health Council (NHC), which provides on ethical aspects in research involving human beings, incorporating from the perspective of the individual and collectivities, bioethical references, such as como: autonomy, non-maleficence, beneficence, justice and equity, among others to ensure the rights and duties of research participants, the scientific community and the State (M. da saude Brasil, 2012). All research participants signed the Informed Consent Form. The project was submitted to the Brazil platform and Ethics Committee (CEP) of the Santa Casa de Misericórdia do Pará Foundation (FSCM-PA), and approved under the number of the opinion: 3,364,553.

III. RESULTS

The results were divided into two chapters, the first relating to the characterization of socio-demographic and labor aspects, and the second deals with the basic protocols of patient safety, where it talks about the execution of the basic protocols by nurses, the knowledge of these professionals about the protocols and the correlation of the workload with the execution of the basic protocols of safety.

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The data presented below are the most relevant in the use of statistics in GraphPad Prism 8 and in the application of the Pearson correlation test.

CHARACTERISATION OF SOCIO-DEMOGRAPHIC AND LABOUR ASPECTS

Table 1 infers that there is a significant frequency of female participants 12 (75%) in relation to male participants 4 (25%). The average age among nurses was 45.5 years, with a predominance of age between 40-49 years 9 (56.3%), and most are married 7 (43.8%). There is a predominance of participants in the study who are granted 11 (68.8%), and the remaining 5 (31.3%) work in temporary employment.

It is noted that there is a balance in the length of training for professionals with an average of 18.4 years. It is also shown that all nurses have done at least one post-graduation and that the predominant frequency occurred in the obstetrics area 12 (54.5%), 3 (13.6%) in the neonatology area, and in the areas of Emergency and Emergency, Epidemiological Surveillance, Health Systems Auditing, Oncology, Cardiology, Collective Health and Women and Child Health 1 (4.5%) frequency in each area.

It is inferred that currently 16 (100%) professionals work in the obstetrics area and 11 (68.8%) for more than five years. As for the time spent in hospital, a significant number of nurses 11 (68.8%) have worked in the hospital for more than five years. The average hours worked by nurses are 8.6 hours a day, with half of the professionals working 6 hours 8 (50%), and 4 (25%) working 12 hours.

Table 1: Distribution of the socio-demographic and labor characterization of nurses working in overcrowded units of a Public Hospital in Belém, Pará, Brazil 2018.

Sociodemographic and Labor Profile	**N**	**%**
Gender		
Female	12	75,0
Male	4	25,0
Age Group		
30-39	2	12,5
40-49	9	56,3
50-59	5	31,3
Civil State		
Married	7	43,8
Single	5	31,3
Widower	1	6,3
Divorced	3	18,8
Type of bond		
Contest	11	68,8
Temporary	5	31,3
Training time		
1-9	3	18,8
10-19	6	37,5
20-29	5	31,3
30-39	2	12,5
Working time in the hospital (years)		
1 – 5	5	31,3
5 – 10	11	68,8
Current field of action		
Obstetrics	16	100,0

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Time in the current field of activity (years)		
1 – 5	5	31,3
5 – 10	11	68,8
Working hours (hours)		
6h	8	50,0
8h	3	18,8
12h	4	25,0
18h	1	6,3

Source: Authors' research.

Figure 1 shows a comparison between the execution of the patient's basic safety protocols and the time of graduation in years, showing a weak correlation (r = -0.2257).

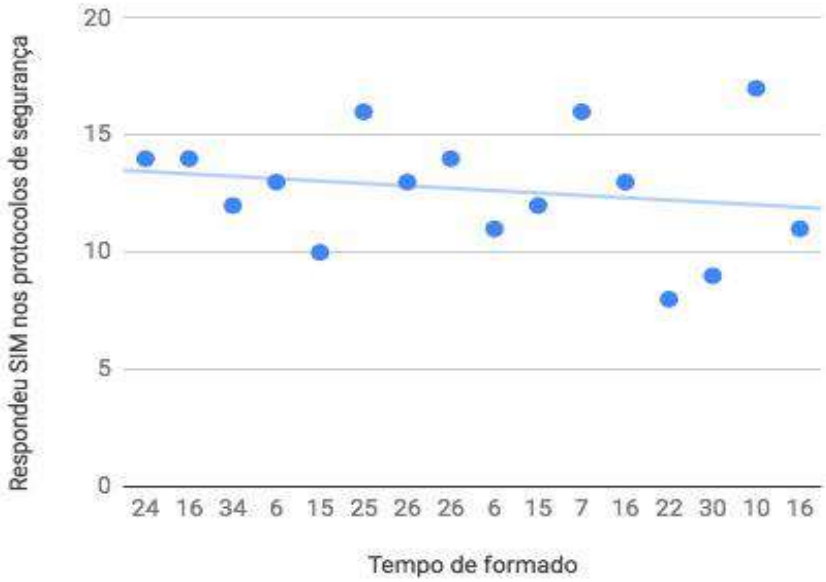

Fig.1: Correlation of YES responses in patient safety protocols with time of training of nurses working in overcrowded units of a Public Hospital in Belém, Pará, Brazil 2018.

Source: Authors' research. (tempo de formado = time of graduation)

BASIC PATIENT SAFETY PROTOCOLS

The results regarding the basic protocols for patient safety were organized in three moments: the first one that brings results about the execution of the patient safety protocols; the second one talks about the nurses' knowledge about the patient safety protocols; and the third one that brings evidence about the comparison of the workload with the execution of the basic safety protocols.

Execution of basic patient safety protocols

Regarding the execution of protocols, figure 2 shows the relative frequency of YES (positive responses) and NO (negative responses), 6 (37.5%) nurses answered more than 75% of the form with YES assertives, 9 (56.3%) answered between 50% and 75% of the assertives with positive responses, and 1 (6.25%) participant answered more than 50% of the assertives with NO responses.

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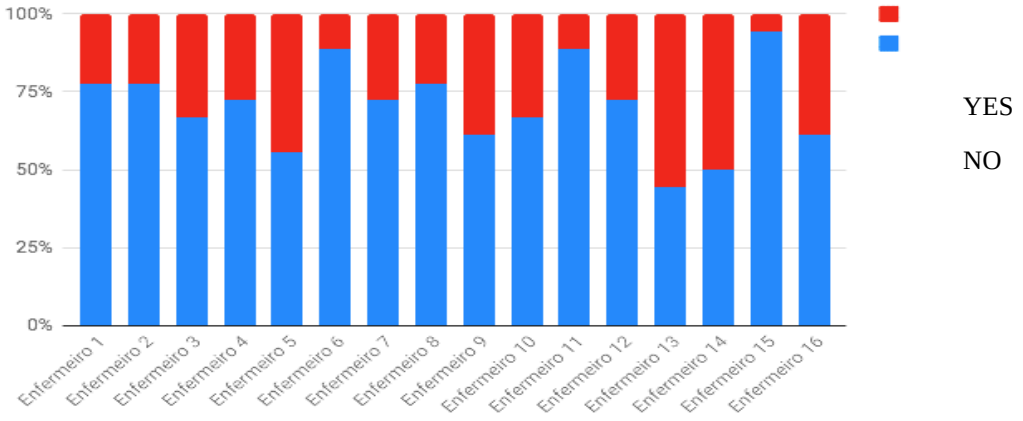

Fig.2: Joint assessment of patient safety protocol execution by nurses working at a Public Hospital in Belém, Pará, Brazil 2018.

Source: Authors' research. (Enfermeiro = Nurse)

Figure 3 shows the basic protocol of "hand hygiene practice in health services" identified as "hand hygiene" with a relative frequency of execution of 75%, the basic protocol of "patient identification" identified as "identification" with a relative frequency of execution of 56%, the protocol of "fall prevention" with 75% of execution, the protocol of "pressure injury prevention" with a relative frequency of execution of 63%, and the protocol of "safety in prescription, use and administration of medicines" identified as "medicines" with a relative frequency of execution of 81%.

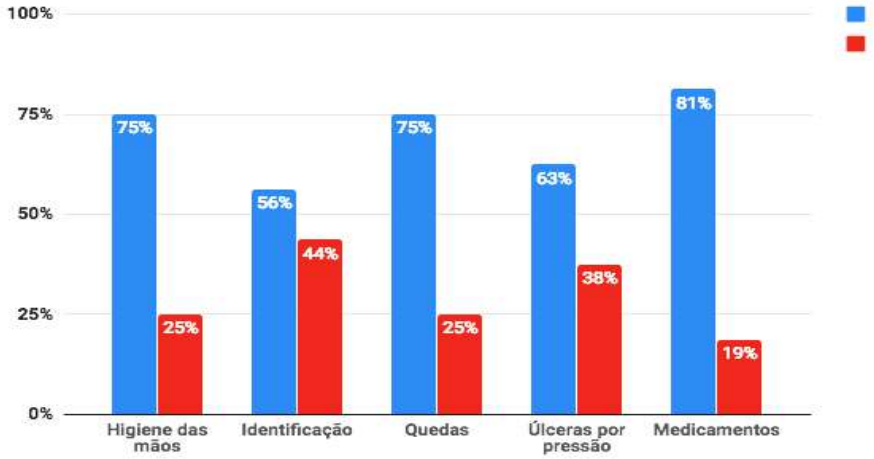

Fig.3: Distribution of the relative frequency of execution of five basic patient safety protocols used in the care by nurses working at a Public Hospital in Belém, Pará, Brazil 2018.

Source: Authors' research. (Higiene das mãos = Hand hygiene); (Identificação = Identification); (Quedas = Falls); (Úlceras por pressão = Pressure ulcers); (Medicamentos = Medicines); Blue = YES; Red = NO.

Nurses' knowledge of basic patient safety protocols

In figure 4, after the statistical comparison between the variables, the comparison between the questions of the protocols related to pressure injury and the accomplishment of permanent education, is significantly related to the absence of permanent education on this subject (p = 0.0345).

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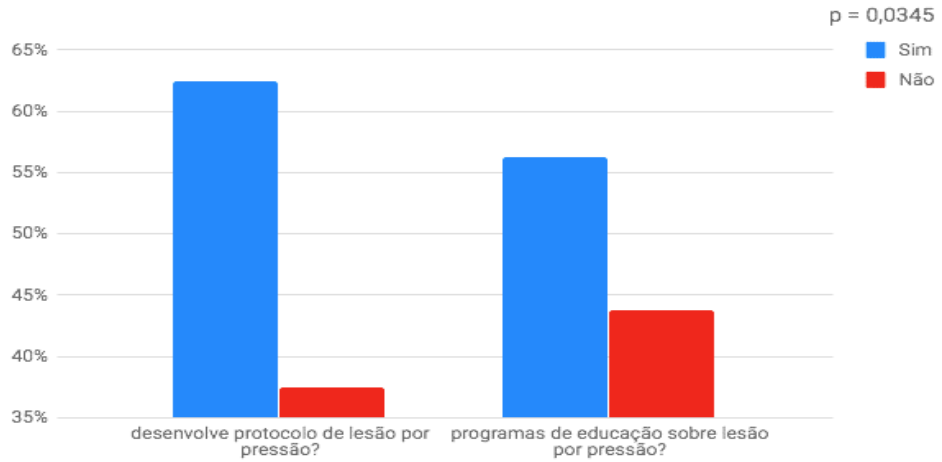

Fig.4: Comparison between performing the pressure injury protocol and continuing education by nurses working in overcrowded units of a Public Hospital in Belém, Pará, Brazil 2018.

Source: Authors' research. (Desenvolve protocolo de lesão por pressão = Develops pressure injury protocol); (Programas de educação sobre lesão por pressão = Education programs on pressure injuries); Blue = YES; Red = NO.

Comparison of workload with the execution of basic safety protocols

As for the comparison of the "YES" answers of the questions, with the working hours of the professionals, the dispersion diagram shows a weak negative correlation, that is, the longer the working hours of the nurse, the smaller the number of correct procedures performed (r = -0.3037).

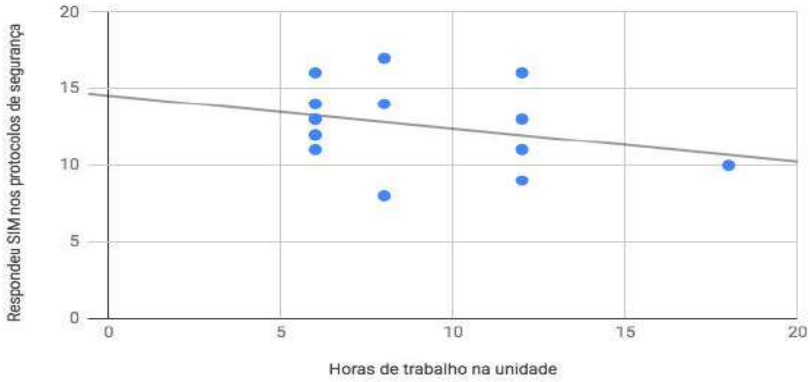

Fig.5: Comparison of the joint evaluation of the form's questions with the working hours of nurses working in overcrowded units at a public hospital in Belém, Pará, Brazil 2018.

Source: Authors' research. (Horas de trabalho na unidade = Hours of work in the unit).

IV. DISCUSSION

CHARACTERISATION OF SOCIO-DEMOGRAPHIC AND LABOUR ASPECTS

In Brazil, women represent 73% of health jobs. Nursing is a profession where the female gender is predominant. It is considered that there is a historical relation between this predominance and care (Carrieri, Diniz, Souza, & Menezes, 2013). It was found that the nurses who attend the patients in the institution studied in the city of Belém/PA are characterized by being mostly female (75%). These data are similar to another study in 2012 in southern Brazil, where the predominance of the female gender was identified in the study (Esser, Mamede, & Mamede, 2012).

Another important aspect evidenced in the results of the research is the correlation of the execution of patient safety protocols with the time of training of nurses, which showed a weak correlation (r = -0.2257), which may indicate that regardless of the time of training, professionals know the recent policy of patient safety, which may be related to continuing education and education. The same indicates a recent study that showed that continuing education provides gradual changes in the complex reality of health services (Campos, Sena, & Silva, 2017).

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BASIC PATIENT SAFETY PROTOCOLS

Execution of basic patient safety protocols

The study showed that the relative frequency of execution performed by nurses presents a similar response, where it can be identified that all basic protocols are performed with a frequency higher than 56% of use, which may indicate a positive aspect related to the performance of the basic protocols by nurses.

The protocol most used by the study nurses is that of "prescription, use and administration of drugs", in the figure identified as "drugs", with a frequency of 81%. This may indicate an adequate level of knowledge regarding the use of this protocol.

A study conducted in 2016 identified similar results to this survey, inferring that drug administration is one of the most important activities in nursing and that knowing the types of errors and causal factors in the occurrence of failure in drug administration is essential for developing preventive measures to reduce them (Costa et al., 2016).

However, it was found that the lower frequency of performance was in the "patient identification" protocol, it is noted that in practice, patient identification is a stage of nursing care that does not receive proper attention, and may interfere with the other stages essential to ensuring the quality and safety of the service provided.

It is worth noting that a 2007 publication by the National Patient Safety Agency (NPSA) of England and Wales highlighted that more than one in ten cases of reported incompatible care were related to the identification bracelet (Hoffmeister & Moura, 2015).

The identification bracelet being an additional resource in combating errors, when used correctly, containing the definition of patterns related to color, material, identifiers and when checked before performing procedures, favors a safe practice in the identification of the patient.

It was identified, according to the joint evaluation of the form questions, considering that the answers "YES" meant that they performed the proper activity, that less than half (37.5%) of the nurses answered positively to more than 75% of the form assertions, being able to identify that 62.6% of the interviewed professionals have a lack of knowledge about the protocols, and probably do not perform basic protocols of patient safety in a complete way, for the realization of a safe assistance and care based on non-maleficence.

Embora estudos brasileiros relacionados a erros e eventos adversos dentro do sistema de saúde não sejam escassos, porém, quando relacionado com os protocolos básicos de segurança do paciente ainda é um desafio para os pesquisadores no cenário nacional. O que poderá propiciar um maior amadurecimento nas organizações de assistência e de formação, induzido pela necessidade de se implantar o Programa Nacional de Segurança do Paciente, que objetiva monitorar e prevenir, em hospitais e outras unidades de saúde, os incidentes causadores de danos na assistência ao usuário (Lopes et al., 2019).

Nurses' knowledge of basic patient safety protocols

The study showed that the professionals responded positively to the assertions of the form, indicating that there is knowledge, and realization of the basic protocols of patient safety.

The research also highlights that the continuing education offered by the institution, along with the continuing education that the professional seeks, are proposals for strategic actions that lead to the understanding that the individual must have in his improvement a goal to be followed throughout his life.

A study conducted by Paschoal, Mantovani, & Lacerda, (2006), brought similar results regarding continuing education, where it is understood as a constant search for learning, as one of the actions that enable the development of this process of change, aiming at the professional qualification of the nurse and consequently the realization of competent, conscious and responsible professional practice. For the nurse, this search for competence, knowledge and updating is essential to ensure the survival of both the professional and the profession itself.

The comparison between the questions of protocols related to pressure injuries, it was verified that the non performance of these procedures, may be related to the lack of permanent education on this subject, inferring that the nursing assistance offered to the care and prevention of pressure injuries are not yet the most adequate.

It is believed that the nursing management team should identify this weakness and seek, together with professionals from other areas involved, methodologies to provide updates on effective care to minimize the occurrences and their severity in patients in this institution.

The same is identified in another study, where it was found that lifelong education benefits the professional at the point where he or she acquires new knowledge, and favours the institution, because the professionals together start to offer quality care by reducing the incidence of errors and contemplates the patient who will receive quality care from nursing (Gonçalves et al., 2013).

Since permanent education is essential for quality assistance, in a study conducted with 14 preceptors of residence, showed that the majority did not receive adequate

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qualification, in relation to extension courses, updating, and felt impaired in relation to preparation for teaching. This shows that since specialization the professional has no contact with continuing education and does not know its benefit in relation to patient safety (Girard, Sardinha, Nascimento, Teixeira, & Borges, 2019).

Workload correlation with the execution of basic safety protocols

The working hours of the professionals, in the dispersion diagram shows a weak negative correlation, that is, the longer the working hours of the nurse, the smaller the number of correct procedures performed (r = -0.3037), which may indicate the occurrence of more adverse events to the patient due to physical and mental exhaustion.

And we can observe in the research that the professionals fulfill an average workload of 43 hours per week, ranging from 30 hours to 90 hours, among them, it was noticed that 50% of the professionals fulfill a workday equal or superior to 40 hours per week.

In a study conducted in the state of São Paulo in 2014, it was found that approximately 78% of the AE in patients were related to complications attributed to the work overload of the nurse (Novaretti, Santos, Quitério, & Daud-Gallotti, 2014). Segundo Araujo et al (2017), the quality of nurse care reflects the quality and safety of patient care.

The same study points out that there may be a relevant association between the nurse's workload and the occurrence of adverse events, such as bed falls and central venous catheter-related infections, demonstrating that, within the hospital environment, the increase in the number of patients assigned to each nurse may increase the incidence of these indicators, having a negative impact on patient safety (Magalhães, Dall'Agnol, & Marck, 2013).

These findings are consistent with results presented by previous studies that suggest that proper sizing of the professional with lower patient/professional rates helps reduce the incidence of adverse events, including bed falls and infections.

It should be noted that the challenges faced by these professionals, related to overcrowding in the health services, possibly include the absence of adequate risk rated reception; lack of qualified professionals; lack of material resources; high waiting time for care; inadequate physical areas; absence of back beds; excessive workload; shortage of human resources and lack of standards and routines. To improve the quality of care, these factors need to be changed (Kolankiewicz et al., 2017; Paixão, Balsanelli, Bohomol, & Neves, 2017).

To solve the problem of overcrowding, a study says that it is necessary to create public health policies aimed at this sector, the implementation of programs and management tools to ensure improvements in the quality of care. In addition to strengthening basic care to effectively solve problems of low complexity, increasing human resources in the health services, which will contribute to the reduction of overcrowding (Santos & Santo, 2014).

The limitation of this study focuses on the small use of a population sample. However, the material found and the analysis made make it possible to identify important competencies for the realization of patient safety, as well as to indicate the possibility of carrying out new studies that improve their development.

V. CONCLUSION

This article concluded that the basic patient safety protocols are being performed in overcrowded environments. Furthermore, that continuous and continuing education can be effective methodologies that allow subjects a process of self-analysis at work, for work and beyond, in order to succeed the knowledge of the nurse in the application of the basic protocols of patient safety, regardless of the time of training of this professional.

The relevance of this study to nursing is highlighted in terms of the nurse's role, since he is the promoter of the patient's safety culture, which should be understood as a device to mediate changes and ensure a safe assistance practice, with the minimum of mistakes.

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Educational Action on Hand Hygiene to Combat Intestinal Parasitosis in a Public School in Belém of Pará Brazil

Lidiane Assunção de Vasconcelos[1], Daniele Melo Sardinha[2], Amanda Silva Arenhardt[3], Hilton José Vaz[3], José Natanael gama dos santos[3], Leticia dos Reis Monteiro[3], Naiana de Paula Tavares[3], Gisely Santiago Santos[3], Tayna Ianka da Costa Oliveira[3], Gabrielle da Silva Ferreira[3], Anderson Roberto Assunção de Vasconcelos[4], Simone Daria Assunção Vasconcelos Galdino[5], Marcos José Risuenho Brito Silva[6], Ilma Pastana Ferreira[7].

[1]Master in Health, Environment and Society in the Amazon, Federal University of Pará (UFPA). Professor at Cosmopolitan College. Belém, Pará, Brazil.
[2]Master Student in Epidemiology and health Surveillance by Institute Evandro Chagas – PPGEVS (IEC/SVS/MS). Ananindeua, Pará. Brazil.
[3] Medical Student, Federal University of Pará (UFPA). Belém, Pará, Brazil.
[4] Information System Academic, Federal University of Pará (UFPA). Belém, Pará, Brazil.
[5]Master in Health Services Management and Planning. Professor at Cosmopolitan College. Belém, Pará, Brazil.
[6] Nurse, State University of Pará (UEPA). Belém, Pará, Brazil.
[7] PhD in Nursing, Federal University of Rio de Janeiro(UFRJ). Professor at the State University of Pará (UEPA). Belém, Pará, Brazil.
Corresponding author:Daniele Melo Sardinha
Danielle-vianna20@hotmail.com
Travessa timbó 1411A, Pedreira, Belém, Pará, Brazil

***Abstract*— *Enteroparasitosis is a serious public health problem, the main factor being lack of knowledge about preventive measures, especially among the most neglected populations, which is a condition for the dissemination of enteroparasitosis. Therefore, it is essential to know the behavior and degree of knowledge of people in relation to the subject, since the information obtained is fundamental for the preparation of actions and intervention programs. The objective is to carry out an educational action in a public school, on the hygienization of the hands to combat intestinal parasitosis. It is a descriptive study, of the type report of experience, developed by academics of the medicine course of the Federal University of Pará, in a public school, with two classes of infantile education, in two stages, a video was presented on the subject, and soon the hand washing was carried out for a certain period, with the objective of teaching the children the appropriate technique of hand washing. The involvement of the students was visible. Realizing that the main objective, which was to sensitize children to adopt hygiene habits in daily life was achieved and thus influence the prevention of intestinal parasitosis. It was concluded that school is the ideal environment for the practice of health education, and has the potential to have a real impact on the problem on board, since it stimulates critical thinking, resulting in the reduction of illnesses, morbidity and mortality.*

Keywords*— *Intestinal parasitosis; Hygiene of the hands; Health Education.

I. INTRODUCTION

The Family Health Strategy (FHS) of the Riacho Doce, in the Guamá neighborhood in the municipality of Belém, State of Pará, is a field of practice for the Federal University of Pará in the area of integrated health care, and based on this partnership served as a basis for identifying relevant problems and implementing health promotion measures. It should be noted that this community has a lack of infrastructure to ensure a preventive health quality, since the lack of garbage collection, water supply, inadequate sanitary conditions and housing, all these social determinants in health are unfavorable for life in society

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and more conducive to the emergence of diseases (Carrapato, Correia, & Garcia, 2017)..

The activities of home visits by community health workers, nurses and doctors have made it possible to perceive that the greatest health problems in this locality involve violence in general and chronic diseases. However, what was most evident in academics and professionals were the high rates of parasitosis in all age groups, especially in children. It is clear that these parasitosis are directly related to the environment in which the individual lives, degree of knowledge about health education and water quality that is made available, these factors are determinants for infection (Garbossa et al., 2013).

In this way, social institutions, when encouraged to participate actively in health actions, develop co-responsibility with health teams, allowing interaction with greater scope in the face of health demand (Silva et al., 2018). The lack of knowledge about preventive measures, especially among the most neglected populations, is a condition for the dissemination of enteroparasitosis. therefore, it is essential to know the behavior and degree of knowledge of people in relation to the subject, since the information obtained is fundamental for the development of actions and intervention programs (Busato, Dondoni, Rinaldi, & Ferraz, 2015).

Thus, when it comes to promoting health in the school environment, this reality seems distant because it is not treated in a timely and consistent manner. In this sense, health education is one of the essential components for monitoring the student's school development and should be experienced by the university and FHS(Ferrari de Lima, Malacarne, & Strieder, 2012).

According to the scenario we are experiencing, the development of health education actions is justified, addressing as an instrument the Arc of Maguerez, which consists of working from the problematization of the community. This theme approaches the construction of active learning from some stages, such as: observation of reality; identification of problems; theorization; hypothesis of solution and execution of action (Prado, Velho, Espíndola, Sobrinho, & Backes, 2012).

Based on the problems observed by the community, there was a need to intervene through a health education project entitled "Clean hands in combating intestinal parasitosis: a measure based on the Maguerez arch". This study is a report of experience in a public school in Belém, relating the prevention of intestinal parasitosis with healthy hygiene habits through the washing of hands.

Within this perspective, the general proposal from this work was to carry out an educational action on the prevention of intestinal parasitosis at school, with a focus on the hygienization of the hands, in order to address this practice in the student's school experience. To insert a practical knowledge of the medicine course of the Federal University of Pará in relation to the hygienization of the hands in the daily life of the child; to sensitize the school of the importance of inserting the education in health in the school activities of the child; to strengthen the habit of hand washing in the daily life of the child to prevent infections by parasitosis.

II. MATERIALS AND METHODS

This is a descriptive study, which addresses a report of experience with health education, carried out at the Edson Luiz Elementary School, located at Rua Barão of Igarapé Miri in the Riacho doce community, Guamá, Belém, State of Pará-Brazil. The work was developed by a group of 08 academics of the 3rd semester of the medicine course of the Federal University of Pará, in partnership with the ESF of the Riacho Doce.

The work proposal was presented to the school management and it was defined that the participants would be children aged 05 and 10. Two classes were selected to be implemented as a pilot, one of infant education II, with 27 students and another of primary education with 30 students. The activities were developed in the month of November 2018 in that school.

The method used was the participatory type, allowing greater interactivity between students and facilitators and thus the activities became dynamic, because the children had the opportunity to reproduce the learning. The technique approached was hand sanitizing, based on the hand sanitizing manual in health services of the National Health Surveillance Agency Anvisa, (2019), being adapted to the reality of the children's audience.

First, it was worked with the two classes separately with a video presentation, entitled "The Adventures of Super Soap in Fighting Parasites", in order to make them aware of the importance of hand washing; (https://www.youtube.com/watch?v=H1NO1VPRsEM),
Then face towels were distributed individually; followed by the practical applicability of the technique, using liquid soap made and supplied by the academics every week until the conclusion of the work. These activities were followed weekly by the group of the Federal University of Pará and daily by the professor of the institution where the project took place.

Another strategy adopted was the elaboration of an invitation letter to local businesses to participate in the project, with the contribution of soaps to manufacture the product; to parents or guardians a Free and Informed Consent Term was elaborated in order to allow the

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participation of students in the project and through an invitation letter to encourage the children to wash their hands whenever necessary and send to school the clean towel to be used in the child's daily life. In addition, a server of the institution was directed to make the liquid soap, with the support of local partners and the direction of the school was delivered some soaps to continue the project.

During the week, the teacher of the institution followed these activities, always remembering the importance of washing hands and approaching with themes in class. On the other hand, every Wednesday in November, the academics monitored the hand hygiene activities and the replacement of the liquid soap. Always observing the technique taught and correcting faults and in conversation with the children wondered if they were doing the activities in their homes.

For the theoretical support, it was based on two studies relevant to the reflection of the authors, being: "The role of the school in health promotion: a necessary mediation" by Dartel Ferrari de Lima; Dulce Maria Strieder and Vilmar Malacarne of 2012 and "the arc of Charles Marguerez: reflecting strategies of active methodology in the formation of health professionals" by Marta Lenise do Prado et al, 2012.

III. RESULTS AND DISCUSSION

Within this perspective that was proposed by the group, the involvement of the students was visible. Realizing that the main objective, which was to sensitize children to adopt hygiene habits in daily life was achieved and thus influence the prevention of intestinal parasitosis.

The dynamics allowed the child's participation in the actions and their ability to learn new things in both groups. Since the students of Early Childhood Education performed with ease the hygienization of the hands, they were easier to work with during the practices, but had a certain dependence and need monitoring, in this group the interest of parents in the activity that favors their children's health was more accepted.

In relation to primary education, they also had ease in applying the correct practice, more independence and organized in relation to the materials, but had a certain difficulty in organizing during the practice.

In this context, intestinal parasitosis represents a worldwide public health problem, and is responsible for high morbidity rates, as well as, these diseases are related to sanitary conditions and have high prevalence in Brazil, affecting mainly school-age children, related to their precarious hygiene habits and their developing immunity. Intestinal parasitosis is caused by protozoa and helminths, representing a serious problem for the health of children and adults, and can cause changes in physiological processes (Rodrigues, Lima, Pereira, & Catunda, 2019).

The most important intestinal protozooses and helminthes in Brazil are: amebiasis, balantidiasis, trichomoniasis, schistosomiasis, himenolepiasis, teniasis, hookworm, ascaridiasis, enterobiasis and strongyloidiasis. Lack of hygiene may be one of the high occurrence related factors demonstrated from examinations performed in the community, since all intestinal parasites detected can be transmitted by factors such as: lack of hygiene, contaminated water and food and other factors that contribute to the spread of these parasitosis.However, in order to eradicate this problem, improvements in socioeconomic conditions, basic sanitation and health education are needed, as well as changes in cultural habits(Visser, Giatti, de Carvalho, & Guerreiro, 2011).

The occurrence of intestinal parasites has an important relationship with unsatisfactory sanitation, as well as inadequate hygiene practices in the population. The low quality of living conditions and poor or even non-existent basic sanitation, the lack of knowledge of the population about the transmission and control of these infections and principles of personal hygiene and care in the correct handling of food also contribute to the increase in the occurrence of enteroparasitosis. However, control actions still present barriers to basic sanitation infrastructure, as well as the lack of community-based educational projects (Faria, 2015).

In this context, health education is a fundamental tool in the face of this problem and is a very effective strategy to address the issue of intestinal parasitosis, since it facilitates learning and promotes an improvement in the health of individuals, since the knowledge built through it can help in prevention (Bragagnollo et al., 2018).

Health Education aims at the prevention of illnesses, seeking to impact the change of behavior through the stimulation of a critical conscience. In this sense, it seeks that the individual himself guarantees the maintenance, acquisition and promotion of his health. It should be planned as a process capable of impacting on people the critical awareness of the real causes of their problems and, at the same time, create a readiness to act towards change (Gomes et al., 2016).

In this way, health education, besides being a low-cost strategy, is still able to achieve significant and lasting results in intestinal parasitosis control. Studies confirm that educational practices are as effective as basic sanitation, and even superior to long-term mass treatment, with educational action being a recommended type of intervention in both high and low endemic populations(Toscani et al., 2007).

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The school constitutes a privileged space for social interactions, presenting beliefs and cultural values characteristic of its environment. In order to achieve that students are able to intervene in the maintenance and improvement of their health conditions and the community where they live (Sunardi & Yuliati, 2018)

In this sense, it is essential that students build the knowledge necessary to obtain such behaviours. Therefore, it is recognized the important role of the school in contributing to an effective health education, and it is suggested to continuously rethink the pedagogical practices adopted in order to better meet the needs of the subjects involved(Ribeiro & Messias, 2017).

In this way, it is emphasized that the role of the school has been increasingly important in the development of healthy habits. In this environment, it is necessary to have space for educators and students to discuss health issues, however, to achieve this, it is fundamental that educators have adequate training and knowledge. Thus, continuing education for teachers or improving the access of health professionals to the school environment would be an excellent strategy which would have a real impact on the problem addressed(Costa, Gomes, & Zancul, 2018).

In the context of the educational practices developed by academics, it is very important, because it awakens in the future health professionals the educating side, which is primordial for the action to promote the health of the community, since it is known that health education is a fundamental strategy to reduce the number of aggravations, hospitalizations, deaths, morbidities, mortality and high costs to the public system (Sardinha et al., 2019).

IV. FINAL CONSIDERATIONS

Thus, the child is a being in constant learning and must always be motivated to participate in the construction of this knowledge, with social institutions such as school and family working in an integrated manner and providing the appropriate tools for stimulation.

This experience gave the child the opportunity to participate in practical learning; experience activities within the classroom in relation to the topic addressed; seek to extend these habits beyond the school environment and evaluate learning through writing and drawing. The university and FHS facilitators were able to see that the problem seen from the community is more advantageous to work, because it reflects the real social need and generates a better response to society.

Thus, we suggest that the school approaches themes about the daily life of the student and strengthen the materialization through essays and drawings. In addition to encouraging debates on these topics among students, they will be part of the construction of this knowledge.

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Econometric analysis of school success: case of the Moroccan community in France

Rabia Hajila

National Institute of Archeoloy and Heritage Sciences, Rabat, Morocco
Email: hajila_rab@yahoo.fr

Abstract— *Among the debates that cross French society today, those affecting school, immigration and the integration of immigrants, rarely serene, they stay carriers of many received ideas. Economic, social and cultural integration, the sharing of common values and the transmission of knowledge are at the heart of the challenges of both school and immigration. Being more than a million foreign children to attend, it is today on the school that we count to strengthen the integration of young immigrants.*
Keywords— ***Immigration, Logit model, Moroccan community, School success.***

I. INTRODUCTION

France receives many immigrant workers who come to seek work on their soil that they have not been able to find in their native country, and which also make an important contribution to its economy. France, loyal to its tradition of hospitality and a policy of cooperation whose relations with the emigration nations are one of the important modalities, to develop a policy of welcoming migrant workers. This policy must help these foreigners and their families to better solve their life problems in France and to fit in as best as possible in the French community, for the good of all. The education of these migrant workers and their children is one of the main points of application of this reception policy, which the positive balance sheet can already be established, without failing to chart future directions, marking the next steps to be taken.

II. PROBLEMATIC OF THE STUDY

1. Objectives of the study

The aim of the study is to detect the determinants of school success and to verify the accuracy of several hypothesis concerning the school success of young Moroccan immigrants in France who are still pursuing their studies and in parallel those who abandoned, and thence know their relationship with their families, their friends, their comrades, their teachers and in a global context all the entourage of their place of social and school life in the French society.

Hence the interest of making a survey of these children in order to verify if the family environment, the school environment, the student's surrounding, his profile as well as his behavior have an influence on the school success of the Moroccan immigrant child in France.

From this problematic, follows a questionnaire for which we asked ourselves several questions: What are the factors that determine the school success of the children of Moroccan immigrants in France? What are the explanatory variables of the school success of young Moroccan immigrants within the French society?

2. Questionnaire development

After consulting a certain number of statistical documents (questionnaires, grids, interviews, group discussions, etc.), we have several themes related to our research. This allows us to phrase the contents of the questionnaire project and to collect a set of qualitative and quantitative sufficiently relevant variables. The latter was tested on some children of Moroccan immigrants who came to spend their holidays in Morocco. This pilot survey was used to restructure and focus in the choice of the final variables of the questionnaire.

This one is composed of several types of variables such as:

- Individual variables;
- Environment variables;
- Behavior variables;
- School variables;
- Performance variables.

This decomposition as a whole is not fixed, it does not reflect all the complexity of reality and is not unique. Moreover any other logical decomposition could be considered. The goal is to simplify the presentation to better understand the reality.

3. Choice of surveys

This survey concerned the children of Moroccan immigrants whose age varies from 13 to 22 years. It was conducted with:

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- Families with children in school or who have dropped out;
- Students continuing their studies;
- Students who have left school.

It should be noted that some families did not respond favorably to our expectations, as some institutions did not even want to read the content of the questionnaire.

4. Location of the survey

The department of Yvelines (Poissy, Les Mureaux, Chanteloup, Mantes-la-Jolie, Saint-Germain-en-Laye) as well as Trocadero and the suburbs of Paris have been selected for reasons of convenience and means.

Indeed, the Moroccan school population is more represented in these regions of high immigration, because of the existence of a very large number of companies that employ abundant foreign labor in addition to the headquarters of our embassy in France .

We wish to point out the support of the members of our family residing in Yvelines that has been of great help to us since no subsidy was granted to us for transport or stay during our multiple trips to France.

5. Survey field

We have been faced with some problems with some middle and high schools for direct contact with students in class and for a consultation of their school booklets. This reluctance is due to bad circumstances:

- Beginning of schooling.
- Period of bombings.

These obstacles did not prevent us from continuing and persevering to determine the field of our investigation. We visited the following places:

- High schools;
- Middle schools;
- Youth associations;
- Sociocultural center;
- Households of Moroccan immigrant families (home visits).

On this occasion, let us point out the reluctance of some managers of administrative establishments showing a clear racism, which did not allow us to access the classes of different middle and high schools for direct contact with students and a consultation of school booklets. This resulted in the narrowing of the field of our survey. With regard to the selected high schools:

- Saint Exupéry High school in Mantes la Jolie;
- Jean Rostand High school in Mantes la Jolie;
- Vaucanson Professionnal High school in Les Mureaux.

We would like to point out the support of our Embassy in Paris and our consulate in Pontoise, who helped us a lot to carry out this study, following their various interventions.

6. Sample size

600 copies of the questionnaire were distributed. Our desire was to get the largest number to have a comprehensive and representative sample and to be able to collate the results of the survey.

Unfortunately, only 56% were rejected and only 52% were reinstated as well as the size of our sample without increasing the wealth of their information.

We give below the number of questionnaires delivered and returned in each city.

City	Number of questionnaires	
	Distributed	Returned
Poissy	148	114
Les Mureaux	60	10
Mantes la Jolie	200	105
Achères	46	37
Chanteloup	10	9
S.G. en Laye	10	3
Trocadéro	70	44
Limay	20	0
Others	36	13
Total	**600**	**335**

7. Receipt of questionnaires

Of the 600 copies distributed, only 335 questionnaires were retrieved. As noted earlier, some students and school leaders have had uncivilized behavior sometimes even throwing us the questionnaire.

We are very pleased to report the positive support of our embassy in Paris and our consulate in Pontoise for their intervention with the Prefect of Yvelines in Versailles for an extension of the residence visa and the incentive to answer the questionnaires.

During the collection and taking advantage of the grouping of children at the exit of schools, or in front of the doors of their homes and in the socio-cultural centers, some questionnaires were completed thus allowing to enrich the research.

8. Data gathering

With regard to data collection, the survey took place during the period from 24/08/1995 to 11/11/1995. On the whole, all the objectives set were achieved despite the many difficulties encountered.

9. Data processing

The data processing took place in two steps:

9.1 Computer processing

It has been realized in several phases:

- Coding of variables;
- Consistency test between variables;

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- Making entry masks;
- Data entry;
- Clearance of files (consistency tests and code validity program);
- Tabulation program.

Data managing was performed on the statistical processing software **EXCEL**, **SPSS**, **STATA** and **LIMDEP**.

9.2 Results and statistical tests

The results of the exploitation allowed us to reach the following series:

- The marginalized;
- Two-dimensional cross-tabulations;
- The ratios;
- Statistical tests: Fisher, Student et Khi²;
- Correlation tests;
- Logit models.

All these results have been analyzed and interpreted. In terms of content analysis for qualitative questions, we elaborate summary sheets to identify key ideas for each theme.

III. INDENTATIONS PRESENTATION OF THE RETAINED ANALYSIS

In this section, we present the rankings of variables and data processing methods implemented in the following sections.

1. The ranking of variables

The data extracted from the questionnaires have been grouped into five homogeneous sets which are as follows:

- The individual variables,
- The family variables,
- The environment variables,
- The behavior variables,
- The school variables.

This decomposition as a whole is not fixed, it does not reflect all the complexity of reality and is not unique. Moreover any other logical decomposition could be considered. The goal is to simplify the presentation to better understand the reality.

2. The methods used in statistical processing

The approach consists of using the data collected on young immigrants to identify the most significant econometric models (from the statistical, economic, social and other points of view). The search for the most relevant models requires the elimination of colinear variables. Thus, among two collinear variables, the one that is the least correlated with the variable to explain, namely the school success of the children of Moroccan immigrants in France, is discarded.

On the other hand, analyzes are occasionally completed and explained by the crossing of the rival variables within double-entry tables.

Finally, note that the interpretation of the results found is done by reference to:

- To the results of the various statistical treatments performed on the data of our sample,
- The theoretical contributions cited in the bibliography that preceded the development of this work,
- The results of empirical work carried out by some researchers and organizations specialized in the field.

IV. THE DETERMINANTS OF THE SCHOOL SUCCESS OF CHILDREN OF MOROCCAN IMMIGRANTS IN FRANCE

This section focuses on the determinants underlying the school success of children of Moroccan immigrants in France. Among the factors selected and analyzed, we can identify personal characteristics of the student, his family environment, his environment, his behavior, a set of school variables, as well as previous school performance (CM_2, 6th, second year, the baccalaureate). These will allow us to define the variable to explain: school success.

1. General presentation of the different cohorts taken in the analysis and definition of the model

In many cases the specification of a linear model is incorrect. One of these cases is where the predicted variable is dichotomous, or polytomic.

The use of the linear probabilistic model is possible, but it implies an estimation which leads to predicted values outside the interval [0,1] that are non acceptable values. Therefore, the limits imposed on the binary variable - for example, 0 and 1 - are ignored if the standard least-squares multiple regression model is used.

Although there are several possibilities to overcome this difficulty in the linear probabilistic model, it seems preferable to look for models for which the predictions conform to the appropriate interval. Thus, the problem can be reformulated so that predictions are no longer a binary variable, but rather a continuous variable that naturally remains in the range [0,1]. In this respect, the model used is the Logit model. This will measure the effect of each explanatory variable on the variable to explain, that is to say the influence of the variable after elimination of structural effects.

This is a dichotomous univariate Logit model. The observed variable for each student is school success (yi = 1 if the student's average is greater than or equal to 10 and yi = 0 otherwise).

The probability of school success was chosen logistically:

$$\mathbf{P}(y_i = 1) = \frac{1}{1 + e^{-xi\,h}}$$

Among the plethora of explanatory variables available,

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we can group in five categories the variables that we selected in our effort to determine the school success of children of Moroccan immigrants in France.

The first includes personal characteristics: sex, age of student, school starting age, age of arrival in France.

The second group includes family variables: the rank of the student, the age of the father, the age of the mother, the number of brothers, the number of sisters.

We also have a rich set of variables that describe the student's environment: the type of housing, the type of life of the student, the language spoken within the family, the educational level of the parents, the educational level of the brothers and sisters, the socio-professional category, the requirement of the parents, the family problems, etc.

The fourth category of variables is used to describe student behavior: cigarette, alcohol, and drug use, non-study activity, part-time work, lunch location, relationship with boys, relationship with girls, location where the student is comfortable, watching television, interesting shows, etc.

Finally, we have the school variables: type of institution attended, private lessons, grade repition, thinking about dropping out of school, satisfaction of the guidance, help with school work, more difficult time during the examination period, activity the day before the exam, problems with the teachers, absence of the student, etc.

2. Econometric models and equations

It is therefore a question of explaining the school success (RS) in the baccalaureate, in the second, in the 6th and in the CM_2. Due to the dichotomous nature of the dependent variables, the equation to be estimated becomes for the student i:

$$\mathbf{RS = \alpha_0 + \alpha_1 X_{1i} + \alpha_2 X_{2i} + \alpha_3 X_{3i} + \alpha_4 X_{4i} + \alpha_5 X_{5i} + \mu_i}$$

Wherein

$$\mathbf{RS} \begin{cases} = 1 & \text{if the average is} \geq 10 \\ = 0 & \text{if the average is} < 10 \end{cases}$$

Thus, we can write the equations of the Logit model for the four cohorts as follows:

RS bac $= \alpha_0 + \alpha_1 X_{1i} + \alpha_2 X_{2i} + \alpha_3 X_{3i} + \alpha_4 X_{4i} + \alpha_5 X_{5i} + \mu_i$

RS sec $= b_0 + b_1 X_{1i} + b_2 X_{2i} + b_3 X_{3i} + b_4 X_{4i} + b_5 X_{5i} + \mu_i$

RS $6^{ème} = c_0 + c_1 X_{1i} + c_2 X_{2i} + c_3 X_{3i} + c_4 X_{4i} + c_5 X_{5i} + \mu_i$

RS $CM_2 = d_0 + d_1 X_{1i} + d_2 X_{2i} + d_3 X_{3i} + d_4 X_{4i} + d_5 X_{5i} + \mu_i$

and

x_{1i} is the set of personal variables,

x_{2i} is the set of family variables,

x_{3i} is the set of environment variables,

x_{4i} is the set of behavior variables,

x_{5i} is the set of school variables.

μ_i is the element of the random error vector whose probability distribution follows a logistic form.

The results are overall satisfactory. The coefficients of the variables are in the majority of cases significant at the usual levels of confidence and their sign does not contravene reality.

The numerical values of the coefficients have no direct interpretation; however, their sign and the fact that they are significant or not are interpretable. The sign makes it possible to know if the probability of success is an increasing or decreasing function of the corresponding explanatory variable.

The non-significance of certain coefficients makes it possible to identify variables that have little explanation for school success or failure.

V. ANALYSIS AND RESULTS OF ECONOMETRIC MODELS

1. Impact of individual variables

Several authors, including those belonging to the School of Differential Psychology, claim that certain individual characteristics such as gender, age, rank and many others are determinants of the student's personality and school performance.

The individual variables studied for influence on academic success, through statistical and econometric treatments, are as follows:

- The sex,
- The age,
- School starting age,
- Arrival age to France.

The majority of researchers say that sex does not influence (or little) school performance (LIVINGSTON 1968, THOMAS 1954). A minority believed on the basis of differential psychology, male superiority in digital proofs and mechanical skill and female superiority in performing tasks, involving memory and verbal data handling (VERON 1952).

MONTMARQUETTE (1989), based on an empirical study, infirm, albeit partially, the hypotheses of differential psychology relating to differences in performance according to sex, in one area or another.

In this study, the parameters of the equation of determinants of school success for each cohort show that it is explained by several variables. Indeed, sex has a negative influence on school success, but it is only significant in the 6^{th} grade with female predominance (on average 53%).

School success is a growing function of age, all things being equal, an increase in the age of one year increases the probability of success. Age is apparent throughout the school curriculum except in the 6th where it is not significant

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and has a negative effect on school success in CM_2, because for this cohort, the older the student, the worse his results are and the motivation for the studies.

At this level, we can say that the results of this analysis are in the same direction of those of several researches (DANDEKAR (1955), MONTMARQUETTE (1989)). GHARIB (1991), based on a survey found that students with school delay were older than their comrades who had the best school performance.

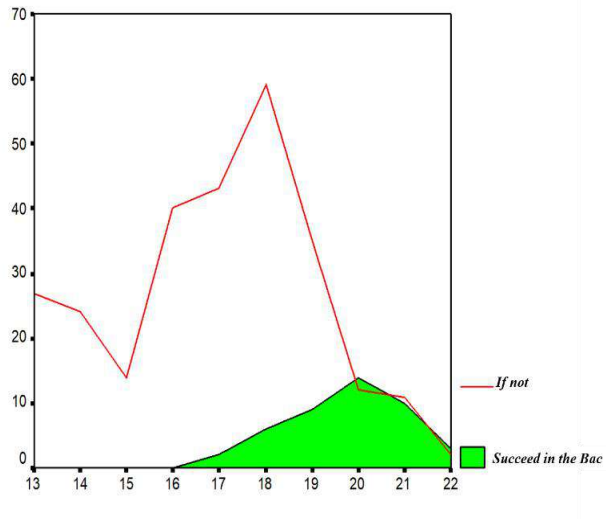

Fig. 1: Graph representing the discriminatory threshold of students in the baccalaureate

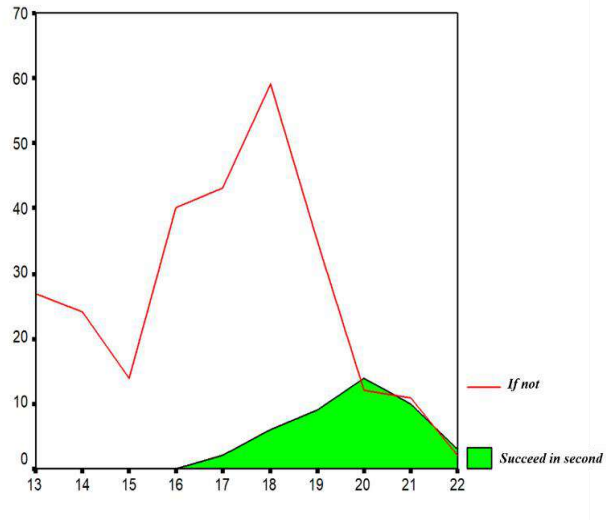

Fig. 2: Graph representing the discriminatory threshold of students in 6th

The negative sign and the value of the age squared variable imply that the probability of succeeding in the baccalaureate is up to 20 years, to pass in second rises to 18 years. In contrast, in 6th it is not significant despite the negative sign of the coefficient. The graphical representations show us the threshold of discrimination among students in the baccalaureate and second.

School success is a decreasing function of arrival age in France. In other words, the more the student arrives in France at a late age, the more these school performances deteriorate. This result is apparent at all levels from CM_2 to the baccalaureate, but not significant.

We can raise almost the same results for the age of entry to school. This explanatory variable has a negative but irrelevant impact on school success, except in the 6th where the effect is positive. However, the early entry to school means a highly likely entry to a private school, since public schools in France only accept children aged 6 years.

The influence of the variable "age of entry to school" is very controversial in the field of psychopedagogy. Thus, some authors deduce from their studies that adolescents with poor school performance, sometimes leading to school drop-out, have mainly delayed their entry into school (BOWMAN, MATTHEWS, 1960). Others state that age of entry has no effect on school performance (LIVINGSTON, 1968).

2. Impact of family variables

The family environment appears as a powerful determinant of school success. The age of the father and the age of the mother are sometimes positive fonctio, sometimes negative, depending on the level of the student. Indeed, the age of the parents has a positive impact at the level of the second and, positive and significant at the level of the 6th. At the level of CM_2, only the age variable of the mother is significant but negatively, on the other hand at the baccalaureate the age of the parents is decreasing function of the school success but it is significant only for the father (age of the father higher than 54 years old).

This effect can be explained by the fact that whenever the father and / or the mother are old enough, the probability that they will not be educated is great. Indeed, the average age of mothers with no education is higher than that of mothers with higher education levels: 44 for the first and 40 for the second. On the other hand, even when parents are educated, their school curriculum differs from that of their children because of the different changes that have affected the school system.

As at the macroeconomic level, at the family level the financial resources are not unlimited. In general, each time the number of siblings increases, the share of space, financial resources and time allocated by parents to children is reduced. Several researches have revealed that when the number of the brothers and sisters becomes high, the possibility of the school failures is greater (DILLON 1969, MILLER 1963, LIDDLE 1962).

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Our results show that the number of siblings only significantly affects school success at the level of CM_2. In contrast, in the baccalaureate this variable acts negatively and weakly on school performance. While in second only the number of sisters has a negative influence without being significant on the school success. At the 6th level, siblings are a growing function of school success.

We can add that when we move from a mother without a level of education to a mother of a university level, the average number of children goes from 4,8 to 3,2. The same results were found for the analysis of the relationship between the number of children and the father's level of education.

Psychologists say that sometimes peer education is more effective than that of parents. The cause comes from the approximation of age and cognitive, emotional and psychomotor development.

The translation at the level of the family help makes it possible to affirm that it is more relevant by the brothers and sisters than by the parents. The exchange of knowledge of the student with that of his brothers and sisters, of a higher level of education increases the probability of school success.

3. Impact of environmental variables

Academic success is also a function of a set of environment variables. The type of life is significantly positive only in 6th and 5th grade. Indeed, a sixth grade student can succeed even if he only lives with his family members, however a pupil in CM_2 must be with his parents to succeed. The type of life has a weakly negative influence on school success in the baccalaureate which can be explained by living alone, the student is away from the authority of parents and their support.

The language spoken within the family is only significant in the second grade and in the CM_2 with a negative sign at the CM_2 and 6th levels. So the language spoken within the family other than the French language has a negative effect on school success, except for the baccalaureate. The language spoken within the family remains for the majority of Moroccan immigrants the language of origin with its different dialects. Indeed, there is no student from a disadvantaged family speaking French as a family.

The existence of a school language different from the language spoken as a family may be one of the causes of grade repetition and school drop-out (DEBLE, 1980).

Research carried out in Thailand, Iran, and Canada has shown that school failure, leading to grade repetition or dropping out, are more likely among children whose parents spoke a language different from that used in teaching (UNESCO, 1967, MONTMARQUETTE, 1989). Linguistic poverty, which is identified as a factor in school failure, is linked to the disadvantaged social category (AHRACHOU, 1991).

The parents' requirement is negatively linked with the dependent variable, at the baccalaureate, the second and the sixth level without being significant.

The emotional climate of the family environment can undermine performance and special education. In principle, a united family gives the child more security and influences positively school success. The separation of the parents, which can be due to several causes (death, divorce, separation ...), acts in the negative sense, not only on the school performance, but also weakens the "me" and makes appear the feeling of insecurity.

Based on the above, it's more logical to believe that living in a single-parent family is at a disadvantage in terms of school performance. MONTMARQUETTE confirms this observation through three ideas:

• Lone parent has less time to care for children since he/ she is solely responsible for all family responsibilities;

• Some children experience psychological problems as a result of their parents separation;

• The resources are lower because the income of lone-parent families is on the whole rather low.

These negative effects of the disunited family are also valid for the Moroccan education system. The confirmation comes from the results of GHARIB (1991).

Our econometric results show that the family stability illustrated by the variable parents together has an impact, negative in second and negatively significant in sixth, on the school success. A stable and united family can therefore have a positive influence on school performance.

Note that the roles of the father and mother are complementary in the education and emotional support of children. It is not only the physical separation that reduces the chances of school success, but also the emotional separation and the conflicts that result from it.

Based on the statistical results, we note that absences increase each time the parents are separated. Separation can indeed have several causes:

- Death: 35,7%.
- Divorce: 32,1%.
- Abandonment: 25%.
- Other reasons: 7,2%.

Absences in annual averages are, for each aforementioned cause:

- Family separated by death: 4,8 days.
- Family seperated by divorce: 4,6 days.
- Family seperated by the abandonment: 3,1 days.
- Family seperated by other reasons: 19,5 days.

Note that the average absence is 9 days.

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Different family problems can also have a negative impact on school success. It manifests itself at the level of the bachelor's degree with a critical probability that tends to zero.

The change of place of residence is significant starting with the CM_2, but with different effects. School results of the pupils in the 5th grade are positively influenced, but the effect becomes negative for the students in the 6th, the second and the baccalaureate.

According to BENNACER (1991), the student's school grades are generally in line with the expectations of his parents and his aspirations for the pursuit of higher education. The school mark varies according to the student's degree of commitment, which can be high or low depending on the socio-economic level. The first level benefits more favored and middle-class families, non-repeaters and those with high aspirations for future studies.

For the adolescent who is very sensitive to the expectations of others, the level of his aspirations reinforced by the perceptions of his parents, introduces into the structure of his personality the need to avoid inferiority. The latter is often transformed into a need to succeed.

According to the results found, the fact that parents think about the success of their children has a meaning and a positive impact on school success throughout their course. In other words, the more parents think that their children will succeed the more successful they are.

Several researchers stress the importance of the impact of the socioprofessional category (C.S.P) on school success (UNESCO (1967), BIENSTOCK (1968), SYNDERS (1976), KAZYNSKA (1934)). The C.S.P is an excellent measure of the socio-economic level. The poverty of family resources requires the help of children. The consequence is a reduction of the time that the student devotes to his studies. In the same way the conditions of revision of the lessons and resolution of the exercises can be at the origin of the school failures. Indeed, the disposition of an isolated room and the possibility of accessing a library facilitates the acquisition of human capital (TIOURIRINE (1990), MONTMARQUETTE (1989)). CHEDATI (1990) establishes a statistical table from which it can be deduced that the school success rate decreases when one moves from one CPS to another: it is 50% for the civil servants compared to 25% for the unemployed.

The C.S.P is a composite variable, it combines several elements. To understand it, we retained the social category to which the student belongs, the type of housing and the place of residence. The type of housing is strongly related to the social category. It is even one of its main elements.

Finally, the results found show the expected importance of the role of the social category, as defined here, in determining the educational success of students with an immigrant background. In fact, the average socio-professional category of cohorts belonging to the baccalaureate is significant and is positively correlated with school success. While for those belonging to the second, it is the socioprofessional category favored that is significant but negatively correlated with academic success. In addition, this variable is linked to other variable such as the absence of the student. In fact, students from disadvantaged social class families are absent more than their comrades from other social categories (middle and favored): 87,5% compared to 75,5% and 74,5%.

On average, the annual absences of pupils from the three social categories can be seen from the following result:

- Underprivileged class: 20 days.
- Favored class: 9 days.
- Middle class: 8 days.

The number of missed days is, therefore, on average higher for students from families with lower socio-economic status than among other students.

The journey from home to high school (in minutes) and the means of transport are significant only at the level of the baccalaureate and the second. In fact, the more the pupil goes from level to level, the more the path changes and so he can use a means of transport.

THOMAS (1954) concludes in an empirical study that there is no significant relationship between school dropout rage and the distance between home and school. The effect of distance, when long, is attenuated by the availability of private means of transport.

In the absence of these means, the student of a disadvantaged social category must sometimes travel a long distance several times a day. The student in these conditions and especially when his health does not allow him to spend enough physical energy, arrives exhausted at school.

Concentration would not be fully ensured upon arrival in the classroom. As a result, the understanding of certain notions escapes him. Students who have their own means of transportation invest the time and the physical energy saved in other school or out-of-school activities.

The award of the scholarship has a positive impact on school success, but is significant only at the baccalaureate and the second level.

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4. Impact of behavioral variables

Certain behaviors such as cigarette, drug and/or alcohol use can have a negative impact on school performance, especially at the age of adolescence that characterizes high school students, who are the focus of this study.

As a teenager, the student often smokes in groups. This behavior often causes absences and delays to join the group of smokers, to which he belongs. This last attitude generates a break in the constitution of the student's knowledge resulting from the logical acquisition of notions.

According to our results, cigarette consumption has a negative impact on the school success of students in CM_2, in second and in the baccalaureate being significant at the last level. On the other hand, the drug consumption is very significant at the level of the CM_2, the 6th and the second and acts negatively on the academic success in the bachelor's degree.

The use of drugs and/or alcohol requires the student to waste more time and money. Moreover, the looking for money necessary for the acquisition of drugs and alcohol becomes a major concern of the student. When these consumptions become permanent, they cause a loss of concentration hindering the normal acquisition of knowledge. Drug and/or alcohol use is largely correlated with the cigarette consumption variable (40%). School results are related to this last variable which negatively influences it. The consumption of cigarettes, drugs and/or alcohol is linked to certain other school or environmental variables. Indeed, 3,8% of smokers do not live with their parents. 89% of them do not receive private lessons and 91,7% are not always helped by their families to do their school work. 47,8% do not feel comfortable in class, while 69,8% of student smokers feel comfortable with friends and 40% have problems with their teachers.

The consumption of these products is also linked to the absence variable. As a matter of fact, at the age of adolescence the student smokes most of the time in group, he must then often absent himself to satisfy his desire. The average number of missed days is:

- 08 days for non-consumers;
- 12 days for cigarette consumers;
- 25 days for alcohol consumers;
- 28 days for drug consumers;
- 32 days for the three products consumers.

Television is a decreasing function of school success from The CM_2 to the second with a great significance at the CM_2 level. However, this result changes when the students watch television with their parents and the influence then becomes positive from the CM_2 until the second and very significant at the CM_2 level. So the existence of parents while the children are watching television is a determining factor of school success.

5. Impact of school variables

Finally, it remains to analyze the influence of school variables on school success. This includes the most difficult time in the period of exams and the activity the day before exams. The majority of education researchers agree on a negative influence of fear on academic performance.

Fear and anxiety destabilize the student during exams. LEGAL (1980) cites stress as a functional factor that negatively influences school outcomes. Other researchers find that fear and stress affect school engagement and consequently school performance (BENNACER (1991)).

The results of the model show that resting or having fun the day before the exam has a negative effect on school success. In other words, the fact of not revising the day before the exam acts negatively especially at the level of the CM_2 and the baccalaureate.

As for the relationship between the socio-professional category and the institution attended, the private establishments are composed only of pupils from higher and middle social classes. On the other hand, there is no pupil enrolled in private education and coming from a disadvantaged social category.

The membership in a private institution most often reflects a membership in a family of a high socio-economic and socio-cultural level, most often adopting the French language - exclusively or in combination with other languages - as language of communication within the family.

This last situation has a considerable effect on a sustained learning of the French language and the mastery of the different subjects taught at school especially for pupils who are not born in France.

Some authors speak of a positive relationship between the student's ambitions and his academic achievements (P.MALRIEU, 1976).

We can say that when the student believes in his academic success, he often invests the majority of his time in revising his lessons. This when presenting the principal activity of the student, can positively influence his school result. All the aforementioned variables and school performance allow the student to position himself with regard to the option. This attitude of the student, measured by the satisfaction of the orientation, has a positive influence on the school results.

The usefulness of training in the accumulation of cognitive knowledge and the increase of chances for a future job, can generate a satisfaction of the orientation.

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Our results show that the more the student is not satisfied with his orientation, the more his school performance deteriorates. This result is pertinently evident in the baccalaureate, the 6th and the CM_2.

Problems with teachers can also influence student success. Indeed, this explanatory variable is significant at the level of the baccalaureate, the second and the CM_2 and acts negatively at the level of the 6th and the CM_2.

It is quite possible that when the student establishes bad relations with his teachers and his classmates the school is no longer for him a favorable learning environment.

GHARIB (1991) found a relation that he called "negative" between students with poor results and their teachers. The author adds that the best students are the ones who tend the most to establish "positive" relationships with their classmates. The student who has a school delay is often underestimated by his teachers and comrades; in the majority of cases he seeks his comrades outside the school.

VI. DISTRIBUTIONS OF PREDICTED AND OBSERVED VALUES OF SCHOOL SUCCESS

Finally, the evaluation of the distributions of the predicted and observed values of school success for the entire sample has proven to be relevant. The tables below show the different results obtained.

	Total	0	1
Total	311	280	31
0	267	260	7
1	44	20	24

Table. 1: Distribution of predicted and observed values of school success

The model correctly identifies 24 out of 44 students who passed their baccalaureate and 260 of the 267 youngsters who have not yet reached the baccalaureate's level and/or who have not passed their baccalaureate.

	Total	0	1
Total	311	118	193
0	139	102	37
1	172	16	156

Table. 2: Distribution of predicted and observed values of school success in second

The model correctly identifies 156 among 172 students who have succeeded in the second and 102 of 139 youth who have not yet reached the second and/or who have failed.

	Total	0	1
Total	311	18	293
0	42	13	29
1	269	5	264

Table. 3: Distribution of predicted and observed values of school success in the 6th grade

The model correctly identifies 264 among 269 students who have succeeded in the 6th and 13 out of 42 who have not yet reached the 6th grade and/or who have failed.

	Total	0	1
Total	311	10	301
0	13	8	5
1	298	2	296

Table. 4: Distribution of predicted and observed values of school success in CM_2

The model correctly identifies 296 out of 298 students who have succeeded in the CM_2 and 8 out of 13 who did not succeed.

Thus, our results are more successful in specifying the impact of certain determinants than in accurately predicting the behavior of young people.

VII. CONCLUSION

School success can be explained in a general way on the basis of objective elements that constitute the mode of socialization of young people: the family history, its trajectory, its way of life, its system of aspirations that determine its attitude towards school and social advancement.

It is important to note that success is not the privilege of a child or two in the family. It often concerns several siblings when it is not the whole asembly.

Throughout this study, we have tried to explain the determinants of school success of Moroccan immigrant students in France in the baccalaureate, the second, the sixth and in the CM_2.

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The results corroborate the role of several variables already observed in similar studies carried out on school success with, however, some exceptions.

The results point out that the role of the family is complex, but that the personal variables, behavioral characteristics and variables of the school environment play a role that is traditionally found in several other studies.

Thus, we have highlighted how the family, the environment and the school play a key role in the schooling progress of the child.

The stability of the couple, of the residence, the regularity of life, the parents French proficiency, constitute favorable elements.

The results obtained thus make it possible to better understand the French school system and the role of the social, family and school environment on the school success of Moroccan immigrant students in France.

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Block.ino: Remote Lab for Programming Teaching and Learning

Juarez Bento da Silva[1], Graceline de Oliveira[2], Isabela Nardi da Silva[3], Paulo Manoel Mafra[4], Simone Meister Sommer Bilessimo[5]

[1,2,4] Post-Graduate Program in ICT, Federal University of Santa Catarina, Brazil
Email: juarez.b.silva@ieee.org; graceedeoliveira@gmail.com; paulo@mafra.eti.br; simone.bilessimo@ufsc.br
[2] Robotics Instructor in Social Service of Industry – SESI, Brazil
Email: isabela.nardi@hotmail.com

Abstract *— This article introduced the remote lab Block.Ino to support the teaching and learning of computer programming. In a remote lab user work with equipment or devices and observe activities through a web camera. The validation was performed in order to understand the acceptance of the services and resources available. It was performed in two scenarios where Block.Ino was employed to perform practical online activities. Questionnaires were applied that sought the perception of the respondents about their experience using the remote laboratory. The questionnaires included items related to usability, learning perception, usefulness and satisfaction, by the two focus groups of the research (presential higher education and basic education). 144 students participated in the research (103 high school and 41 higher education). The average scores for the 24 items, arranged on a Likert scale of 5 (-2 to 2) points, were 1.58 for high school and 1.43 for higher education. The results showed that Block.Ino can bring benefits to practical activities in introductory computer programming disciplines, especially outside the classroom environment, by taking advantage of existing connectivity, and by using mobile devices to perform practical activities.*

Keywords *— **Teaching and learning, Programming teaching, Remote laboratory, Block.ino.***

I. INTRODUCTION

The remote laboratories (LR) provide resources to perform didactic practices that in the various fields of knowledge. In a remote lab user are able to work with equipment and devices and observe activities through a webcam, mobile device or microcomputer. The act of accessing resources from a remote laboratory to perform a practical activity may be called experimentation. According to Carnegie Mellon University (2000), running experiments from a remote location is called remote experimentation. This experimentation allows the user to interact with the real world through electronic control and monitoring and control systems accessed by computer devices.

The remote lab helps students gain information from the Internet by searching for it directly in the physical world and allows them to access resources that institutions sometimes lack, and remote labs are a financially useful tool as they that can be shared with various educational institutions and enable a large number of users to access them. [1]. Remote labs can make learning more flexible about the student's time, place, and pace, and practice can be tailored to schedule and promote self-learning. [2]. Figure 01 illustrates the process of operating a remote laboratory.

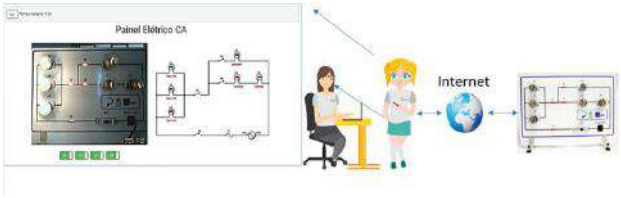

Fig. 01: Example of access to the remote experiment. Source: Authors.

Figure 01- Example of access to the remote experiment. Source: Authors.

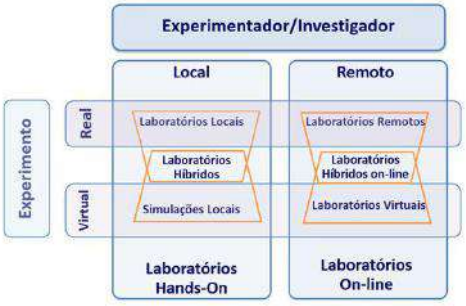

Fig. 02: Online labs.
Source: Zutin, Auer, Maier & Niederstätter, 2010.

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According to the authors, online laboratories can be grouped according to three types, as illustrated in Figure 02 and thus described. Online labs include simulations (virtual labs) where you can reproduce any kind of experiment without restrictions and real experiments (remote labs), whose interaction is mediated by ICT, where the student can manipulate real materials and equipment in a different location than which is found [3]. In an online laboratory, research parameters can be manipulated and the effects of this manipulation are observed to obtain information about the relationship between variables in the conceptual model underlying the online laboratory [4]. According to Zutin *et al.* (2010), Figure 02, online labs can be divided into two main groups: "Virtual Labs" which are web-based software simulations and "Remote Labs", which consist of real hardware equipment, or that is, it is a real experiment, located in a different space from the student, and the contact between them is mediated by an ICT. The intersection of the two types creates the concept of "hybrid lab".

Although a relatively new subject in terms of educational research, remote labs are not a very recent feature. The Second Best to Being There (SBBT) at the University of Oregon State and commissioned in 1995 is recognized as the world's first remote laboratory. The SBBT aimed to enable students to remotely control a robotic arm. The technological resource was used in the Control Engineering discipline [6]. In 1997 the UFSC Remote Experimentation Laboratory (RExLab) presented the project of the same name, which allowed the user to run a program for the 8051 microcontroller developed in the Laboratory. It was a laboratory to complement the teaching of microcontrollers where the student studying the 8051 microcontroller. This is considered to be RExLab's first remote lab and was cited and used as an example in Myke Predko's Programming and Customizing the 8051 Microcontroller [7].

In recent decades, many educational institutions have been researching new ways to adapt traditional teaching methods to the modern habits of society. In this context, remote laboratories present themselves as a fully aligned resource, but still little explored in the area of education. The following are some advantages indicated by some authors for their use by educational institutions:

In terms of use, its application can reach all levels of school, ie from basic education, technical education and higher education. Thus, we could, for example, to support the courses, in the distance learning mode, the LR can bring improvements in products, processes and creation of new service, for example, provide laboratory practices via the Internet. Data collected in the e-MEC System (http://emec.mec.gov.br/) [8], on 21/08/2019, showed the existence of 389, in the areas of engineering and computing, totaling 680,260. For these courses, LRs can contribute to answering questions about the impossibility of addressing certain subjects in an e-learning modality, as they provide Internet access and overcome spatiotemporal barriers for people and resources.

In higher education laboratory resources, in many institutions there is insufficient resources, given the requirements of classes conducted in a laboratory environment (number of students per class, amount of equipment, etc.). This presents the need to overcome the challenge of providing educational environments that provide more access to practical activities. LRs contribute to meet this challenge through a new approach and tools for practical activities. And present itself as an important support tool for classroom teaching, assisting teachers in their practices.

In basic education, experimental activities help inspire teens and young people to practice science, technology, engineering, and math, as well as provide tools for teachers to make their classes more attractive and aligned with the real world. It is not difficult to realize that many young people find the virtual world more exciting than the school environment they attend, because they perceive it far from the world in which they "live". There is a need to have more attractive teaching and learning environments and not considering this, may imply the demotivation and disinterest of students. Perception, which weakens training, especially in the STEM areas. For example, basic theories and mathematical models of natural phenomena are presented in a "traditional" way (concepts presented in oral sessions), and the complementation of this formation should take place through the use of physical experiments conducted in instructional laboratories. However, the availability of laboratory equipment is poor or non-existent in many elementary schools. According to the 2018 Census of Basic Education, in Brazil, in relation to public schools of basic education: 38% have computer labs, 54% have broadband internet, 8% have science labs and average computers for student use. per school is 6.73.

II. THE REMOTE LABORATORY BLOCK.INO

The LR Block.ino, object of study of this research, aims, according to Carlos, Lima, Simão & Silva (2016), offer an experimentation environment directed to the creation and execution of programming codes with the possibility of access and manipulation of real devices, as well as to verify their operation and performance in real time by streaming video. Its application is directed to

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teaching programming logic in computer programming and robotics through the use of mobile devices, using visual programming environment, using blocks to control a remote Arduino platform. LR Block.Ino is a framework for developing and running programs on an Arduino board that can control sensors and actuators via remote access via the Internet. Its applicability, in the educational scenario, can occur in all levels: Basic, Technological and Higher Education.

Regarding Basic Education, many educators see coding as a way to stimulate computational thinking: the required ability to learn to code combines in-depth knowledge of computer science with creativity and problem solving. Additionally, the arrival of user-friendly tools including Arduino, Raspberry PI, Scratch and LegoNXT are making it easier than ever for students to get started on coding learning [10].

In higher education, the subjects of introduction to programming, there are several denominations, for example: Introduction to Computer Science, Introduction to Computer Programming, Programming Logic, Algorithms, among others, are present in the curriculum of several courses, in the various areas, not just the exact ones.

However, students, especially freshmen, find it very difficult to understand these concepts, leading to failures or locking in the discipline and even dropping out of the course. That is, it is one of the existing bottlenecks, especially in the exact area courses, making it difficult for students to continue in the course [11].

For the two scenarios addressed, the commonality is the need for more attractive teaching and learning environments. It is essential to extend this technological perspective not only to the classroom, but also to the school, and to enable thinking as a process of action (doing) and the creation of knowledge (knowing). Favorable context for the use of LR [12].

In this context, LR Block.ino is presented, for conducting computer programming experiments, seeking to appropriate existing connectivity and offering students of different educational levels, resources for learning.

Access to LR Block.ino, as shown in Figure 03, is from the Remote Labs Learning Environment or simply RELLE [http://relle.ufsc.br], where others are available. RExLab and Partner LR. LR Block.ino is currently available in four languages: (1) Portuguese; (2) English; (3) Spanish and (4) French.

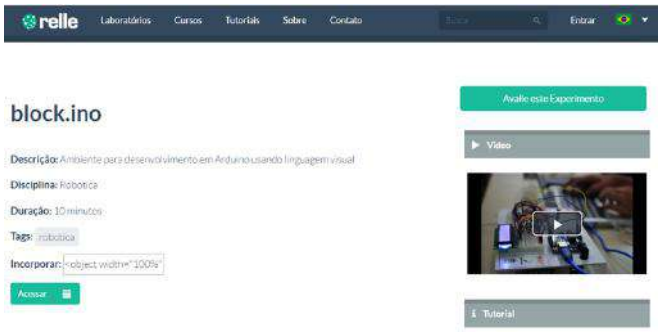

Fig. 03: LR Block.ino access page.
Source: Authors

Figure 03 - LR Block.ino access page. Source: Authors

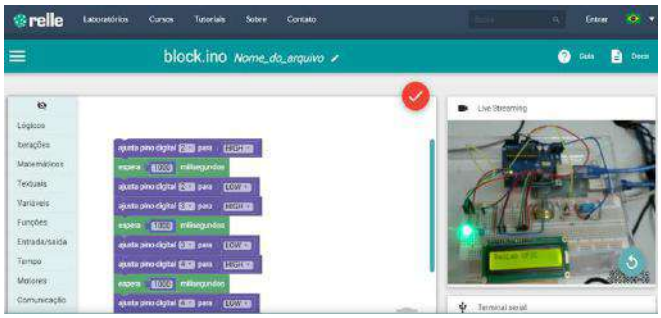

Fig. 04: LR Block.ino access page.
Source: Authors

LR Block.Ino was implemented from a client-server architecture and its development process was divided into three steps. As shown in Table 1, in more detail [9].

Table 1 - Steps of Block.ino development.

Steps	Processes
Arduino Remote Lab	Arduino Uno board, sensors, actuators connected to protoboard. An acrylic case accommodates the components. Raspberry PI connected to Arduino card via USB.
Client Application	Use of web technologies; Responsive Designer. Blockly library in charge of the creation of blocks.
Lab Server Application Development	Remote Lab is a standalone resource connected to the internet. Operation based on an application programming interface (API). Using Raspberry PI to process the application. Node.js is processed and triggers the API. WebSocket protocol is used to transport data exchanged between client and server.

Source: (Carlos et al., 2016).

Since access to the LR can only be performed by one user at a time, given that there is a queue that must be respected. To minimize the problem with the queue, LR replication process was used and thus provide access to

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multiple Block.ino instances. Thus contributing to a greater number of users could simultaneously access different instances for didactic practices in the Arduino development environment [13].

III. MATERIALS AND METHODS

The validation of the LR, with an evaluative and observational profile, contemplated two scenarios: high school and computer course in higher education. The instrument applied was a questionnaire that sought the perception of respondents about the experience and use of remote laboratories. The questionnaire was constructed from the instruments developed by Professor Euan David Lindsay of Curtin University in Australia [14], and another by professors Sergio López, Antonio Carpeño and Jesús Arriaga of the Universidad Politécnica de Madrid [15].

The adapted questionnaire included items 24 related to usability, learning perception, usefulness and satisfaction by the two focus groups of the research. The 24 items, composed of objective questions, were distributed in the domains: usability (6), learning perception (6), utility (6) and satisfaction (6).

The items of the questionnaires were arranged in a Likert-type scale of five, consisting of items in the form of statements, on which the degree of satisfaction should be displayed, see Table 2. In this context, the number of students (frequency) was considered. which ticked all the alternatives to perform the percentage calculation [16].

Table 2: Scale of numerical values with defined scores.

Strongly Disagree (SD)	Disagree (D)	Neither agree nor disagree (NO)	Agree (A)	Strongly agree (SA)
-2	-1	0	1	2

Source: Authors

For purposes of data analysis, it was decided to perform and establish the average score for the answers of each item, obtained in the questionnaire based on the Likert scale used in this research. To estimate the reliability of the questionnaires applied in the research, Cronbach's alpha coefficient was used.

This coefficient was presented by Lee J. Cronbach in 1951. Table 03 presents the acceptable values, by range, for internal consistency verification [17].

Regarding alpha values, they vary between 0 and 1.0, and the closer to 1.0, the greater the internal consistency of the analyzed items [18].

Table 03: Internal consistency of the questionnaire according to alpha value

Alpha coefficient value	Internal Consistency
0,81 – 1,00	Almost perfect
0,61 - 0,80	Substantial
0,41 – 0,60	Moderate
0,21 – 0,40	Median
0,00 - 0,20	Insignificant
< 0,00	No agreement

Regarding high school, the study was conducted in three public schools, two in the municipality of Araranguá / SC and one in Balneário Arroio do Silva/SC. Since none of the schools offer computer programming as a curricular discipline, the resources were applied in semi-presential workshops (30 hours face-to-face and 60 distance at AVEA) of Introduction to Electronics, Programming and Robotics, taught in the school during the day. On-site activities were carried out by RExLab scholarship students and also by volunteer undergraduate students and the UFSC Postgraduate Program in ICT (PPGTIC) in Araranguá. They also assist in workshops at public schools, scholarship holders of PIBIC-EM. The practical activities were performed with electronics kits (protoboard, diodes, resistors, capacitors, various sensors, multimeters, soldering irons, etc.) and robotics (Arduino kits and parts and pieces built in 3D printer and Laser marking and cutting), plus tablets and laptops. All resources used were made available by RExLab. The activities already made use of AVEA IntecEdu, RExLab's virtual educational environment. Six workshops were held in 2018, 103 students participated and completed the activities. It should be noted that this was not a punctuated activity, that is, it did not have grades for any discipline and the adhesion to the courses was voluntary.

In higher education the study was conducted in a private institution, located in the city of Criciúma/SC/Brazil, during the 2018 school year and included students of the Information Systems college course, night time. The research subjects were students enrolled in the Management Information Systems discipline, related to the 6th phase of the course, and students attending the Systems Analysis and Design discipline, related to the 7th phase of the course. Being a total of 41 student respondents. To apply the research two exercise lists were created so that students could use the development environment of the remote experiment and the components available in Block.ino instances. Activity lists were named version "A" with six activities and version "B" with five activities.

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IV. RESULTS AND DISCUSSION

The questionnaire applied to high school students sought to evaluate the satisfaction regarding the use of remote laboratories in the lesson plans by the students. Ninety-six high school students (93.2% of the total number of participants) answered, during 2018, from three public elementary schools in the municipality of Araranguá / SC.

The questionnaire applied to high school students sought to evaluate the satisfaction regarding the use of remote laboratories in the lesson plans by the students. Ninety-six high school students (93.2% of the total number of participants) answered, during 2018, from three public elementary schools in the municipality of Araranguá / SC. Cronbach's alpha coefficient for the questionnaire applied (24 items) was 0.91 (Internal consistency value "Almost perfect" according to Landis & Koch (1977). The mean score on the Likert scale was 1.58 and the standard deviation for the item average was 0.404. For the domains individually analyzed, we obtained: Usability (item average = 1.34, alpha = 0.41 (Moderate) and DV = 0.632), Learning Perception (item average = 1.82, alpha = 0.88 (Almost perfect) and DV = 0.075), Satisfaction (item average = 1.54, alpha = 0.88 (Almost perfect) and DV = 0.390) and Utility (item average = 1.64, alpha = 0.79 (Substantial) and DV = 0.360).

Figure 05 graphically presents the mean score values for the four scales evaluated.

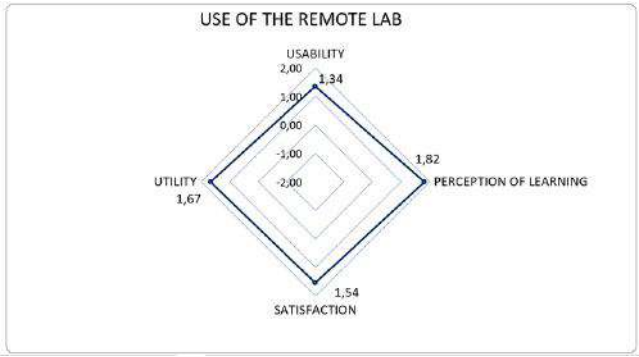
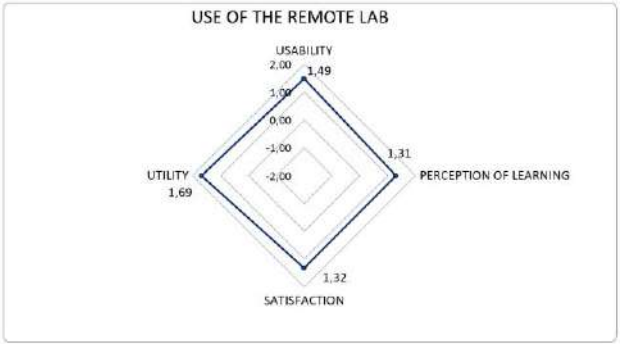


Fig. 05: Scores for the domains assessed, Higher Education.
Source: Authors.

From the questionnaire applied to the students of the Higher Education Information Systems course, based on the four domains explored in the questionnaire. Cronbach's alpha coefficient covering the 24 items of the questionnaire, including the four defined domains, presented a coefficient of 0.89 (Internal consistency value "Almost perfect" according to Landis & Koch (1977). Likert scale mean scores was 1.43 and the standard deviation for the mean of the items was 0.238.

Figure 06 presents the average scores obtained in the four domains defined in the questionnaire.

Fig. 06: Figure 06 - Scores for the domains assessed, High school.



Source: Authors.

For the domains individually analyzed were obtained: Learning Perception (average of items = 1.31, alpha = 0.87 (Almost perfect) and DV = 0.075), Satisfaction (average of items = 1.32, alpha = 0.85) (Almost perfect) and DV = 0.390) and Utility (item average = 1.49, alpha = 0.75 (Substantial) and DV = 0.360). The four domains were analyzed individually, all scores are above zero, reflecting positive actions regarding the use of resources. Regarding Usability, six statements were elaborated, and the Cronbach's alpha coefficient obtained was 0.69 (Substantial), the average of the items = 1.49 and Standard Deviation = 0.183.

For the perception of learning, six statements were elaborated. Cronbach's alpha coefficient obtained was 0.82 (Almost perfect) and Cronbach's alpha coefficient obtained was 0.67 (Substantial). 1.31 and Standard Deviation = 0.196. Regarding the Satisfaction subscale, six statements were formulated. Cronbach's alpha coefficient was 0.78 (Substantial), the average of the items = 1.32 and Standard Deviation = 0.30. Finally, for the Utility subscale, six statements were elaborated. Cronbach's alpha coefficient was 0.70 (Substantial) the mean of the items = 1.69 and Standard Deviation = 0.175.

By grouping the percentages presented in Figure 10 into DT + DP (Totally Disagree and Partially Disagree) and CP + CT (Partially Agree and Strongly Agree), excluding the percentages of No Opinion. The percentages obtained for CP + TC were as follows: 86.18% (Learning Perception), 86.76% (Satisfaction), 93.73% (Usability) and 96.34% (Utility).

Regarding High School performing the same type of grouping, the following percentages were obtained: 97.13% (Learning Perception), 90.68% (Satisfaction), 88.20% (Usability) and 96.06% (Utility). The values did not show significant variations and the percentages were

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very significant in all domains. In relation to high school, it was found in the domain Usability the lowest average and the lowest percentage value in item # 3, which dealt with the internet connection and waiting time in line to use the resource remotely. For this item in high school 26.88% pointed out that the Internet connection and the waiting line hampered the experiment and 61.29%, who had no problems in this regard. In higher education these values were 14.63% and 82.93% respectively, it should be noted that the activities at this school level were also performed in the HEI laboratory.

V. CONCLUSION

This paper aims to present the use of a remote laboratory for hands-on online computer programming introduction activities. The remote lab shown can reach all school levels. The resources and services provided by it can be applied from basic education to higher education. Experimental activity is one of the key aspects in the teaching and learning processes of computer programming disciplines and the sciences in general. If we address the lack of technological infrastructure in public institutions in Brazil, especially in basic education, it will be realized that they are not able to provide satisfactory environments for carrying out practical activities.

On the other hand, mobile devices such as smartphones allow access to creative information and activities anytime, anywhere. They also support global connections and potential to represent learning opportunities. And to fill even the gaps in infrastructure shortages. A favorable context thus arises and remote laboratories are a real possibility, as they are devices that can support experimental activities, and contribute significantly to the improvement of teaching and learning processes.

Validation was performed in two educational scenarios, with great potential for use (presential course in computing and basic education). In higher education were part of the assessment of night information systems classes. In basic education, the use of resources occurred with high school students, in semi-presence workshops introducing electronics, robotics and computer programming, which were held in the evening, and with voluntary adherence.

The results obtained in the evaluation of use satisfaction by the potential users of the platform demonstrated the feasibility of reapplying the use of the remote laboratory Block.Ino in similar or even different contexts. Also, it indicates favorable platform scalability. Factor favored by the fact that its development is supported by open educational resources, free software and open hardware.

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Evaluation of the profile and experience of nurses working in Intensive Care Unit (ICU) of a northern city of Espírito Santo-ES and their knowledge about pressure ulcer.

Adriana Vieira Gama Lisboa, Guilherme Bicalho Nogueira

College Valle of Cricaré, São Mateus, Brazil

Abstract— *Pressure injuries in hospitalized patients have been a serious problem in nursing care management. Due to the high rates found and the emotional and financial costs that health professionals cause, they have been driven to seek elaboration of increasingly improved routines. Objectives: To evaluate nurses' technical / scientific knowledge regarding to the prevention and reduction of pressure injury within ICUs. Methodology: This is a simple descriptive exploratory study with a quali-quantitative approach, performed in two hospitals in the northern state of Espirito Santo in May and June of 2019 with 17 nurses from four ICUs through the assessment of knowledge of actions / interventions existing to prevent LPP in ICUs. An instrument containing 23 questions related to the interviewees' socio-demographic profile, knowledge and practice was used.The data analysis process was performed by simple descriptive statistics by calculation of absolute and relative frequency, being the qualitative research analysis consisting of: ordering, data classification and final analysis. Results: From 17 Of the respondents, 55.55%were in a predominanting age group between 30 and 40 years old , 27.77% sometimes used the Braden scale and 16.66% did not use the Braden Scale. Most of them 61.11%, have Lato Sensu Graduate Studies in Public Health, none of them in stomatherapy Of the respondents, 83.33% reported having difficulty identifying the six LPP categories, 16.66% reported not having received training on the subject and 22.22% reported the obtaining of information through books, magazines and articles on the internet. Conclusion: The study identified a deficiency in knowledge about the subject, since it pointed out that most participants reported weakness in technical and scientific knowledge on basic subjects about the LPPs. As a final product a quick consultation booklet was prepared, with the intention of contribute to the preventive care of LPPs within ICUs.*

Keywords— ***Pressure Injury, Intensive care unit, Nursing Care, Intensive Care, Scales.***

I. INTRODUCTION

The increased rates of prevalence and incidence of skin lesion and its impact has been the subject of constant discussion, so that the search for safe practices and more effective has met national and international organizations for building tools that meet the new public policy rules in force, as in the XXI century is still common to find professionals adept at empirical practices and stuck to the use of skin lesion treatments already exceeded (Domansky, 2014).

Among the numerous skin lesions, higher concern in hospital settings remain the Injuries pressure (LPP); these injuries of multifactorial origin and chronic nature are associated with intrinsic and extrinsic factors, and have constituted a public health problem because of its high incidence, cost and recurrence rates (CAMPOS, 2010).

Inserted in this scenario there is the figure of nurses, professional responsible for making dressings, coordinate and mainly supervise the staff in the prevention and care to the injured, under Resolution 501/2015 of the Federal Council of Nursing (COFEN), which regulates the nursing team skills aimed at effective care and patient safety (COFEN, 2015).

Recent studies indicate that despite the progress achieved over the years, some flaws are identified in the execution of the care process. A survey conducted within an Intensive Care Unit (ICU) in a university hospital in southern Brazil, showed that when evaluating LPP prevention measures used by nurses noted that they recognized the major prevention practices and, achievement of change of position, hydration, cushions, among others; however, these often are stopped midway

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due to some obstacles such as overhead activities, critical condition of patients and staff, high absenteeism, among others (STEN et al., 2012).

Another study conducted in a public teaching hospital of the Great Victory, Holy Spirit with 55 nurses, pointed out that the participants, 92.7% had regular knowledge or inadequate on the subject. Most, 67.3% reported not having obtained sufficient knowledge at graduation on wound care. Most nurses had lower level of the desired knowledge in relation to wound care (Faria et al., 2016).

In clinical practice of our region, empirically, there is, in the ICU of the state of North hospitals of the Holy Spirit, both public and private, the presence of patients with LPP. These patients originally developed the LPP in the ICU or have come with Injury evidence. This fact has caused deep concern, not only by the lack of size of the problem, but also because it encourages us to want to know what has been the look and the importance that nurses have given for that matter.

In this context, seeking to reflect on this theme and analyzing the literature, it was possible to know some aspects inherent to this problem and its relation to the nursing care of the patient. However, there is still ignorance: how nurses, primary care manager within the state of North ICUs of the Holy Spirit, have realized and led to prevention of LPP, and more than that, what this professional working tool is used to risk assessment in critically ill patients?

In order to answer these questions and using the knowledge gained to build a quick reference booklet education care to patients at risk for LPP, this study aims to contribute to the quality of management of nursing service in North ICUs the state of Espirito Santo.

In the new classification proposed by the National Pressure Ulcer Advisory Panel - (NPUAP, 2016), the pressure Injuries are classified by their tissue characteristics as follows:

- **Injury Pressure Stage 1:**Intact skin with erythema not whitens and may look different in skin dark. The presence of erythema or changes in sensitivity bleaches, temperature or consistency (hardness), can precede the visual changes. changes in color do not include discoloration purple or brown; these may indicate deep tissue damage.
- **Injury Pressure Stage 2:** Loss of skin partial thickness with dermal exposure. The wound bed is feasible, pink or red, moist color and can also present as an intact bubble (filled with serous exudate) or broken. The adipose tissue and deep tissues are not visible. Granulation tissue, slough and eschar are not present. These injuries usually result from inappropriate microclimate and shearing of the skin in the pelvic region and the calcaneus. This stage should not be used to describe the skin lesions associated with moisture, including dermatitis associated with incontinence (DAI), the intertriginous dermatitis, skin lesions associated with medical adhesive or traumatic wounds (friction injuries, burns, abrasions).
- **Injury Pressure Stage 3:**Loss of the skin in its total thickness in which the fat is visible, and often epíbole and granulation tissue (lesion with curled edges) are present. Slough and / or eschar may be visible. The depth of tissue damage varies according to the anatomical location; areas with significant fat deep lesions may develop. Detachment may occur and tunnels. There fascia exposure, muscle, tendon, ligament, cartilage and / or bone. When the slough or eschar preclude the identification of the extent of tissue loss, you should classify it as Injury Pressure Not Sortable.
- **Injury pressure Stage 4:**Loss of skin in its total thickness and tissue loss with exposed or direct palpation of the fascia, muscle, tendon, ligament, cartilage or bone. Slough and / or eschar may be visible. Epíbole (lesion with curled edges), detachment and / or tunnels often occur. The depth varies with the anatomic location. When the slough or eschar preclude the identification of the extent of tissue loss, you should classify it as Injury Pressure Not Sortable.
- **Injury Pressure Not Sortable:** Loss of skin tissue and its total thickness loss in the extent of damage which can not be confirmed because it is hidden by the slough or eschar. When removed (slough or eschar) Injury pressure in stage 3 or stage 4 will be apparent. Eschar stable (i.e., dry, adherent, no erythema or fluctuation) in the calcaneus or ischemic limb should not be removed.
- **Deep Tissue Injury Pressure:** Intact skin or not, with localized and persistent area of dark red discoloration, brown or purple not whitens or epidermal separation showing lesion with darkened bed or bubble with bloody exudate. Pain and change in temperature often precede skin color changes. The discoloration may appear different in people with darker skin tone. This injury results in severe pressure and / or shear prolonged and the bone-interfacemuscle. The wound may evolve rapidly and reveal the actual extent of tissue

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damage or solve without tissue loss. when tissuenecrotic, subcutaneous tissue, granulation tissue, fascia, muscle or other underlying structures are visible, this indicates the total pressure damage with tissue loss.

Also according to the new classification proposed by NPUAP (2016), the following additional definitions have been added:

- **Injury Pressure Related to Medical Device:** The Injury Pressure Related to Medical Device results from the use of devices designed and applied for diagnostic and therapeutic purposes. The resulting pressure sores usually exhibits the pattern or shape of the device. This injury should be categorized using the pressure injuries classification system.
- **Injury Pressure on Mucous Membrane**: The pressure sores on mucous membranes is found when there is a history of use of medical devices at the site of damage. Because of the anatomy of the tissue, these lesions can not be categorized (NPUAP, 2016).

The Arabic numerals are now employed in the nomenclature instead of the Romans, and the suspect was abolished term of diagnostic categories (NPUAP, 2016).

It is up to health professionals, especially nurses, to appropriate these terminologies in their daily lives in order to demonstrate the applicability and limitations that such changes lead (MORAES et al., 2012).

These measures become important tools in prevention through knowledge and strategies to ensure the reduction of exposure to risk factors and increased protection of the individual. Therefore, it is suggested as the first step in prevention, identification of patients at risk or more specifically, the factors that make the individual more vulnerable to the development of LPP (SERPAet al., 2011).

II. METHODOLOGY

This study was conducted in 04 ICUs of four two hospitals in São Mateus located in the north of the state of Espirito Santo. The selected hospitals have been named as The Hospital (Public) and Hospital B (Private), to maintain the anonymity of institutions. These hospitals were chosen for developing a comprehensive care for people with chronic wounds (elderly and adults), regardless of the etiology, one of the hospitals with a capacity of 242 beds geared totally to the customer care of the Unified Health System (SUS) and the other private service that provides the SESA (State Secretary of Health). Both have two ICUs with capacity of 10 beds each, totaling 20 beds in each hospital. While The Hospital has 20 beds General ICU,

The Public Hospital Nursing teams, (Hospital A) are composed of technicians and nurses who take turns on a scale of 12 / 36h, one nurse for every day and night shift, five nursing technicians. The medical team is formed by a diarist doctor, on duty and a coordinator.

Already the Private Hospital (hospital B) has a capacity of 105 beds, 80 operating. The hospital has 02 nurses day laborers 6pm in each ICU, alternating between morning and afternoon, and night 03 physicians who take turns on scales 12 / 60h totaling 05 nurses cadaUTI. Both day laborers as the physicians take turns at 12h scale on the weekends daytime shifts and holidays. The team of nursing technicians consists of 05 technicians in each shift alternating in 12 / 36h day and night duty rosters. The medical team, as in the former Hospital is composed of a day laborer doctor, an on duty doctor and an engineer.

III. RESULTS AND DISCUSSION

Survey participants nurses working in institutions that received their names The Hospital (Public) and Hospital B (Private); The Hospital provides service to the Unified Health System through the openings via SESA regulation system (State Health Secretariat); both are located in the northern state of Espirito Santo in the city of St. Matthew. The participants were 17 nurses who belong to 03 types of work shifts and operating in 04 ICUs, being a cardiology ICU and 03 general ICUs with 10 beds each. One participant nurses operates in two institutions in different shifts. Of non-participating nurses from 01 search was on maternity leave and another had requested shutdown of the institution during the period prior to the survey. No guest nurse refused to participate, everyone was very collaborative and responsive actively responding to all issues related to their daily practice, after signing the term of free clarification and receive explanation of the purpose of the research, which contributed greatly to the preparation of this study. Participants received identification ENF 1, 2 NFS, NFS 17, as described in the data analysis. They had preserved their secrecy, so did not cause any embarrassment in the responses. as described in the data analysis. They had preserved their secrecy, so did not cause any embarrassment in the responses. as described in the data analysis. They had preserved their secrecy, so did not cause any embarrassment in the responses.

It was observed during the interviews a concern in parts of most nurses manage the care of patients admitted in the intensive care unit with impaired physical mobility and increased risk to develop LPP. They showed in their

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speech always be following the work of the technical directing and supervising the activities within the intensive care unit.

As for the operating time (Table 1), was found in hospital A that 5 of the nine respondents were between 5-10 years of training, which corresponds to 55.55% of all nurses in the institution and none of the nurses under 1 year training while in the hospital B 4 of 9 respondents, 44.44% have more than 10 years of professional experience, being 11.11% of nurses with operating time between 1-4 years and 11.11% with time less of acting than one year.

Therefore the average of two hospitals A and B of total respondents, 8 (44.44%) have operating time between 5 to 10 years and 6 (33.33%) over 10 years in nursing practice.

Table 1 -Time of professional experience in nursing.

	The hospital	hospital B	Hospital A / B
<1 year	22.22%	11.11%	16.66%
1 to 4 years	55.55%	33.33%	44.44%
5 to 10 years	22.22%	44.44%	33.33%
Above 10 years	0%	11.11%	5.55%

Source: Personal researcher Archive

As the predominant age group (Table 2) in the hospital was between 30 to 40 years old accounted 66.66%, representing 6 of the 9 respondents in this institution, and only 11.11% aged 25 to 30 years. Already in hospital B, 44.44% of respondents were between 30 to 40 years and 9 corresponds to the 4 surveyed, with an average of either 10, with a total of 10 nurses representing 55.55% between 30 and 40, 22, 22% between 25 and 30 years and 22.22% above 40 years.

Table 2 - Age range of research participants.

	The hospital	hospital B	Hospital A / B
25 to 30 years	11.11%	33.33%	22.22%
30 to 40 years	66.66%	44.44%	55.55%
Acimade 40 years	22.22%	22.22%	22.22%

Source: Personal researcher Archive

Table 3 - The specialization of research participants.

	The hospital	hospital B	Hospital A / B
UTI expertise	33.33%	33.33%	33.33%
another area	66.66%	55.55%	61.11%
stomatherapy	0%	0%	0%
Contains No Expertise	0%	11.11%	5.55%

Source: Personal Archive researcher.

As noted in Table 3, none of the respondents have expertise in Stomatherapy or any expertise in wounds most respondents hospital A have graduate Lato Senso in another area of Public Health, Management, Emergency Department among others, adding 66.66 corresponding 6% of 9 nine respondents; therefore 33.33% reported having a postgraduate degree in the ICU. In what concerns the Hospital B, 5 (55.55%) of the nine respondents have

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expertise in another area with only one of the nurses had no expertise and no one specializing in Stomatherapy. It is important to note that knowledge of appropriate actions to be developed and commit them properly, as well as continuing education for common ideals,(Stein et al., 2012).

Table 4 - Operating time in the ICU of respondents

	The hospital	hospital B	Hospital A / B
<1 year	11.11%	33.33%	22.22%
1 to 4 years	55.55%	11.11%	33.33%
5 to 10 years	33.33%	44.44%	38.88%
Maisde10 years	0%	11.11%	5.55%

Source: Personal Archive researcher.

As for the performance of ICU stay, 5 (55.55%) of respondents Hospital A, they were between 1-4 years of operation, and only 1 under 1 year,corresponds to 11.11% and none of the respondents over 10 years of experience in the Intensive Care Unit. Regarding interviewed the hospital B, 4 (44, 44%) of respondents with operating time between 5 to 10 years and older than 10 years. And the average of both the operating time hospitals A and B, 6 (33.33%) of respondents with time of work in ICU 1-4 years and 7 (38.88%) with time of work in Unit Intensive care between 5 to 10 years.

IV. CONCLUSION

The results of this study showed that nurses demonstrate knowledge of the preventive measures necessary for the LPP inside the intensive care units, such as changing positions, avaliaçãodiária dapele, pneumatic mattress use, cushions, use of body moisturizers, barrier creams and support nutritional were cited.

However, the study pointed out that although nurses recognize the importance of these strategies, some obstacles such as work overload, critical condition of the patient, incomplete team, lack deconhecimento and treinamentos atualizados on the subject, prevent actions are implemented in risk research context .

It is necessary that these aspects are reviewed in practice as soon as possible in order to be the subject LPP a big public health problem, treatment difficult and very costly for the institutions. Further discussions should be made by managers and managers on care, in order to obtain better working conditions and practices that result in better and safer within the ICU of the northern state of Espirito Santo.

Also important to highlight the need for update nurses continues on the subject, either through participation in events / courses to guarantee the creation of new devices, new discussions and decapacitação collective action and thereby improve the quality of service and thus contribute to decreased incidence of LPP in the intensive care units.

Thus, the improvement of knowledge and strategies of nurses in the prevention, care and treatment of LPP in the ICU; the ongoing discussions can provide actions and more effective and safe conduct. The realization of continuing education within hospitals is of paramount importance, makes the trader is in constant learning, in a continuous recycling process.

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Use of Vegetation Cover Index (ICV) to identify susceptible areas to desertification process in the semiarid municipalities of Pernambuco, Brazil

Rayanna Barroso de Oliveira Alves[1], Hernande Pereira da Silva[2], José Coelho de Araújo Filho[3], Marco Antonio de Oliveira Domingues[4], Jones Oliveira de Albuquerque[5]

[1]Institute for Risk and Disaster Reduction of Pernambuco-IRRD-PE/UFRPE, Geoprocessing and Remote Sensing Center/Federal Rural University of Pernambuco GEOSERE/UFRPE, Recife-PE, Brazil.
Email: rayannabarroso@hotmail.com
[2] Institute for Risk and Disaster Reduction of Pernambuco-IRRD-PE/UFRPE, Geoprocessing and Remote Sensing Center/Federal Rural University of Pernambuco GEOSERE/UFRPE, Recife-PE, Brazil.
Email: hernandepereira@yahoo.com.br
[3] Brazilian Agricultural Research Corporation-EMBRAPA, National Soil Research Center, UEP Recife, Recife-PE, Brazil.
Email: coelhoembrapa@gmail.com
[4] Federal Institute of Pernambuco, Recife-PE, Brazil.
Email: maodomingues@gmail.com
[5] Institute for Risk and Disaster Reduction of Pernambuco-IRRD-PE/UFRPE, Keizo Asami Laboratory-LIKA/UFPE, Recife-PE, Brazil.
Email: jones.albuquerque@gmail.com

Abstract *— Climate change in Brazil has led to an increase in temperature and changes in the distribution of climatic extremes, such as droughts and floods. This is potentialized when it comes to the brasilian semi-arid Northeast. Environmental studies related to this theme are in constant development. For this, the geotechnologies are of great importance for the environmental studies, since they allow the acquisition and analysis of information of use of the ground, vegetal cover and phenomena of the nature. In the present work, the Vegetation Cover Index was studied using remote sensing and geoprocessing techniques through the digital processing of images acquired in the years 2000 to 2015 of the LANDSAT satellites of three municipalities of Pernambuco to observe the vegetation cover in the said temporal space with the degraded areas possibly resulting from the desertification process in the region. Thus, it was found that the municipalities of Betânia and Itacuruba have very high vulnerability (0.75 and 1, respectively). On the other hand, the municipality of Floresta presented a high vulnerability of ICV (0.5), as the vegetation deficit influences hydrological dynamics, soil protection, climatic stability and thermal influence, corroborating the desertification process.*

Keywords *— **Climate anomalies, Climate change, Desertification, Environmental vulnerability.***

I. INTRODUCTION

In Brazil, the municipalities influenced by extreme events (dry and drought) are increasing and the dry stage is getting worse. The northeast region is vulnerable to the risks of climate variability which can cause aridization and consequent desertification due to climate change.

Natural systems are vulnerable to climate change and suffer from loss of biodiversity - significant and irreversible impact. As a result, the geographic extent of damage or loss to the affected systems greatly increases the rate of climate change.

Available evidence indicates that changes in climate, particularly rising temperatures, have already affected diverse sets of physical and biological systems. Anthropic activities such as pollution and factors in land use change have also been acting on these systems, affecting the population of various localities and / or regions. The vulnerability of human populations and natural systems to climate change differs substantially from region to region [1].

Some regions are particularly vulnerable due to their physical exposure to climate change risks and / or their limited adaptability. Least-developed regions are especially vulnerable, as most of their economy comes from climate-sensitive sectors and their human, financial

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and natural resources capacity is low, as well as they have limited institutional and technological resources.

In Brazil, the existence of desertification processes was initiated by Vasconcelos Sobrinho, and began to be strongly addressed in the 1970s [2].

According to [3], desertification can be defined as "the process of progressive and vegetal degradation of soil and water resources, resulting from climatic conditions and soil conditions or human actions, or both, leading to the destruction of the primary ecosystem, reduced productivity and loss of soil self-healing capacity".

Vegetation cover has the purpose of regulating soil stability without leading to erosion; regulates hydrological cycles, water supply, maintains soil fertility, and as a consequence, food generation [4], thus conserving areas that may have influences to develop the desertification process.

Vegetation cover is perhaps the most important factor controlling the phenomenon of desertification in semi-arid space. Even deciduous, the caatinga still plays the role of protecting the soil against the weather, reducing its degradation. This finding categorically states that the main cause of erosion in this region is undoubtedly the deforestation of vegetation with the aim of meeting the need for more agricultural areas and the supply of wood for fences and other purposes [5].

In areas affected by desertification in the semi-arid regions of northeastern Brazil, the vegetation is small and larger and spaced between its components than in other areas, generally coinciding with the presence of open hyperxerophilous caatinga. The fundamental characteristic of the desertification phenomenon in the northeastern semi-arid region is the presence of exposed soil patches [6].

According to [7], significant vulnerability and exposure of some ecosystems and many human systems to climate variability generate impacts that are caused by recent extreme weather-related events such as heat waves, droughts, floods, cyclones, and fires. In many regions, changes in rainfall are affecting quality and quantity water reserves and altering hydrological systems.

Exposure variables are used to study environmental and human vulnerability to desertification processes, and one of them is the Vegetation Coverage Index (ICV).

Biodiversity protection can also have a mitigating effect on infectious diseases. In addition, the choice of this component is due to the fact that the larger the native vegetation cover area of a locality, the greater the health and welfare benefits of the communities living in its vicinity [8].

According to [9], desertification is a spatial phenomenon and as such can be treated within a Geographic Information System (GIS). The analysis tools of a GIS allow to establish spatial correlations and diverse modeling for the most varied data such as those derived from desertification process indicators.

Remote sensing has been used to monitor droughts [10] and to delimit degraded areas susceptible to desertification processes in the state of Ceará [11].

Like this, geoprocessing and remote sensing techniques have been used to monitor droughts and delimit degraded areas that are susceptible to desertification processes, contributing to analyzes in order to continuously monitor the affected areas and develop preventive environmental actions.

As soon, this article is part of the work developed by the author in her master's dissertation and calculates the ICV, which allows the assessment of environmental vulnerability related to vegetation, where damage can be indicated and estimated in vegetation cover and presence of exposed soil related to desertification municipalities of Betânia, Floresta and Itacuruba in Pernambuco State, Brazil.

II. MATERIALS AND METHODS

Study area characterization

The studied area is located in Pernambuco semi-arid, in the Sertão Pernambucano and São Francisco Pernambucano mesoregions, and Pajeú Sertão and Itaparica microregions respectively (Figure 1).

Betânia County

Betânia county is inserted in the caatinga biome, has a total area of 1.244,074 km² with population of 12.003 [12] and it is located in the northern part of the Pajeú microregion, northern portion of the state of Pernambuco, and is geographically limited to the north with the municipalities of Flores and Calumbi, to the south with Floresta, to the east with Custódia and to the west with Serra Talhada and forest and the vegetation cover is mainly composed of Hyperxerophilous Caatinga with sections of deciduous forest. The climate is Tropical Semi-Arid, with summer rainfall. The rainy season begins in November and ends in April. The average annual rainfall is 431,8 mm [13].

Floresta County

According to Silva, 2009, "The municipality of Floresta is located in the mesoregion of São Francisco Pernambucano and microregion of Sertão de Itaparica. It is limited to the north with the municipality of Serra Talhada, Betânia and

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Custódia, to the west with Carnaubeira da Penha and Itacuruba, to the south with Tacaratu, Petrolândia and Bahia State, to the east with Inajá, Ibimirim".

The predominant vegetation in the municipality of Floresta is the hyperxerophilous caatinga [14], there are also sections of deciduous forest in mountainous environments [15].

Itacuruba County

Itacuruba is located in the Sertão do São Francisco mesoregion and Sertão de Itaparica microregion, inserted in the Caatinga biome. It has a population of 4,369 inhabitants and a territorial extension of 430,038 km² [16].

The municipality is located in the São Francisco River macro basin and Pajeú River basin, and belongs to the Borborema Province, which is located south of the Pernambuco lineament. Its relief is characterized as smooth-wavy, and cut by narrow valleys with dissected slopes. The vegetation is xerophile, alternating in dry months as deciduous with minor intrusions of xerophytism. It is represented by species such as mandacaru, crown of friar, gentian, xique-xiques, catingueira, pereiro and faveleira [17].

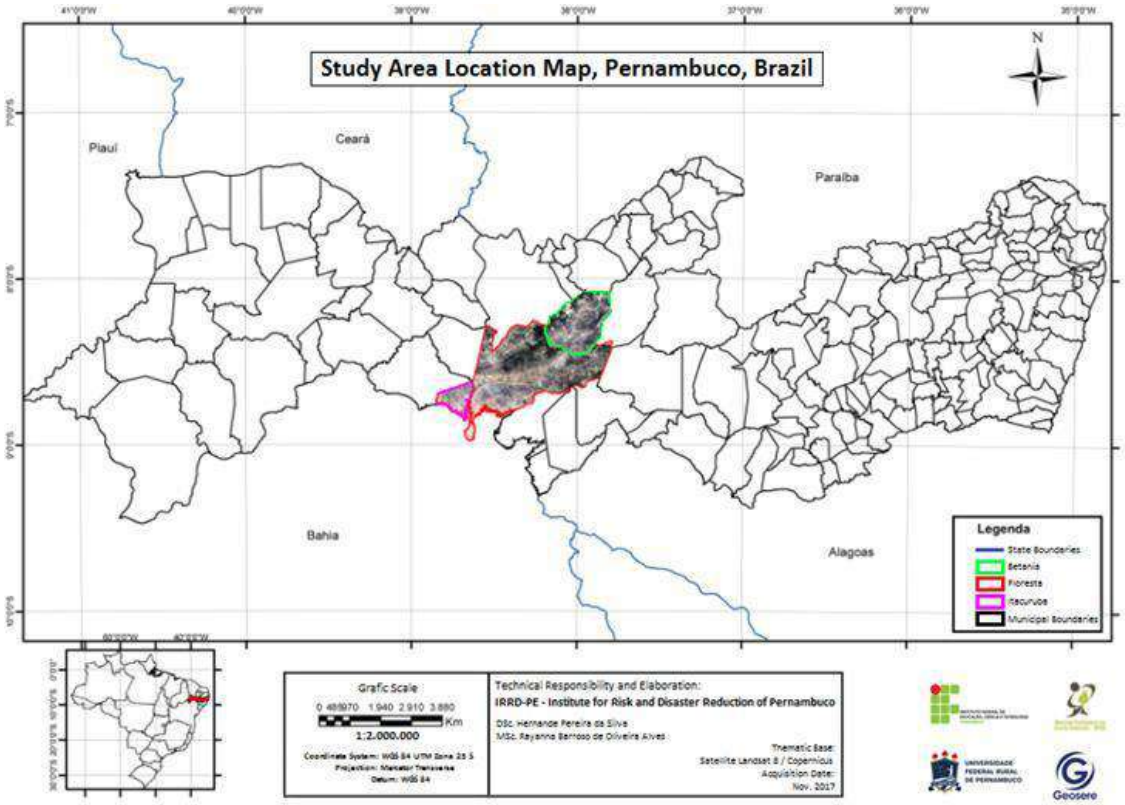

Fig. 1: Geographic localization of the study area.

Landsat Image Selection and Acquisition

The research and treatment of the images were developed at the Geoprocessing and Remote Sensing Center - GEOSERE, more precisely at the RRS (Recife Receiving Station), located at the Federal Rural University of Pernambuco. A historical series of Landsat 5 and Landsat 8 satellite images from 2000 to 2015 were chosen, excluding 2012, since the Landsat 7 satellite sensor has errors in the images and is impossible to use.

The Landsat 5 scenes were acquired by the database of the National Institute for Space Research - INPE. Landsat 8, in its own spatial database developed by the United States Geological Survey - USGS. Thus, the bands 3,4,5 (BGR) and 4,5,6 (BGR), respectively, were used (Table 1).

Table.1: Landsat Scenes Features.

Satellite	Orbit	Spectral Bands	Date of acquisition
LANDSAT 5	216	3,4,5	24/09/2000
LANDSAT 5	216	3,4,5	06/05/2001
LANDSAT 5	216	3,4,5	06/03/2002
LANDSAT 5	216	3,4,5	22/12/2003
LANDSAT 5	216	3,4,5	24/12/2004
LANDSAT 5	216	3,4,5	24/10/2005
LANDSAT 5	216	3,4,5	25/09/2006
LANDSAT 5	216	3,4,5	05/04/2007
LANDSAT 5	216	3,4,5	01/11/2008
LANDSAT 5	216	3,4,5	13/06/2009

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LANDSAT 5	216	3,4,5	06/10/2010
LANDSAT 5	216	3,4,5	31/10/2011
LANDSAT 8	216	4,5,6	30/03/2013
LANDSAT 8	216	4,5,6	02/10/2014
LANDSAT 8	216	4,5,6	14/03/2015

Imagery Treatment

For the treatment of acquired scenes, we used the software SPRING (Georeferenced Information Processing System) developed by INPE, which allows image processing, spatial analysis, numerical terrain modeling and consultation of spatial databases. It was made the clipping, in the cities of Betânia, Floresta and Itacuruba, from the shapes of the municipal limits of the state of Pernambuco and the scenes / images acquired. For better visualization and definition of thematic classes, radiometric correction of the study area was performed.

Thus, radiometric correction was performed from the RGB 3,4,5 color composition for LANDSAT 5 images and 4,5,6 for LANDSAT 8, through contrast equalizing histogram. Based on the methodology used by Alves, 2017, after the previous step, supervised classification began, which is a process of extracting information from images to recognize homogeneous patterns and objects and are used in Remote Sensing to map land surface areas that correspond to the topics of interest. Thus, it allowed the identification of areas with existing vegetation.

Then, the thematic mapping was performed, which allowed the transformation of the classified image (Category Image) to a thematic map.

Calculation of Areas with Vegetation Cover

Completing the previously developed steps, the mapped areas were calculated for each municipality using the Metric Operations tool to identify not only the territorial area unit, but also the relationship between the total area of the municipalities and the vegetation area natural, in percentage.

Vegetation Cover Index (ICV)

The ICV was elaborated through the use of geoprocessing and remote sensing techniques - contrast operation, classification and thematic maps elaboration - in order to obtain the total vegetation area of each municipality and the exposed soil areas.

The calculation of the percentage of vegetation cover area in relation to the total area of each municipality was elaborated (1).

ICV = Weight % Vegetation Cover *(1)*

The weight values for the ICV were prepared according to the percentage range of vegetation cover, as shown in Table 2, where the value 0 represents lower vulnerability, since a higher percentage of vegetation cover brings environmental, climatic and social benefits; weight 4 corresponds to the minimum vegetative area.

Table.2: Weights and percentages of vegetation cover.

Interval (%)	Weight
>30	0
20,1 – 30	1
10,1 – 20	2
5,1 – 10	3
0 – 5	4

The values obtained after performing the previous calculations were interpreted based on the Social Vulnerability Index of IPEA - Institute of Applied Economic Research, in its Social Vulnerability Atlas of Brazilian Municipalities, which ranges from 0 to 1. The closer to 1, the greater the social vulnerability of a municipality (Figure 2).

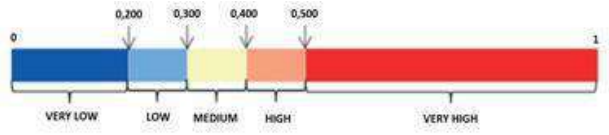

Fig. 2: Social Vulnerability Index Range. Source: [18].

The interval values for the Climate Index were associated with the Social Vulnerability Index developed by IPEA, where it was necessary, for calculations, the intensity weights for each interval (Table 3). 0 to 4, where 0 is the lowest vulnerability of vegetation cover and 4 the greatest vulnerability of vegetation cover.

Table.3: Vegetation cover vulnerability index range.

ICV	Intensity	Weight
0 - 0,201	Low	0
0,201 - 0,300	Very Low	1
0,301 – 0,400	Medium	2
0,401 – 0,500	High	3
0,501 – 1	Very High	4

III. RESULTS AND DISCUSSIONS

Vegetation Cover and Thematic Maps Generation

From the supervised classification of images from 2000 to 2015, in different seasons of the year, it was possible to obtain the result of vegetation cover. The different dates used mainly with regard to the months, was of paramount

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importance, as they are associated with all seasons of the year, which can be evaluated the outcrop of vegetation in the most diverse climatic conditions.

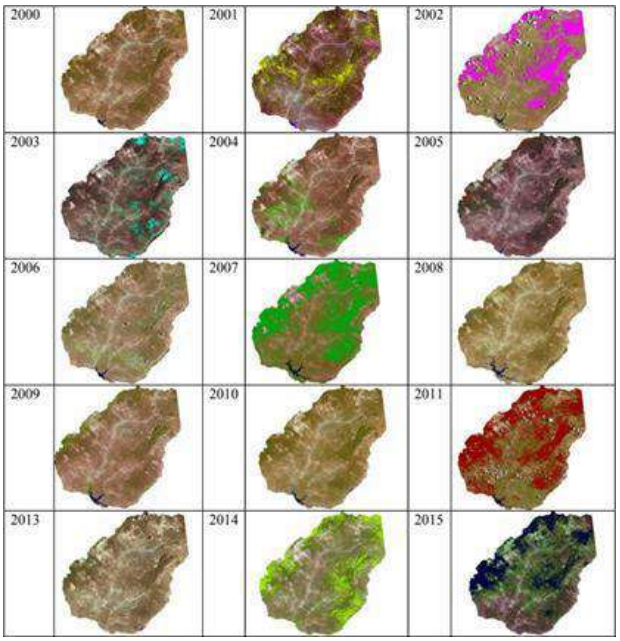

Fig. 3: Betânia county vegetation cover.

Therefore, it was possible to identify areas with vegetation cover and areas with exposed soil of the municipalities studied. The colors used to identify the vegetation are related to the year studied and are the same for the three municipalities.

The Figure 3 presents Betânia county egetation cover in the period of 2000 to 2015.

Figure 4 shows the municipality of Floresta with vegetation cover from 2000 to 2015, where it was possible to identify as areas with vegetation cover and as areas with exposed soil.

Figure 5 presents the vegetation cover of the municipality of Itacuruba from 2000 to 2015, where it was possible to identify areas with vegetation cover and areas with exposed soil. From the classification of the vegetation cover, it was possible to cross each year for all municipalities.

In the Figure 6, we can see in the municipality of Betânia the areas with vegetation cover from 2000 to 2015.

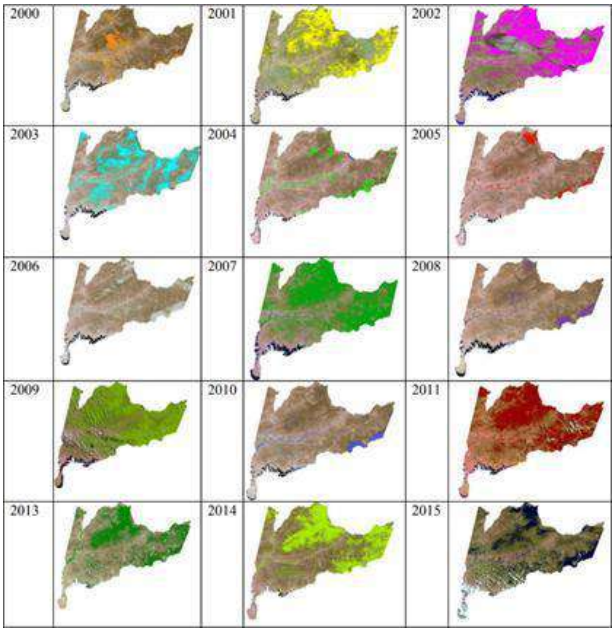

Fig. 4: Floresta county vegetation cover.

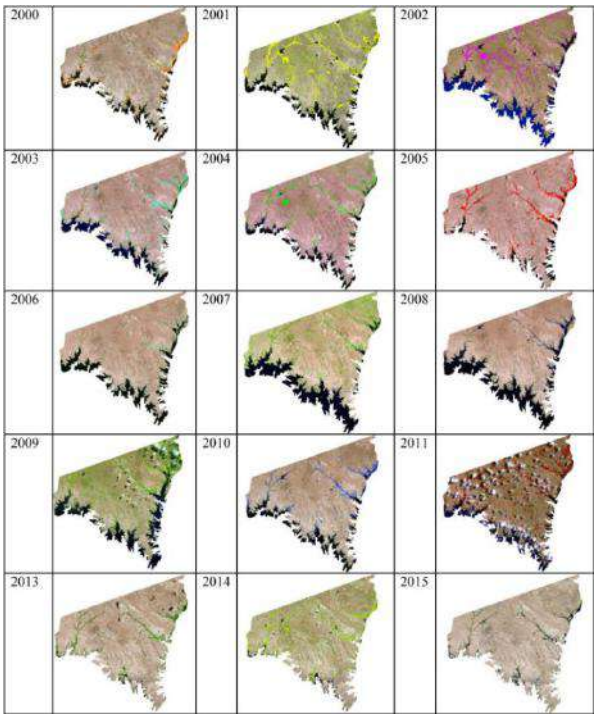

Fig. 5: Itacuruba county vegetation cover.

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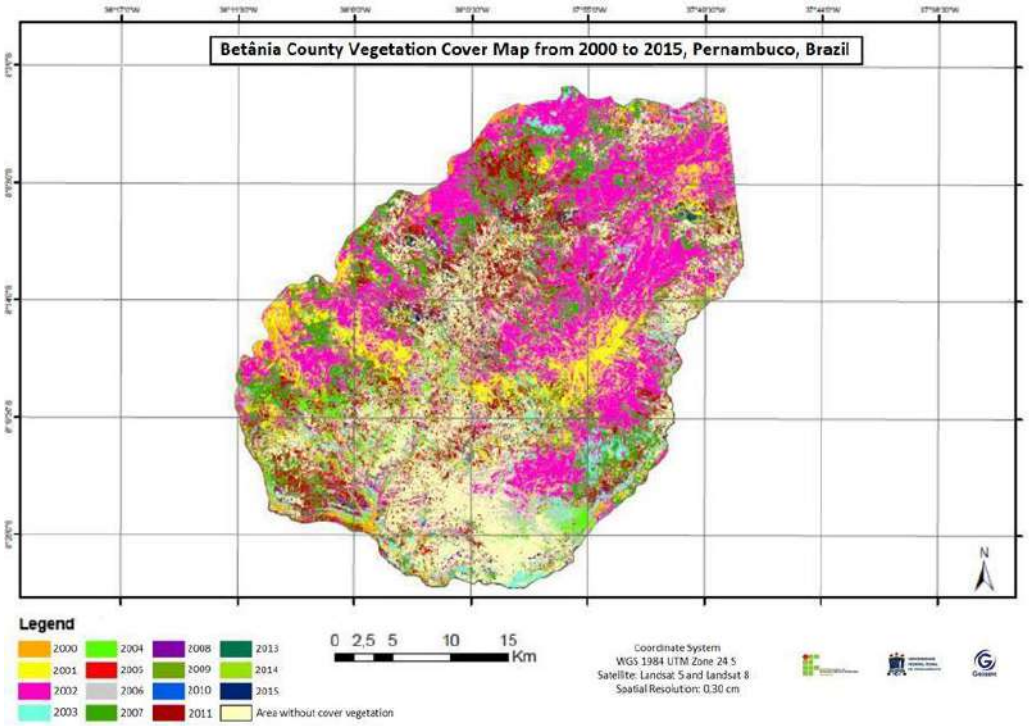

Fig. 6: Betânia county vegetation coverage map.

It was observed that the areas without vegetation cover, over the period studied, have soil classes Luvissolo, Planosolo and Litolic Soil, where the first two have high vulnerability and the third very high vulnerability to desertification processes.

Similarly, the vegetation cover was crossed from 2000 to 2015 to the municipality of Floresta (Figure 7).

It was observed that in the municipality of Floresta, the areas of soil without vegetation cover over the studied period are formed by the soil types Areia Quartzosa, Luvissolo and Litolica Soil, which have very low, high and very high vulnerability, respectively.

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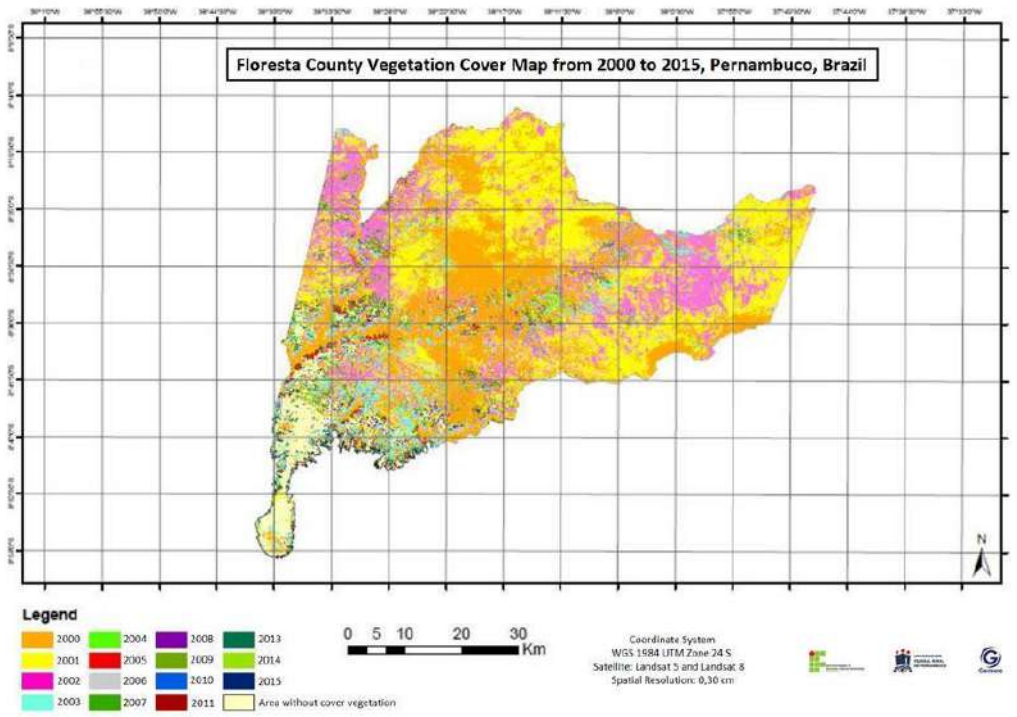

Fig.7: Floresta county vegetation coverage map.

Similarly, the vegetation cover was crossed from 2000 to 2015 to the Itacuruba county (Figure 8).

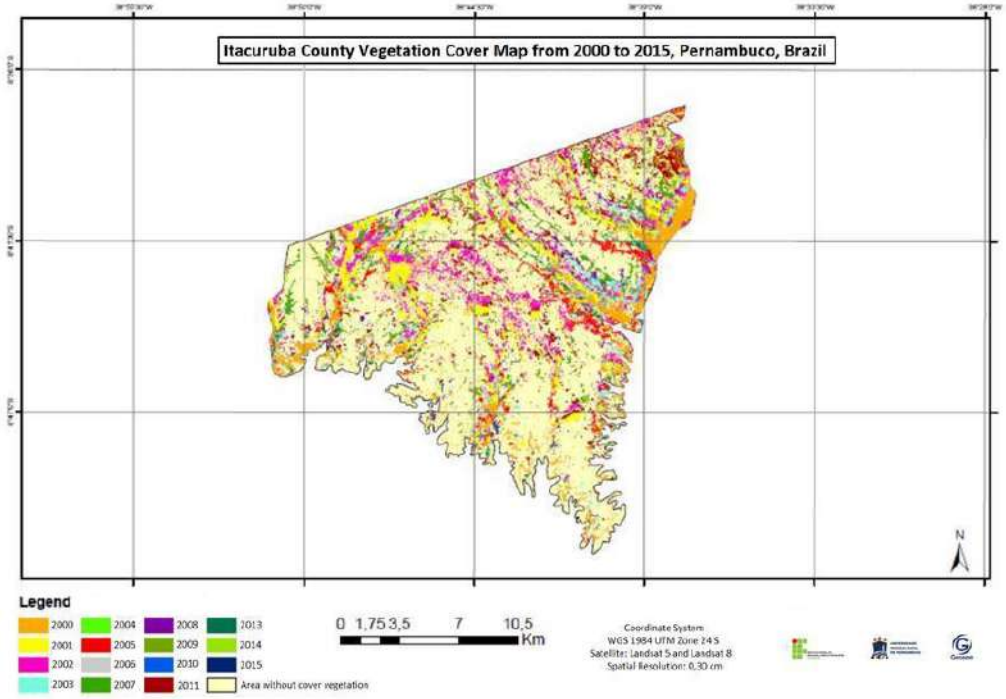

Fig. 8: Itacuruba county vegetation coverage map.

From the previously described methodology, it was possible to evaluate the percentage of vegetation cover of the years studied, by municipality (Table 4, 5 and 6).

The generation of vegetation cover data for each county, it was possible to develop Graphs the percentage of the values of areas with and without vegetation cover and the value corresponding to dry periods (with precipitation) and rainy period (without precipitation).

As mostly temporary crops in the municipalities studied, in the presence of vegetation cover, especially in

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the shrub vegetation of irrigated agriculture areas of studied areas, it is not allowed to offer soil protection against desertification processes, as addressed by [19].

Table.4: Betânia county vegetation cover data.

Year	Vegetation (km²)	County (km²)	%
2000	20,18	1244,07	1,62
2001	63,25	1244,07	5,08
2002	327,51	1244,07	26,31
2003	47013	1244,07	3,79
2004	31,83	1244,07	2,56
2005	18,49	1244,07	1,49
2006	65,33	1244,07	5,25
2007	402,84	1244,07	32,38
2008	14,30	1244,07	1,15
2009	17,97	1244,07	1,44
2010	11,84	1244,07	0,95
2011	564,74	1244,07	45,39
2013	4,20	1244,07	0,34
2014	161,54	1244,07	12,99
2015	249,25	1244,07	20,04

Table.5: Floresta county vegetation cover data.

Year	Vegetation (km²)	County (km²)	%
2000	341,22	3644,168	9,36
2001	914,44	3644,168	25,09
2002	1381,46	3644,168	37,91
2003	841,35	3644,168	23,09
2004	156,77	3644,168	4,30
2005	182,6	3644,168	5,01
2006	459,03	3644,168	12,60
2007	1299,13	3644,168	35,65
2008	266,56	3644,168	7,31
2009	1324,83	3644,168	36,35
2010	154,01	3644,168	4,23
2011	864,72	3644,168	23,73
2013	864,73	3644,168	23,73
2014	1372,98	3644,168	37,68
2015	642,02	3644,168	17,62

Table.6: Itacuruba county vegetation cover data.

Year	Vegetation (km²)	County (km²)	%
2000	14,48	430,038	3,37
2001	25,93	430,038	6,03
2002	24,45	430,038	5,68
2003	6,08	430,038	1,41
2004	7,47	430,038	1,74
2005	18,13	430,038	4,22
2006	9,19	430,038	2,14
2007	11,30	430,038	2,63
2008	7,83	430,038	1,82
2009	11,74	430,038	2,73
2010	11,57	430,038	2,69
2011	20,26	430,038	4,71
2013	5,52	430,038	1,28
2014	11,56	430,038	2,69
2015	5,32	430,038	1,24

Figure 9 below shows the percentage of areas with and without vegetation cover in the city of Betânia. It can be observed that dry period, the municipality of Betânia has approximately 0.34% of vegetation cover, ie, if there is no rain, the municipality will have a vegetation cover equivalent to an area of 4.2 km².

Following this same thought, if there were always high levels of precipitation in the municipality, the area without vegetation corresponds to a percentage of approximately 54%, which corresponds to 1239.87 km². Thus, it can be observed that 54% of areas without vegetation cover may be at risk of desertification process.

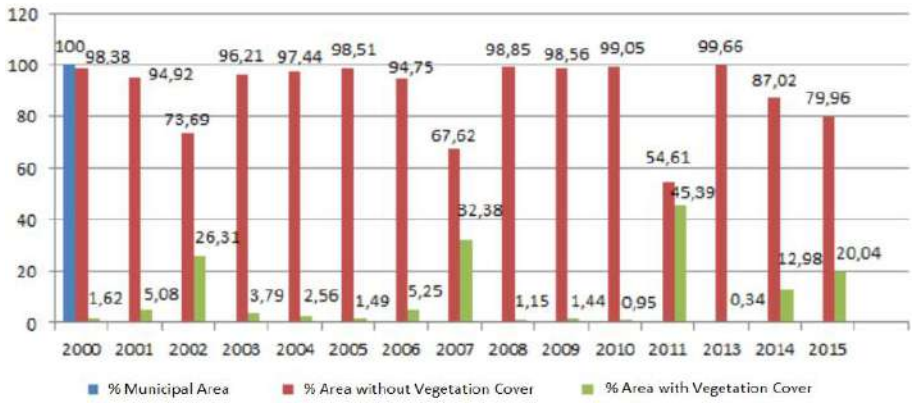

Fig. 9: Betânia county vegetation cover graph.

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For the municipality of Floresta (Figure 10), it can be observed that in the worst case - dry and no precipitation periods - the municipality has, of course, approximately 4% of vegetation cover, ie, if there is no rain, the municipality it will have an equivalent area of 154 km². For this, in the best hypothesis - periods with precipitation - the area without vegetation cover is approximately 62%, which is 2259.4 km².

Thereby, if there is, to the best of our ability, high precipitation rates, the area of the municipality with vegetation corresponds to a percentage of approximately 37%, which equals the area of 11381 km². The municipal area without vegetation cover is approximately 67% and corresponds to an area of 2262.8 km².

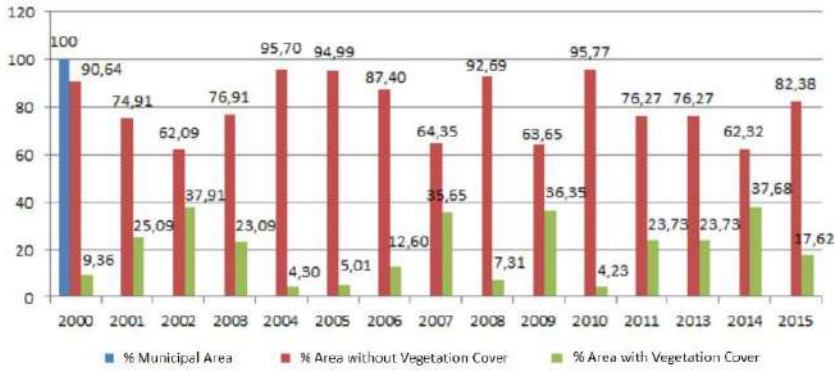

Fig. 10: Graph of vegetation cover in the municipality of Floresta.

In the context of the municipality of Itacuruba (Figure 11) it can be observed that at worst - dry and without precipitation - the municipality has approximately 1% of vegetation cover, ie, if there is no rain, the municipality will have an area of equivalent plant cover 5 km². For this, the area without vegetation coverage is equivalent to approximately 99% of the municipality, which is equivalent to approximately 420 km².

In the high precipitation rates - best of all - the area with vegetation cover of the municipality corresponds to a percentage of approximately 6%, which corresponds to an area of approximately 25 km². The municipal area without vegetation would be 94% and corresponds to approximately 400 km².

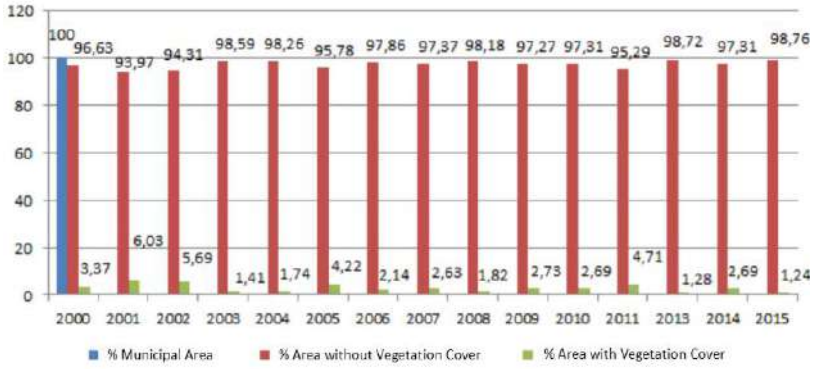

Fig. 11: Graph of vegetation cover in the municipality of Itacuruba.

A problem related to exposed soil is the increase in surface temperature. In a study conducted in the state of Pernambuco, detected impacts related to the deforestation and temperature increase of soil surface. The sparse caatinga contributes to the risks soil erosion contributing to the advance desertification potential [20].

The same can be highlighted for the areas of exposed soil identified over the municipalities. Porting the region has moderate risk for areas susceptible to desertification [21].

Thus, it was possible to calculate the ICV, where it can be seen from the data presented above, that Itacuruba is the municipality which has the lowest vegetation coverage even in periods with high precipitation rates, that is, this municipality has low vegetation even occurring rain.

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From the vegetation cover percentage, the vegetation cover index was calculated, where the ICV values were obtained according to Table 7.

Table.7: Counties Vegetation Cover Index.

County	ICV*
Betânia	3
Floresta	2
Itacuruba	4

*Vegetation Cover Index

Accordingly, based on the vulnerability scale mentioned in the methodology, a vulnerability ICV in the municipality of Floresta has a weight of 2 divided by 4, corresponding to a value of 0,5 on the vulnerability index scale. For Betânia, the weight 3 divided by 4 corresponds to the value 0,75. And for Itacuruba, the value 4 divided by 4 refers to the value 1 on the vulnerability scale (Figure 12).

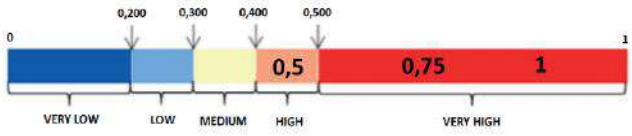

Fig. 12: Vegetation Cover Index (IVC) value on the vulnerability scale.

It is possible to verify, due to the ICV highest vulnerability value, that the municipality of Itacuruba and Betânia has very high environmental and population vulnerability related to the desertification process, because the vegetation deficit influences the hydrological dynamics, soil protection, stability climate and thermal influence. Floresta, on the other hand, has high vulnerability because it has a larger municipal area and greater vegetation cover.

IV. CONCLUSION

The work developed was effective for information generation, monitoring of the vegetation cover of the municipalities studied in the desertification process. It was found that the lack of vegetation cover associated with anthropic actions directly influence the vulnerability of municipalities for generation.

The municipality of Itacuruba showed the highest environmental vulnerability in the desertification process, as the vegetation deficit influences hydrological dynamics, soil protection, climate stability and thermal influence. Therefore, a very high ICV.

Betânia, on the other hand, has high vulnerability, and Forest, because it has a larger municipal area and greater vegetation cover, has intermediate vulnerability.

Recognition by the State and Municipal Governments of the issue of vulnerability to desertification to develop effective public policies is fundamental for improving the population's quality of life.

Further studies of the other General Vulnerability Indexes (IVG) are recommended to more fully assess the environmental and population vulnerability to the desertification processes of these municipalities, and to develop the Human Vulnerability Indexes (IVH) against projections. future climate change.

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Statistical Analysis of Solid Waste Generation for the Preparation of a Management System

Douglas Bastos Belchior de Menezes[1], Mariana Lima Almeida[2], Ana Letícia da Costa Oliveira Lima[3], Clarice Regina Coelho Tavares[4], Nilo Antonio de Souza Sampaio[5], José Wilson de Jesus Silva[6]

[1-5]Universidade do Estado do Rio de Janeiro, UERJ, Resende, RJ, Brazil
[6]Centro Universitário Teresa D'Ávila, UNIFATEA, Lorena, SP, Brazil

Abstract*— *The aim of this paper is to develop new technologies that directly impact the environmental reality in solid waste management and in social and environmental education.For this purpose, the focus group is the population of the university campus, where the project is developed.The synthesis project is developed by the Department of Chemical and Environmental Engineering and by students of the Chemical Engineering course at the Faculty of Technology of Rio de Janeiro State University, Brazil.Based on the types of waste generated by the campus, alternative proposals are proposed for their treatment, development of technologies that can be applied to the reality of Brazilian society and standards that encourage society to be part of the waste treatment process, generating a social impact and environmental responsibility.The initial stage of the project work is to survey the types of waste generated by the campus population so that the priority areas for the development of solutions and technological aspects are determined.It was observed that most of the residues generated were from recyclable materials, followed by non-recyclable materials, as observed in other universities, the biggest divergence was in the discrepancy of collected compostable material. After this stage, development divisions are determined for each large campus waste group, subsequently targeting the region industrial reality.

Keywords*— *Solid waste; management; university; environmental.

I. INTRODUCTION

When one speaks about waste management, society collaboration is essential. Until recently, waste management was viewed as a matter of appropriate inventory, collection, transfer, treatment and disposal, and the main effort was to minimize environmental and public health impacts [1].Thus, engineering and logistics tools were sufficient to plan and implement solid waste management systems. However, today, with the introduction of circular economy concepts [2], resources management and social behavior are becoming an integral part of any solid waste management system.They are essential for treatment of rising recycling rates and better qualification of recyclables, for the participation of industrial stakeholders, eco-design initiatives and closed product and material cycles [3].

Solid waste generation and management remains an urgent global problem [4]. According to data from the United Nations (UN), worldwide, 2 billion tons of waste are produced annually, resulting directly from the inadequate disposal and inefficiency of solid waste management. Alarming data indicate that 99% of products purchased by the population are discarded within 6 months [5].

Brazil, as a developing economy, is not immune to this problem. In 2011, the Brazilian population generated 61.9 million tons of solid waste. Growth of solid waste is not the only problem, the disposal of this waste is also a concern.42% of the total solid waste collected in 2011 was improperly disposed of. Part of this waste disposal occurs in the most ecologically sensitive regions of the world [6].During the 1990s, recycling and other waste management methods were considered the most developed models for municipal solid waste management (MSWM) planning.Current models reflect a change in policy where waste planning has moved beyond full confidence in landfills, and has been placed on more comprehensive management techniques based on the principles of integrated solid waste management (ISWM) [7-11].

Municipal or urban waste is often generated from several sources where various human activities are found.Studies indicate that most urban solid waste from developing countries comes from domestic sources (55–80%), followed by commercial areas (10–30%) with

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varying amounts of public, industrial, and other institutions [12-14].Residues from these sources are highly heterogeneous in nature [15] and have variable physical characteristics depending on their sources; They are made up of food waste, yard waste, wood, plastics, paper, metal, leather, rubbers, inert materials, batteries, paint containers, textiles, construction and demolition waste and many others that are difficult to classify.

Embracing solid waste management programs are one of the biggest challenges for achieving campus sustainabilityConducting a waste characterization study is a critical first step in successfully planning waste management and advancing the overall sustainability of a higher education institution [1].This work is done at various universities around the world, such as the Autonomous University of Baja California (UABC) Mexicali I campus in Mexico [16], Southampton University in England [17] and Prince George Campus at the University of Northern British Columbia (UNBC) in Canada [1]. It used waste characterization categories adapted from several characterization methodologies, mainly from the Fraser George Regional District Waste Characterization Study (FGRD) and the Ontario Ministry of Environment's material classification system, in accordance with Regulation 102/94 (Ontario Ministry of Environment, 1994; Regional District of Fraser Fort George, 2007) [1].

Using the campus of the Faculty of Technology of Rio de Janeiro State University (FAT-UERJ) as a target, the Synthesis Project initially proposes to collect data on the generated waste. The purpose of this paper is to show how the analysis of the types of solid waste generated by a population describes important factors in the solid waste management system and guides the standards to be taken in the planning and structuring process of the management system.

II. METHODOLOGY

At UERJ college of technology, a selective waste collection system was implemented from an extension project called the Synthesis project. For this project, posters were produced across the campus to publicize and raise awareness among the academic community about the importance of recycling and how to sort waste. In addition, the technical capacitation of the cleaning team was trained, and garbage bins were produced from recycled containers from the industrial sector, using the concepts of Circular Economy. The waste generated was segregated in a Waste Plant created in this project.

For the production of the trash bins, the containers were composed of closed 200L pylons, 90 cm high and 57 cm in diameter.With a DW300 Tico-Tico saw, a cross section was made at the top to remove a lid for the bin.Another cross section was made to decrease the height of the bombona to 60 cm, in order to facilitate the trash ergonomics.The ends of the cut were sanded using 80-grit water sandpaper. On the cover, two semicircles on opposite sides were cut so that the residue could be discarded and two nylon clamps were fixed for handles to facilitate removal of cover during waste collection. In the upper interior of the bombona four hooks were placed, distributed evenly, protected with rubber to get support to the lid and to prevent the bags from being torn (Figure 1).

Fig.1: Hooksto prevent the bags from being torn

Fig.2: Trash binssticky and placed in trios

The trash bins produced were sticky and placed in trios (Figure 2), one in each of the busiest

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corridors on each floor of the three-storey main campus building. A trio was also placed in the campus cafeteria.In the corridors, there were wall-mounted general waste bins that, after implementation of the project, were converted to compostable waste bins and, next to each of them, a non-recyclable bins were placed.This was produced by means of recycled cardboard boxes, wrapped with brown paper, properly bonded. All rooms had common trash bins that, with the implementation of the project, became trash bins for the disposal of recyclable waste.

The solid waste, previously separated into bags, was weighed daily for 21 working days on a mechanical scales model MIC-1C, whose capacity is 150 kg and accuracy of 100 g. After weighing, the non-recyclable and compostable waste was discarded and the recyclable waste was separated and sent to the Recycle Resende Waste Pickers Association. The collected data were processed using the Excel program.

III. RESULTS AND DISCUSSIONS

Over a total of 45 days, effective 21-day weighing data were collected, while 24 days were for weekends, holidays, and non-academic campus days. Weighing data for these 21 days were plotted on explanatory graphs using Microsoft Excel software. These analyzes help to draw a quantitative and qualitative overview of the solid waste generated on the university campus.

With an active circulation of 800 people on the college campus, the average solid waste generated per day is around 24.45 kg, an expected amount for a high circulation environment.

As it is a university campus, the waste generated is expected to reflect the everyday life of a student environment, where paper, pens, disposable cups, food packaging and leftover food from campus meals are discarded in larger quantities.

The highest and lowest peaks in Figure 3 can be considered as indicative of the movement of people on a given day. High peaks indicate higher waste generation and, consequently, a larger movement of people on campus, such as on days of academic evaluations or receiving loads of products to the university, while lower peaks indicate lower movement of people, usually around dates. on holidays or weekends.

Fig.3: Total solid waste per day.

A more detailed analysis of the waste generated (Figure 4) indicates that most of what is produced per day is recyclable and non-recyclable waste. Being the first composed mainly of plastics, paper and

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cardboard and the second mainly composed of sanitary and laboratory waste.

Importantly, during data collection, there was still a high proportion of mix between recyclable and non-recyclable waste. This fact serves as a measure of the social and environmental responsibility of the campus population and demonstrates that further dissemination of the importance of selective collection and the positive impact that the proper treatment and disposal of this waste generates on society is still needed.

As far as compostable waste is concerned, the low amount presented in the data collected contradicts what is expected for a campus where a large number of meals are served per day. Once again demonstrating a still ineffective selective collection.

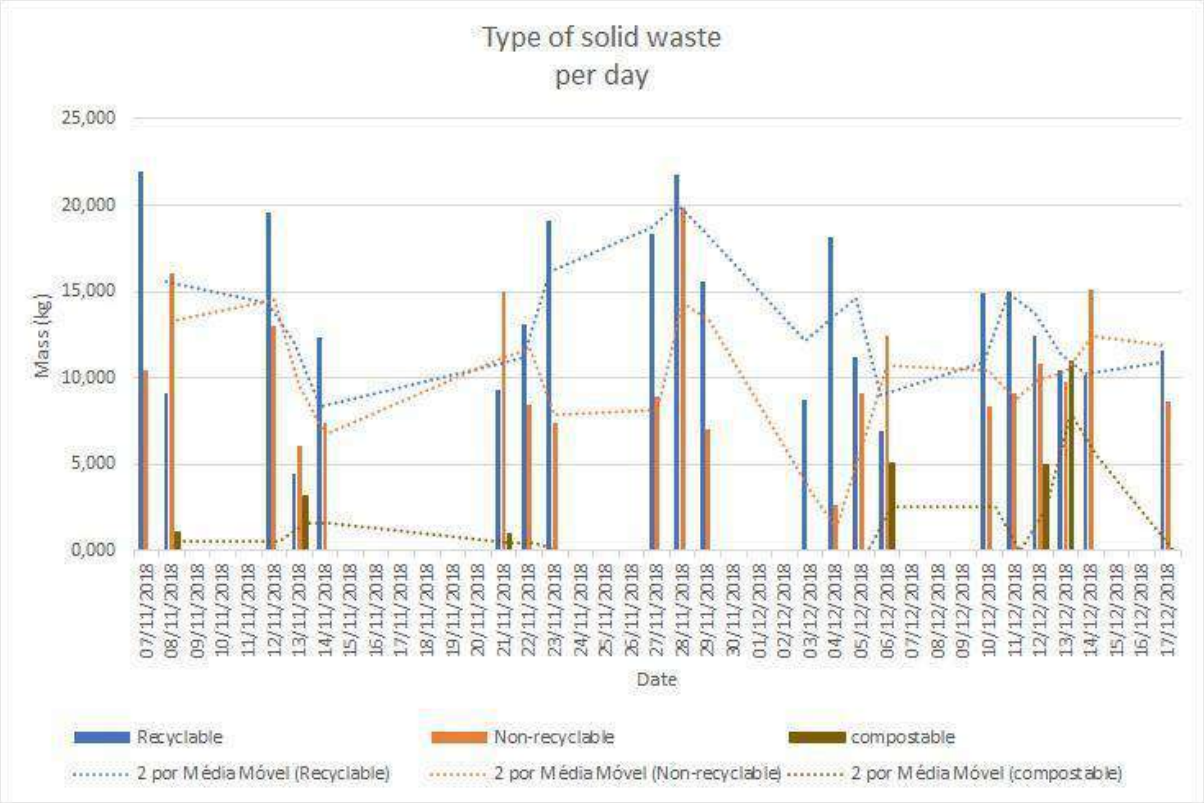

Fig.4: Types of solid waste generated per day.

At the end of 45 days of the weighing step, it was possible to identify how much of each type of waste was produced during this data collection period. Thus it can be shown that more than half of all the waste on the university campus in question is in fact composed of recyclable waste, followed by non-recyclable waste and, to a much lesser extent, compostable waste.

Since the collected garbage is still mixed, the data depicted in Figure 3 are not fully assertive, however, it is a necessary initial basis to elucidate an as yet unfamiliar campus landscape. It is important to emphasize that the implementation of selective collection demands an adaptation of the whole academic society and requires time to be completely satisfactory and with the ideal return.

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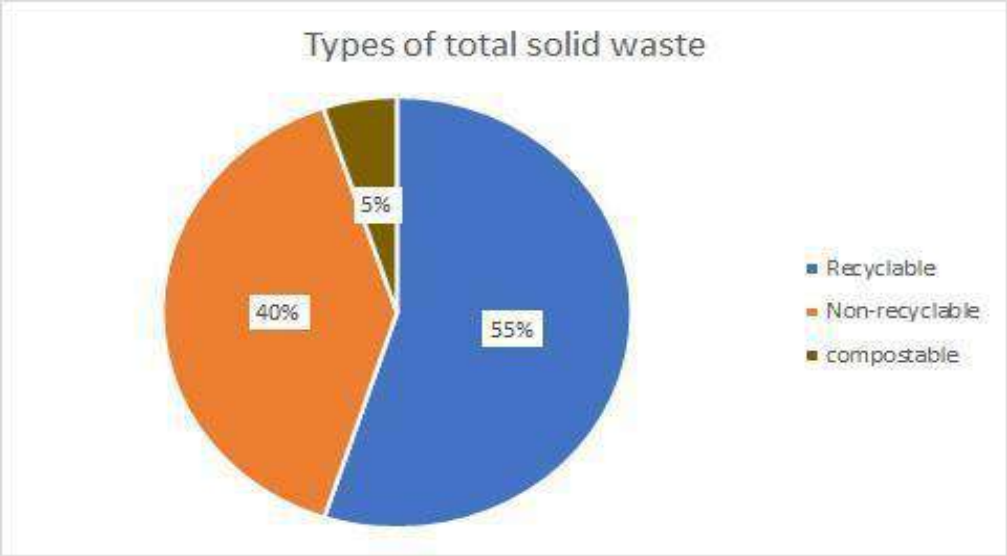

Fig.5: Total solid waste generated.

Comparing the percentages of waste generated on the local university campus (Figure 5) with the percentages of the University of Northern British Columbia Prince George campus [1], where 49.34% is recyclable, 28.42% non-recyclable and 21.61 % is compostable, there is a similarity in the value found for recyclable waste. However, there is a divergence in the values for non-recyclable and compostable, possibly due to the difference in the collection and separation processes.

Based on the data elucidated in the three graphs presented, several strategies can be mapped in the development of alternatives for the proper treatment and disposal of waste generated on campus. Among them, one can cite the best disposal of recyclable waste. Prior to the implementation of solid waste management, such waste was discarded without any sort of separation, however, currently the Resende waste picker association is contacted to give the appropriate destination to the materials that can be reused. As for the waste that cannot be recycled, the collection is done in the traditional way.

In addition, a variety of projects, such as development of composters, installation of used soybean oil collection points, biodiesel production, production of furniture made of PET plastic, among others, are being studied so that their implementation on campus is as quickly as possible, with the collaboration of students, faculty and the entire university community.

IV. CONCLUSION

In order to provide an overview of Campus solid waste generation, the data collected and analyzed here demonstrate that a more effective socio-environmental education of campus-goers is still required for effective and continuous waste management. Still, the data already indicate that several projects aimed at the university itself and the surrounding community can be developed by implementing the development and use of new technologies for the management and treatment of solid waste.

The heterogeneity of waste generated is a major setback in their use as raw material. There is therefore a need for fractionation of waste before it can be subjected to any significant treatment process [18].

The extension project now proposes to base, on the basis of the data collected, the subprojects to be developed in this area, taking into consideration which types of waste are generated the most and that can be viably treated on campus. In addition, new data collections will be made so that it is possible to analyze the progress of education and technological development brought to the campus.

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Analysis of the coal production chain from the caatinga vegetation in the rural area Petrolina – PE

Patrícia da Costa Souza[1], Sidney Silva Simplício[2], Reinaldo Pacheco dos Santos[3], Clecia Simone G. R. Pacheco[4]

[1] Degree in Chemistry, Federal Institute of Sertão Pernambucano (IFSPE/Brazil); PIBIC Project Scholarship. Email: patriciacosta0510@hotmail.com
[2] Degree in Chemistry, from the Federal Institute of Sertão Pernambucano (IFSPE/Brazil); Collaborator of the PIBIC Project
[3] Environmental expert; Member of the Red Iberoamericana de Medio Ambiente (REIMA/Brazil); Collaborator of the PIBIC Project
[4] Researcher at the Federal Institute of Sertão Pernambucano (IFSPE/Brazil); Coordinator of Red Iberoamericana de Medio Ambiente - Brazil (REIMA A.C.); Coordinator Project PIBIC. Email: clecia.pacheco@ifsertao-pe.edu.br

***Abstract*— *This paper aims to present the results obtained from the execution of the Project entitled "Analysis of the charcoal production chain from the caatinga vegetation in the Rural Zone of Petrolina – PE", approved in the selection of Public Notice nº. 55/2018 as the Initiation Grants Project. Scientific - PIBIC of the Federal Institute of Pernambuco Sertão – Petrolina campus. The main objective was to make an analysis of the charcoal production chain in the respective municipality, listing the environmental impacts caused to the native vegetation of the caatinga ecosystem, the fauna and the local society through the charcoal production. This is an applied, exploratory, descriptive and field research, where it was possible to make an exhaustive study of the literature and perform in loco the survey of the main caatinga trees used for coal production in the region. The results indicate the need for discussion of several important points in this agenda that should be discussed in the academic-scientific and political-social, aiming to point out the harmful consequences to the environment and society.*

Keywords*— *Environmental impact, Charcoal plants, Caatinga.

I. INTRODUCTION

Human beings have been accustomed to using firewood as an energy source since the creation of fire, and to this day continue to be widely used for various purposes, such as pulp, paper and charcoal manufacturing, for example. According to Goldemberg and Lucon (2006), the use of firewood in Brazil is significantly important, both in the generation of primary energy in household food cooking and in the generation of secondary energy through charcoal.

Charcoal production is an important activity for family farming in the region and is considered by many to be a source of income generation. Nationally, this is also a large-scale practice produced in different contexts. So while coal is produced in an environmentally and socially acceptable way, unfortunately it is also produced in contexts of environmental destruction and exploitation of cheap labor.

From 1979 to 1988 the rate of consumption of charcoal from native forest showed an increase of 189%, while the rate of consumption of charcoal from planted forests grew by 369%, providing the equivalent of 16 million cubic meters of wood to charcoal production (BRITO, 1990).

Rezende and Santos (2010) state that there are few studies on the charcoal production chain, and no specific systematic studies on the dynamics and structure of the charcoal chain were found, revealing the analysis of the interrelationships between the agents.

Oliveira (2003) points out that, in recent years, population growth, technological advances and the fossil fuel crisis have increased the pressure on the native flora of many regions, in different parts of the world, including Brazil, in various forms, highlighting the production of firewood and charcoal.

Based on these assumptions and in view of the immense plant richness present in Brazilian soils, especially in Caatinga, and the few studies related to coal production using the species of this exclusively Brazilian biome, this work aimed to analyze the coal production chain in the city of Petrolina – PE this coal originates from the native vegetation of the caatinga, listing the environmental impacts caused to the native vegetation of

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the caatinga ecosystem, the fauna and the local society through the production of charcoal.

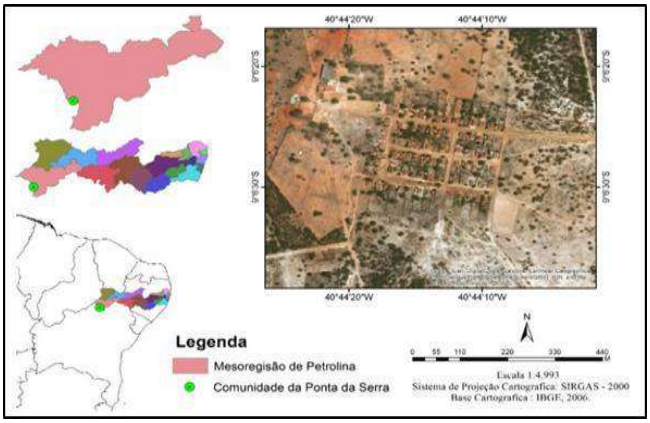
The focus area of this investigation was the charcoal plants of rural Petrolina – PE and surrounding regions, aiming to analyze indicators such as: productivity, resources and raw material, product quality and environmental damage, seeking to understand all such processes to delimit the situation around the charcoal, specify problems caused to the soil, vulnerabilities caused in the local fauna and flora and, from there, draw an economic, social and environmental diagnosis in order to find strategies for the reduction of environmental and environmental impacts of clandestine charcoal plants.

This is an applied, exploratory, descriptive and field research, where it was possible to make an exhaustive study of the literature and perform in loco the survey of the main caatinga trees used for coal production in the region. The results indicate the need for discussion of several important points in this agenda that should be discussed in the academic-scientific and political-social, aiming to point out not only the harmful consequences to the environment and society, but also to present mitigation proposals for these areas.

II. MATERIALS AND METHODS

2.1. Location

The research was conducted in the rural area of Ponta da Serra, in the municipality of Petrolina/PE, located in the state of Pernambuco (map 1). The municipality of Petrolina is located in the São Francisco mesoregion and the Petrolina microregion of the state of Pernambuco, limited to the north with Dorments, south with Bahia State, east with Lagoa Grande, and west with Bahia State and Afrânio (CPRM, 2005).



Map 1: Search Location
Source: Pacheco (2020)

The municipality of Petrolina, is inserted in the geoenvironmental unit of the Depression Sertaneja, which represents the typical landscape of the northeastern semiarid, characterized by a very monotonous pediplanation surface, predominantly smooth-undulating relief, cut by narrow valleys, with dissected slopes. Residual elevations, ridges and/or hills punctuate the skyline. These isolated reliefs testify to the intense erosion cycles that affected much of the northeastern backcountry (CPRM, 2005).

The vegetation is basically composed of hyperxerophilous caatinga (figure 1) with stretches of deciduous forest.

Fig. 1: Vegetation of the caatinga ecosystem in the surveyed area
Source: Souza (2019)

The climate is tropical semi-arid, with summer rainfall, and the rainy season begins in November and ends in April, with average annual rainfall around 431.8mm. With regard to soils, in the Long and Low Levels Slopes of the gentle undulating relief occur the poorly drained planosols, average natural fertility and salt problems; in the Tops and High Strands, the non-calcic, shallow and high natural fertility soils; in the tops and high slopes of the undulating relief occur the podzolics, drains and average natural fertility; and in the residual elevations there are the litholic, shallow, stony soils and average natural fertility (CPRM, 2005).

2.2. Research Typology

This research is presented as descriptive, which aims to observe, record, analyze and correlate phenomena or facts, without interfering with the analyzed environment, being the type of research most used in the social sciences (VIEIRA, 2002; MALHOTRA, 2001). As for the purposes of this research, it was constituted of the exploratory type, because they propose to make a bibliographical survey and interviews in the communities that have their income focused on the charcoal manufacture, with the purpose of getting used to the problem. Thus, it constitutes an exploratory and descriptive research.

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It is also exploratory, as there are not enough scientific productions focused on this theme focusing on the rural communities of Petrolina – PE, where there is a large amount of charcoal production. Descriptive because it aims to know and describe the actors of a specific market as well as understand their behavior for the formulation of strategies (VERGARA, 1988, p. 35).

The work began with a survey of bibliographic sources, analyzing already consolidated studies on the coal production chain, environmental impacts, and the main native caatinga trees used in the Caatinga rural communities of Petrolina, Pernambuco State, with to point out the main impacts in the region. From what was previously mentioned, to reach the proposed objectives, the following steps were traced: the theorists that deal with the charcoal chain, the Caatinga ecosystem and the tree species used in predatory deforestation were read, coal production, as well as its immediate and medium and long term impacts on the soil. For this, it was made the choice of scientific articles published in Scielo, Periodicals Capes, Google Scholar that address these issues.

After reading there was a brief discussion of the most relevant points of reading, between coordinator and students in order to talk about the main points of the research. After the readings, files and discussions, we set out to develop a field research script, carried out in the rural communities of the municipality focus of the research. In the field research, it was analyzed landscape, soil, vegetation and charcoal manufacturing processes, where the obtained results raised the stability level of the research focus area.

As a method of data discussion analysis, a comparison was made between the concepts found in journals and the data obtained in field research. From this, the real conclusion is reached of what is the situation of the local fauna and flora. Based on this, an intervention proposal was elaborated that will take into consideration the physical and social aspects.

III. RESULTS AND DISCUSSIONS

It was verified through the readings that address the thematic chain of charcoal production, that the process of charcoal production begins with the drying, loss of free or capillary water and adhesion water and with the transformation due to physical thermal decomposition, irreversible chemical (FREDERICO, 2009).

Total or partial degradation of wood and the elimination of volatile components are caused by the action of heat. This phenomenon is called pyrolysis, one of the oldest phenomena that presents as a result a series of products, including charcoal. However, this process is associated with the oven temperature level (BRITO, 1990). Carbonization enters with air to partially burn wood volatiles, providing the necessary energy for the process (SAMPAIO, 2008).

Charcoal production occurs in charcoal plants. The name of charcoal (Figure 3) is the place where the furnaces are concentrated and the operations that involve the activities of receiving and dispatching coal production (BRITO, 1990). Coaling is the process of transforming wood into coal (VITAL; PINTO, 2011).

Fig. 3: Charcoal in the research area
Source: Souza (2019)

There are different types of charcoal for charcoal production, some with the application of technologies that are designed to reduce social and environmental impacts and increase efficiency, and others with a rudimentary process characterized by low productivity and large social and environmental impacts (MOTA, 2013).

Based on this information, we sought to know more about the theme by seeking information on the existing charcoal in rural areas of Petrolina-PE, where it has already been noticed the large number on the outskirts of the city. Through on-site visit, it was possible to verify what is described in the literature about the main trees used in predatory deforestation for charcoal production, such as the black jurema (Mimosa tenuiflora), the Jureminha (Desmanthus virgatus), the angico (Anadenanthera colubrina) and the cating tree (Caesalpinia pyramidalis Tul.) (Figure 4).

The Black Jurema - Mimosa tenuiflora is a small tree that grows to 7m in height. The stem is lined with sparse thorns in the younger parts, but adult thornless plants can be found in the Caatinga. The leaves are composed of small leaflets, with forage quality in the feeding of goats and cattle. The flowers are white, arranged in spike inflorescences and have apicultural potential. The wood is used for piles, firewood and coal of high calorific value (4,150 Kcal.m-3) (EMBRAPA, 2010).

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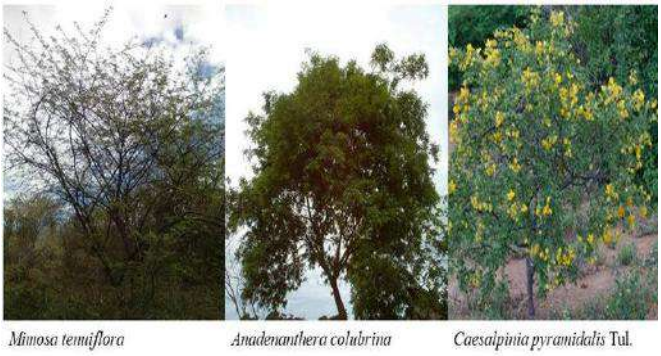

Fig. 4: Main caatinga devastated species
Source: Pacheco (2019)

Already Jureminha - Desmanthus virgatus is a perennial shrub legume, widely occurring in the Northeast. It may also be known as anise-debode, worm's cinnamon, black reed, saracura feather and cowboy's bark, totaling 24 species (LUCKOW, et. al., 1993)

Angico - Anadenanthera colubrina, in turn, is a medium-sized tree, reaching up to 15m in height, with thick and very rough bark. The leaves are composed of 20 to 80 leaflets, always in pairs. The cream-colored brush-shaped flowers are clustered in globular inflorescences. The fruits are flat, thin, long and dark colored pods (EMBRAPA, 2010). The leaves are toxic to cattle, but when hay or dried together with the young branches, they are excellent fodder for cattle, goats and sheep. The wood is used for stakes, posts, firewood and coal of high calorific value (3850 cal.g-1).

According to studies by Embrapa Semi-arid, at 8 years of age, Angico presented average height of 3.7m and diameters at breast height of 4.7cm with an average annual increment of 1.1m3 / ha year-1, indicating that this species can be considered as a good option for production (EMBRAPA, 2010).

The Catingueira - Caesalpinia pyramidalis Tul., can be used for various purposes, including animal feed, its leaves that sprouted after the onset of rain can be an important source of forage; presents honey potential in both pollen and nectar production and shelter for stingless wild bees of the genus Melipona and Trigona, which nest in the hollows of the trunks. In addition, it may have energy use as firewood. In home medicine, the species can be used due to its antidiarrheal properties (use of leaves, flowers and bark) and in the treatment of hepatitis and anemia (use of bark) (MATIAS; SILVA; DANTAS, 2017).

In the field research (figure 5) it was possible to understand how the charcoal production process is constituted. The procedure can basically be done as follows: first, a ditch is dug in the ground and around that ditch are made openings, ie passages where smoke will escape, then placed in the ditch neatly and stacked, the caatinga wood already cut, and on the woods is placed some kind of vegetable such as grass or grass.

Fig. 5: Ongoing stream for the coal manufacturing process
Source: Souza (2019)

After this procedure, the fire is covered with earth, the fire is placed in one of the mouths that is then capped so that the smoke comes out in the other openings, it will produce a lot of smoke, after this smoke ceases and only fire is closed, all openings so that no more oxygen can enter and so the wood turns to charcoal. If not done this way, the wood turns to gray.

Small farmers have for years been extracting firewood [caatinga hardwood by stem thickness] for charcoal production (figure 6), fencing, and especially for traditional crops such as corn and beans. There is another side of the story that needs to be discussed, that is, this increase in the rate of deforestation of the caatinga is primarily due to the demand for firewood and charcoal from large industrial complexes in the northeastern capitals (FOTOS E FATOS DA CAATINGA, 2013).

Fig. 6: Firewood used in chairs
Source: Souza (2019)

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In some areas of the Sertão de Pernambuco, especially in the borders of the municipalities of Serra Talhada and Custódia, this activity is contributing to the devastation of caatinga, since coal is produced on a large scale and sold to industries in the capital Recife (FOTOS E FATOS DA CAATINGA, 2013).

It is clear from past experiences that most charcoal-dwellers survive on their income and have no other source of survival. There are large-scale fabrications where people work for a boss; and on a small scale, where they work for themselves and for family support.

It is possible to classify charcoal producers into groups: professional producers (those who produce charcoal with wood purchased from forests of farmers and reforesters); potential producers (arise at the time of high product prices); independent producers (group of self-employed forest planters who use surplus wood for charcoal production and those who use wood from forest management) and fostered producers (those who receive incentives from charcoal consuming companies) , according to Barcellos classification (2016); Rezende; dos Santos (2010).

However, Santos (2017) states that:

> The sustainability of the charcoal production process is based on ensuring the permanence of the activity in accordance with: (i) the ability of natural resources not to be compromised by the use of raw materials from renewable sources and that the management is adequate to do not harm the environment; (ii) the ability to make the best use of available resources through the use of technologies and good manufacturing practices; (iii) ensuring that human beings will be respected in their elementary needs, both those involved in the activity and those around them; (iv) respect for the environment by the non-emission of pollutants and compliance with relevant legislation; and (v) the economic viability of the activity in generating sufficient earnings to maintain the activity and without harming the environment (SANTOS, 2017, p. 120).

It is evident, therefore, that the rudimentary practice harms the environment, as, for example, some woods used could be better used for medicinal purposes, such as the use of angicos in folk medicine, where it is used by extracting the principles curative actives by peel or gum (resin), by infusion, syrup, maceration or tincture.

The angicos bark is rich in tannins, mucilages and alkaloids that have hemostatic, depurative, astringent, healing and pectoral emulsifier medicinal action being very suitable to treat: coughs, pertussis sexual diseases, uterine problems bruises among others, not to mention the environmental issue itself said (BRITO et. al., 2016).

However, it is also inevitable that many people still need to do this manufacturing because of their financial conditions and where they live. Many rural communities still make a living from selling coal, they make small-scale use of dead wood, produce what they need for a living, and live in fear of being punished in some way by the competent authorities of the environmental crime bodies, such as the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), even if these people manufacture charcoal without causing deforestation of the caatinga, just reusing dead vegetation.

On the soil of the waterfalls (figure 7) it was possible to notice that over time the “black earth”, soil coming from where the charcoal production takes place is a great alternative to be used for fertilization. Some residents of the analyzed region make use of the inactive waterfall soil in irrigation projects and there are empirical reports that the soil is very effective for fertilizing plants such as guava, hoses and coconut trees. They also add that these so-called “useless” and polluting soils are now in good use.

Fig. 7: Inactive Caeiras
Source: Souza (2019)

From this study, it was concluded that the competent authorities must fulfill their obligations to soften the clandestine charcoal production in the municipality, focusing especially on the large-scale ones, which really do the greatest devastation of the caatinga and profit, with the raw materials of the ecosystem.

Small-scale manufacturing needs to be recognized as an environmentally friendly action because natural wood from dead vegetables is used. In addition, all charcoal that is produced on a small scale stays in the municipality for domestic consumption, bringing benefits to the residents themselves and assisting in family farming through the use

of rich and beneficial soil for the cultivation of food species.

IV. CONCLUSION

This research was crucial to verify the main impacts of charcoal production in the region, since there are few literature on this subject. It is concluded based on the readings and discussions, that the objective was achieved and that the research in question is of fundamental relevance, as it showed an existing reality in the city of Petrolina-PE in which before had not been discussed.

It was possible to understand how a charcoal system works, how charcoal is actually made in some regions and this has given impetus to field research, in which it was possible to demystify many previous questions and statements.

In addition, the research also made the academic, political and social view of this issue bring to the public knowledge of the city of Petrolina-PE, about the charcoal chain, the Caatinga ecosystem and the tree species used in predatory deforestation for coal production, as well as its immediate, medium and long-term impacts on the soil.

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Comparison of the Energy Markets of Colombia and Brazil

V. Vásquez, O. H. Ando and J. J. Gimenez

Abstract— *This paper presents a description and comparison of the electricity markets of Colombia and Brazil. First of all, a study of the institutional structures and free and regulated trade environments of both Colombia and Brazil is carried out, as well as the regulated user ratings and the composition of the final prices given to these consumers according to the category to which they belong and how the evolution of these tariff values in both countries has been, regarding to the free environment, the prices of the most recent auctions of these countries are verified. The economic implications that it represents for consumers are then evaluated, belonging to the free or regulated environment in Colombia and Brazil. Moving from the internal comparison through these countries, an analysis between them is carried out, in which it is shown how the stipulated taxes also generate a marked differentiation between the values paid by the consumers of electric energy of the mentioned countries.*

Keywords— ***Deregulated Energy Market, Regulated Energy market, Wholesale Electric Power, Brazilian Energy Market, Colombian Energy Market.***

I. INTRODUCTION

The electric power is one of the most frequent energy sources in the world, being of great importance for the economy and maintenance of various sectors, due to the ease of transmission and the low relative index of energy losses during the conversion processes, what has made it indispensable for modern societies [1]. In this context, electricity causes a significant impact on the socio-economic development of countries, so when a society expands its knowledge about energy sources, it improves its quality, once electric power performs functions in different fields of society, as hospitals, colleges, shopping centers, communication systems, industries, etc. [2].

Colombia and Brazil are mainly water energy matrices countries, in Colombia, this type of generation cover 68.3%, followed by a thermal generation with 30.7% [3]. Between 1997 and 1998, the country experienced a strong child phenomenon, in which the hydraulic generation had a reduction of 30% concerning demand, it went from supplying 68.3% to move to 47.81% of the energy needed. Due to the strong dependence of this source, the maximum use of the backup capacity was required with the thermal generation that reached to supply 49%, leading to the highest known stock prices in the country and generating a rethinking of the system of energy market [4]. The remaining 3.19% was supplied by unconventional sources.

Similarly, Brazil has 66.3% of hydroelectric generation and 16.7% of thermoelectric plants [5]. A large rationing of water was necessary for 2001, so a series of changes were created three years later to modify energy security, tariff forms, and universal attention; by 2012, through a provisional measure, subsequently converted into Law 12.783 / 2013, generation and transmission companies may renew concessions, while their prices are regulated by ANEEL [6].

The energy generated in both countries is transported through a National Interconnected System (NIS), which covers most of its regions, having generators scattered throughout the national territories, these are interconnected to allow energy to be reached at any place that encompasses the system, independently from the point of production, generating greater security for consumers [4] [6].

Generators, transporters, and consumers interact through energy markets, while distributors and electricity traders are also part. In both countries, the electricity business in broad strokes has two negotiation environments: regulated and free, determined by the intervention that the state performs with prices, times and forms of supply in trade agreements of energy.

The Brazilian and Colombian markets have great similarities in their structure, however, the components charged to users vary, mainly regarding taxes added to the electric power account of Brazil. To make a comparison between the markets of the two countries, the first step was to analyze their institutional structures to identify the function performed by the different organs that compose them. Afterward, the commercial environments were

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evaluated due to the importance of the characterization and criteria that determine the types of users framed in the regulated environment, from this categorization to the consumers depends on the variation in the tariffs they must pay. For the free environment, the requirements to belong and the energy values in the most recent auctions of both countries are addressed.

Afterward, the components of the energy bills of both countries are addressed both in the free trade environment and in the regulated one, addressing the values related to unit costs per generation, public lighting, and taxes. Is shown what is the impact that the generation price, taxes, sector orders, and public lighting have on the account, as well as the methodologies used to stipulate each of them.

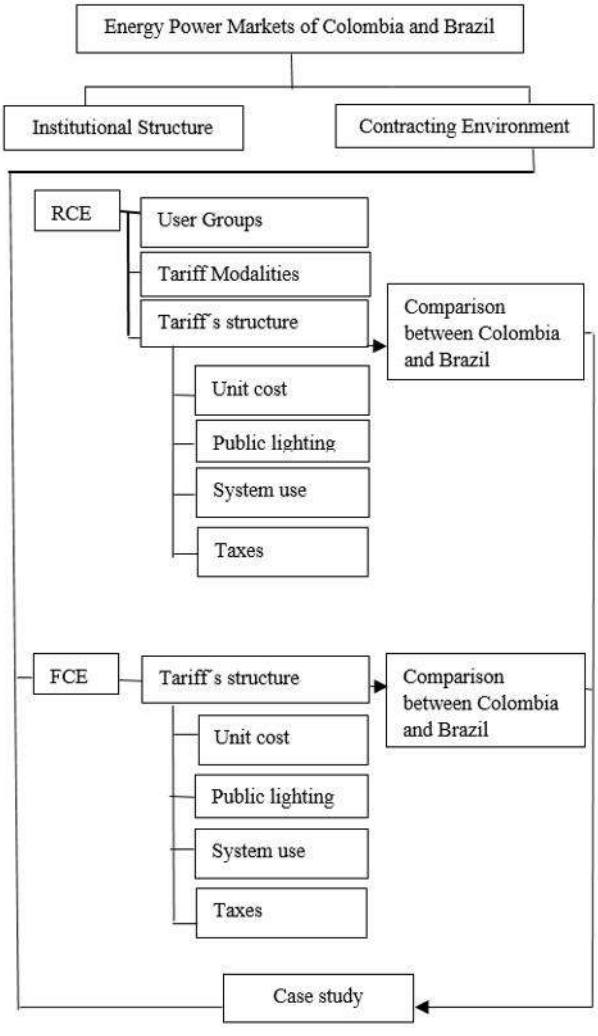

Fig.1. Flowchart of the study of the Brazilian and Colombian electricity markets.

From the evaluation of the advantages and implications that each environment has in the national spheres, goes to an international comparison, in which it is visualized, as the laws and the control carried out by the governments, generate implications for consumers.

In general terms, by studying the functioning of markets, it is evaluated as the economy when a user goes to de RTE to the FTE. The comparison of tariffs is compared both in the regulated trade environment (RTE), and in the free trade environment (FTE) of both countries, which leads to the application of these to a case study that shows the cost of energy for the Colombian and Brazilian industry in both environments, as well as the consequences of the transfer of large consumers to the free environment in these countries (Figure 1).

II. MARKET COMPOSITION

As was mentioned before, all the electric markets have generating agents, distributors, carriers, marketers, consumers and external agents [7]. The generators are the owning companies or concessionaires of the central plants of the electric energy, which could be thermoelectric, conventional hydroelectric or special units producers, that carry out the generation through wind, solar and cogeneration energy, etc. The carriers transport the energy from the generation plants to the high demand. The distributors distribute through concessions the energy in specific geographic zones to the consumers that are classified in regulated and free or specials (to buy and have free access to the prices set with the generators) [7].

In general Colombia and Brazil count with homologous structures, resulting in commercial environment with similar characteristics, the main differences are marked by the classification according to the user consumption in the regulated environment, and the required consume to be part of the free trade environment.

All the agents that are part of the markets are being governed by laws and institutions to regulate and control them, that's why it is important to understand that the institutional structures of the electric sector are fundamental for understanding the energy markets.

A. Brazil´s Institutional Structure

The Brazilian electric sector organizations (Figure 2), is governed with policies that are generated by the National Energy Policy Council and the Presidency of the Republic, through *(i)* the National Energy Research Council, *(ii)* the

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Ministry of Energy and Mines and at *(iii)* the Electricity Monitoring Committee; the facts related with the regulation and inspection are monitored by the National Agency of Electric Energy. The system operation is managed by the National Operator and the business affairs are monitored by the Electric Energy Chamber of Commerce [8]. To continue the functions of the constituent entities of the system are going to be explained briefly.

National Energy Policy Council (*Conselho Nacional de Política Energética CNPE*): Adviser of the Presidency of the Republic to formulate policies and energetic guidelines, regarding the technical, economic, social and structural aspects, with the purpose to obtain the use of energy resources [9]-[10].

Ministry of Mines and Energy (*Ministério de Minas e Energia MEM*): It is the main component of the National Energy Policy Council; its functions are the coordination and the executive secretary. [11].

Research Energy Company (*Empresa de Pesquisa Energética EPE*): It serves the Ministry of Energy and Mines through the regulation of the National Electric Energy Agency, it makes studies and needed researches to the organization of the energetic sector, including referent processes for the realization of auctions [12].

National Electric Energy Agency (*Agencia Nacional de Energia Elétrica ANEEL*): it regulates the electric sector controlling the generation, transmission, distribution and commercialization and supervising through agreements and concessions the permissions and system services according to the policies and laws from the government [13]. It also supervises and approves the process of energy commercialization made by the Electric Energy Chamber of Commerce, ONS network operating process and the generating expansion for the regulated consumers [11].

National Petroleum Agency (*Agencia Nacional de Petróleos ANP*): linked to the MME is responsible for regulating oil, natural gas and biofuels, through the promotion and regularization, trade and control of the economic activities of the industry [11].

National Electric System Operator (*Operador Nacional do Sistema ONS*): Acting under the supervision of ANEEL, it controls and coordinates the generation and transmission operations of the NIS and the isolated systems [15].

Chamber of Commerce of Electric Energy (*Câmara de Comercio de EnergiaElétrica CCEE*): through the control of ANEEL, it is responsible for making possible the purchase and sale of electric energy, managing and registering the contracts of the free trade environment and the regulated environment, promoting auctions, defines the dispute settlement price (DSP) of the short-term market for the submarket, as well as the limits for trade electric power and the penalties for such matters [16].

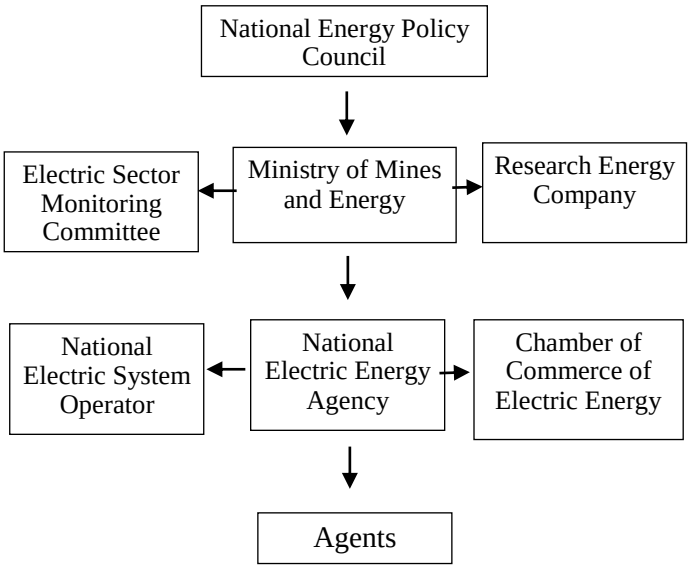

Fig.2. Institutional diagram of the Brazilian Electric Sector [8]-[14].

Electric Sector Monitoring Committee (*Comité de Monitoramento do SetorElétrico CMSE*): Evaluate the continuity and safety of the electric power supplement and its supplement conditions, accompanying the development of the activities of generation, commercialization, import and export of electric energy [14].

B. Colombia´s Institutional Structure

The Colombian electric energy market, as shown in Figure 3, is headed by the Ministry of Mines and Energy, who regulates and legislates, with the help of the Energy and Gas Regulation Commission, the Superintendence of Home Public Services and the Mining-Energy Planning Unit; The supervision of the SIN operation is carried out by the National Dispatch Center, while the administration is carried out by the Administrator of the Commercial Exchange System and the Liquidator and Account Manager of the National Transmission System.

Ministry of Mines and Energy (*Ministerio de Minas y Energía* MME):Manages resources seeking to obtain their best use by formulating, implementing and coordinating policies related to the generation, transmission, distribution and updates for the rational use of energy and the incentive to production through alternative sources [4].

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Commission for the Regulation of Energy and Gas (*Comisión de Regulación de Energía y Gas* CREG): Regulates the provision of the service and promotes the competencies of the agents providing it, making them efficient, through the preparation of bills and the regularization of the superintendence, mainly regarding tariffs [17]

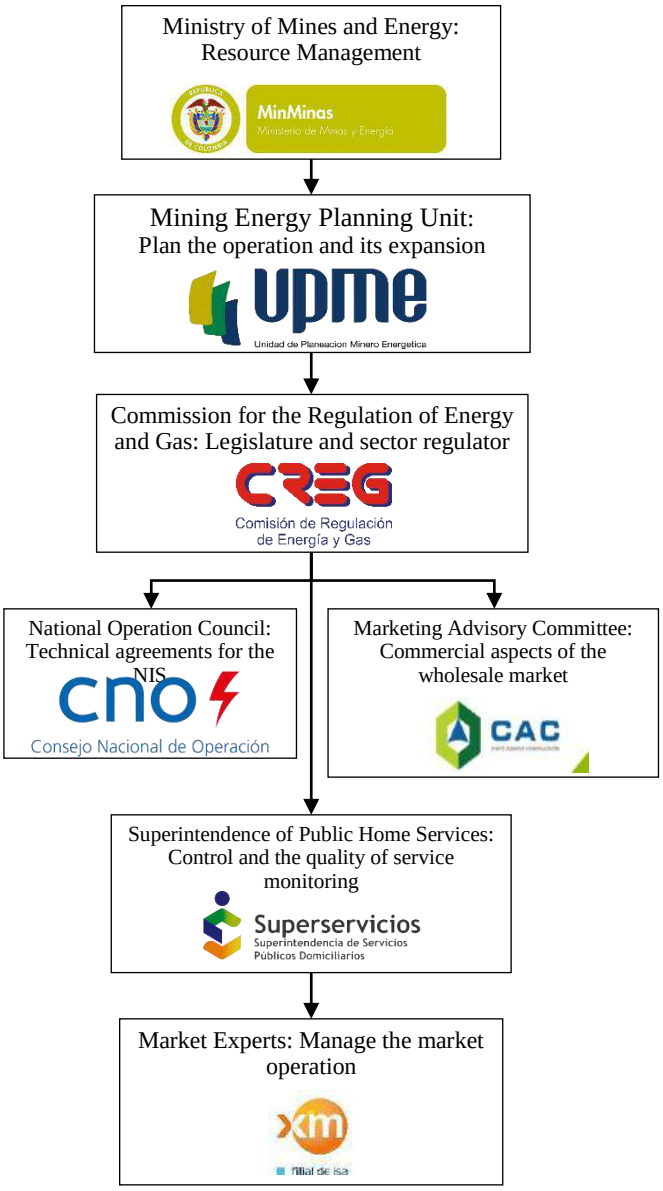

Fig.3. Main Institutions of the Colombian Electricity Sector [4] [17] - [19].

Superintendence of Public Home Services (*Superintendencia de Servicios Públicos Domiciliários SSPD*):Control and supervise the system independently of the Regulatory Commissions [4].

Mining Energy Planning Unit (*Unidad de Planeación Minero-Energética UPME*): It is attached to the MME, whose function is to plan and coordinate the agents of the electricity sector, take care of the use of resources and produce the information required for the creation of policies that support the ministry's programs [18].

National Dispatch Center (*Centro Nacional de Despacho* CND): is responsible for the planning, supervision and control of the integrated operation of the generation, interconnection and transmission resources of the National Interconnected System (SIN). Prepare the generation office and the coordination of the agents that participate in the SIN operation to have an economical, safe, reliable operation and following the operating regulations [4].

Administrator of the Commercial Exchange System (*Administrador del Sistema de Intercambios Comerciales ASIC*): Keeps records of commercial boundaries and long-term energy contracts, performs the liquidation, billing, collection and payment of the value of the energy acts or trade traded on the stock exchange of values by generators and marketers, is responsible for the maintenance of the required information systems and computer programs; of portfolio management, the management of guarantees and the fulfillment of the tasks necessary for the proper functioning of the Commercial Exchange System (SIC), through the conclusion of a contract [4].

Liquidator and Account Manager of the National Transmission System (*Liquidador y Administrador de Cuentas del Sistema de Transmisión Nacional STN*): Liquidates and invoices the charges for the use of the National Interconnected System networks that are assigned to it, as well as the regulated income to the transporters and to administer the accounts that by way of Network usage is caused to wholesale market agents [4].

National Operation Council (*Consejo Nacional de Operación CNO*): It makes the agreements of the technical aspects to guarantee that the operation of the SIN is reliable and economical, additionally, it executes the operation regulation [4].

Market Experts (*Expertosen Mercado XM*): It is a private company that performs SIN operation functions and manages the Colombian energy market [19].

III. TRADE ENVIROMENTS

The free and regulated trade environments (FTE - RTE) are a common denominator in the energy power markets of both countries, the first one is based on negotiation of the price of a certain amount of energy in a stipulated

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consumption time, through direct trades between the consumer and the generator; the second one, has state intervention for the regulation of the prices [4] [6] [20].

In Brazil, there are two modalities for becoming a FTE, (*i*) special consumers, who are required to make their agreements with special incentive sources, such as wind, biomass or small hydroelectric plants, furthermore, their demand must be equal to or greater than 500 kW and not exceed 3MW, if this value is exceeded and the voltage exceeds 69 kV, the user will be considered as (*ii*) free consumer [6] [21]-[22]. In the case of special consumers, there is the figure of "communion", in which one, when a single consumer does not reach the minimum demand required to belong to the FTE, he can join with other consumers to complete it [22]-[23].

Due to the reduction in costs for the special or free consumers, in relation to the RTE, the increase in the number of users of the FTE has been occurring exponentially. 2016 was the year that showed a greater insertion of consumers to the free environment, this meant that between 2015 and 2017, the increase represented 136%, where they were mostly special consumers [23]-[24].

The Brazilian free-market supplies more than 60% of industrial consumption and more than 30% of the country's energy [23] [25]-[26].

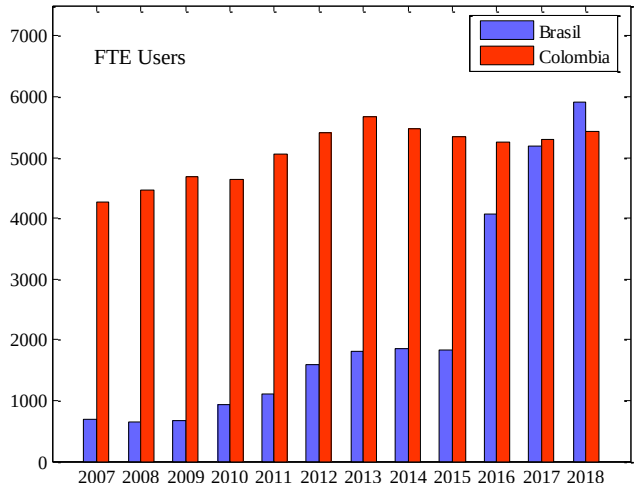

Fig.4. The number of FTE users in Colombia and Brazil [25]-[27].

For Colombia, CREG has stipulated that for becoming at the free trade environment, the minimum demand is 0.1 MW or consumption of 55 MWh-month [28]-[29].

Free buyers in the country, since 2011 has remained higher than 5000 users, without presenting large variations [27]. This fraction of buyers represents the majority of Colombian energy consumption, being in 2018, accounted for 68.3% of the energy consumed [30].

In both countries, when the contracted demand values by the free consumer are exceeded, it must go to the spot market, a short-term market with high price volatility that seeks to market surpluses and missing of the contracts, in which the operator of the market (in Colombia XM and Brazil CCEE) makes projections of consumer demand and the supply of energy of the bidders the day before its sale in a short-term auction [29] [31] - [32]. In this market, distributors also carry out transactions, both buying and selling [29] [32].

Users who do not reach the minimum demand and/or voltage levels required in both countries are forced to belong to the RTE, in which the price for energy consumption is calculated by specific methodologies that will be presented in sections IV and V.

IV. TARIFF STRUCTURE FOR BRAZILIAN REGULATED CONSUMERS

In Brazil, the tariff structure is monitored by ANEEL, who stipulates the methodology and values of the rates, these values vary according to the division of the user groups of the system based on the tensions they are served and their category.

Regarding the energy bill, this must cover the costs of generation, transmission, distribution, Governmental (Federal, State, and Municipal) segment burdens, the taxes for PIS / COFINS (Social integration Program/Contribution for Social Security Financing) the ICMS (Tax on Commodity Circulation Transactions), and public lighting [33].

On average, as shown in Figure 5, in account for regulated users, 54% corresponds to the cost of generation, transmission and burdens (TSB), 30% ICMS, PIS / COFINS and the remaining 17% to the distribution costs of the electric energy [34].

It is important to clarify that according to ANEEL (2011), the public lighting rates vary in different locations, being defined for the municipal government.

The calculation of the energy rate is defined by the concession trade between the distributor and the Union, they provide three mechanisms for the tariff update, these being the annual adjustment, the periodic tariff revision (approximately every four years) and the extraordinary revision tariff. [33].

The value to be charged to the consumer is given by equation 1.

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$$\text{Consumer Value} = \frac{\text{ANEEL´s tariff value}}{\text{1-(PIS+COFINS+ICMS)}} \quad (1)$$

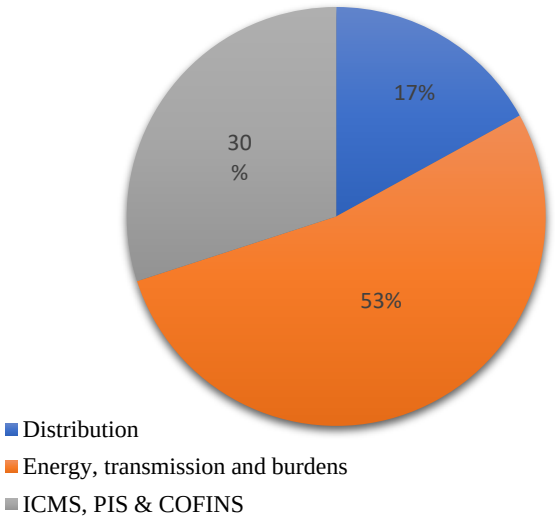

Fig.5. Brazil Energy Bill Composition Diagram [34].

The energy rate is charged in USD$/MWh and the prices vary with different factors such as peak (P) and off-peak (OP) schedules throughout the day and the applied rate modality [33].

Another determining factor in the price of the energy tariff is given by the user group in which the consumer is classified, as developed below.

A. User groups

Figure 6 shows how to differentiate network users and be able to make different user tariffs. Users are divided as high voltage groups "Group A" and low voltage "Group B", the reference value is 2.3 kV

These groups are divided into subgroups, those of group A, are divided according to the tension that will be attended, while group B depends on the kind of service, which in turn has subclasses. [35].

Additionally, and according to ANEEL, system users can also be divided as (*i*) consumers, (*ii*) generating plants and (*iii*) other distributors. By this last division, the rates will be applied by tariff modalities.

The tariff modalities refer to the set of rates for the consumption of electric energy and the demand for active power, according to figure 7 [35].

Among group A, there are two different schedules, which are cataloged according to consumption per hour:

Peak (P): In the 3 consecutive hours with higher energy consumption. Not hugging Saturdays, Sundays and national holidays [35].

Off-peak (OP): Hours complementary to the peak period [35].

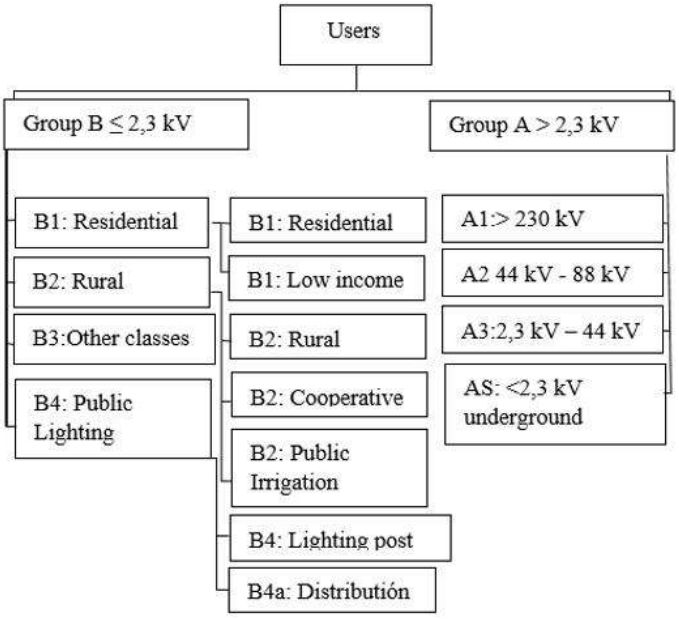

Fig.6: User Categories, Brazil[35].

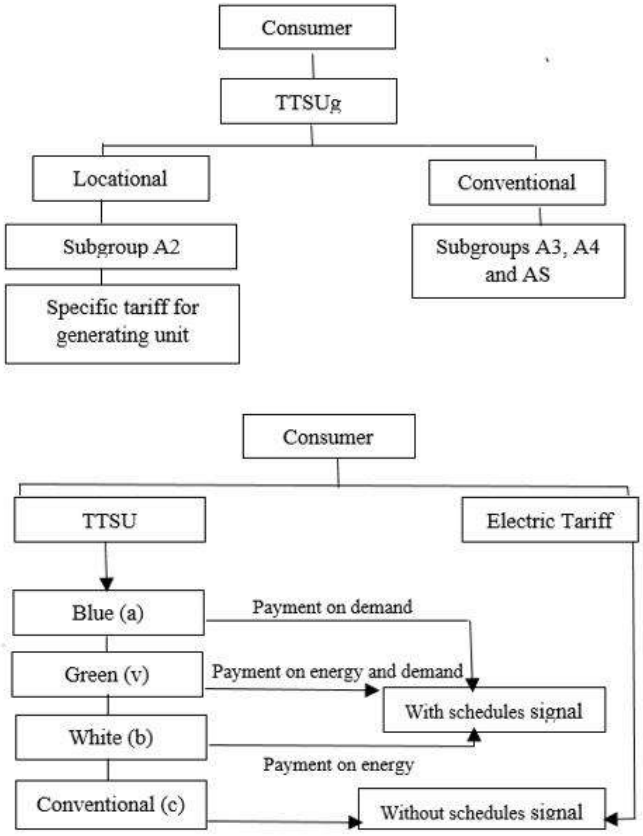

Fig.7: Tariff modalities, Brazil [35].

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Regarding group B, three positions are classified, the (*i*) Peak-hour (P) which, like Group A, is the three consecutive hours of highest consumption on day (not applicable for weekends and holidays), (*ii*) the Intermediary (I) that covers the hour immediately before and after the peak period and the (*iii*) Off-Peak (OP), referring to the remaining hours [35].

To the above terms, the seasonal factor is added to regulated consumers, in which the rate is altered according to the generation costs, by classifying three flags or levels, as shown in figure 8 [35]:

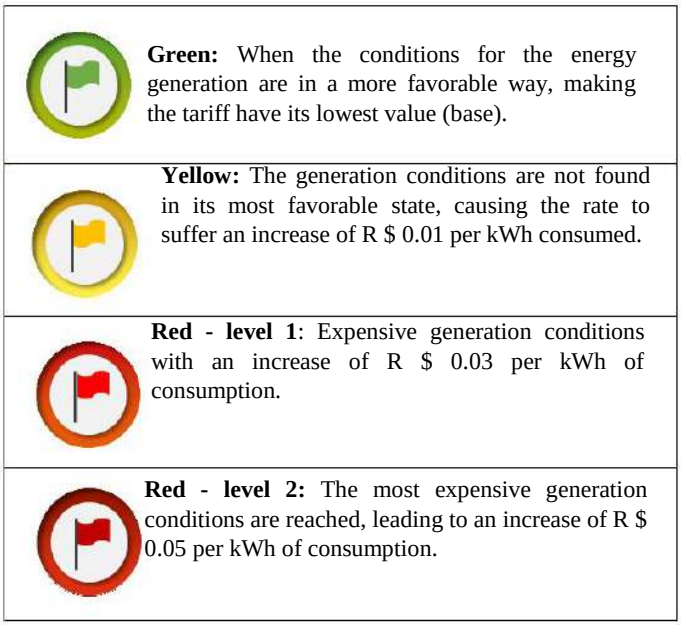

Fig.8: Energy rates according to flags and patamares [36].

B. User Bill

As shown on the COPEL website, the value to be paid by the user will be given by the equation 2.

$$AP = \frac{PL}{1-(ICMS+PIS+COFINS)} * C \quad (2)$$

AP- Amount to be paid;
C - Consumption,
PL- Public lighting rate stipulated by ANEEL;

The value referring to the ANEEL tariff is defined with all the items previously treated (the type of user, rate modality, flag, etc.).

C. Public lighting

The public lighting service is under care and administration of each municipality, so the collection of the same, it is also, since the changes in their rates must be approved by ANEEL. Figure 9 shows how the behavior and value of these rates have been between 2012 and 2018 [38].

As each city is independent of the form of collection, some choose to set a fixed time per user, but the most common methodology is to distribute the cost of lighting, according to the proportion that each user had at home [39].

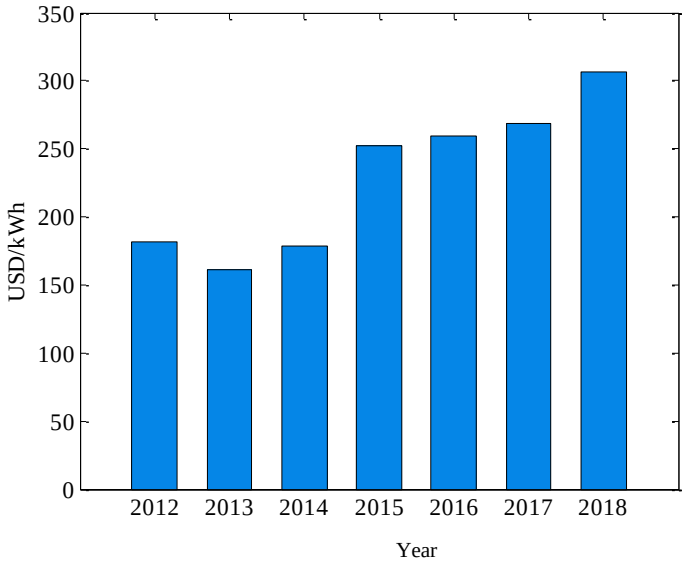

Fig.9: Evolution of public lighting rates in Brazil [38].

V. TARIFF STRUCTURE FOR COLOMBIAN REGULATED CONSUMERS

For the Colombian case, the rates are established according to CREG Resolution 079 of 1997, in which the determining factor is a socio-economic classification called “stratums", where 1,2 and 3 have a subsidy of 20% of the cost of the service that is charged for users of stratums 5, 6 and industries, stratum 4 and official agencies pay for their consumption [40].

The minimum charge for the availability of the service is charged only when the user's consumption is lower than that charge [41]. When a user is connected to the network, by CREG resolution 225/97, the connection charge is only charged once, which refers to the costs associated with the connection to the power meter. [42].

In general, in the tariff structure decreed by CREG, production, transmission, marketing, and administration costs are taken into account using formula 3 [41].

$$\text{Service Cost} = UC*\text{Consumption}+Cm \quad (3)$$

The CREG (2017) stipulates that the unit cost per service provision (UC) is calculated by the sum of the fixed unit cost

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(UCf), which is the basis of marketing and the variable unit cost (UCv), using equations 4 and 5.

$$UC = UCf+UCv \quad (4)$$

$$UCv = G+T+Cv+Lc+R \quad (5)$$

The generation charge "G" corresponds to the energy acquired from generators by traders, whether in the short-term market of the energy exchange (spot) or the long-term market, the latter is the most common [43].

Transmission cost "T", is the use of the national transmission system networks, in which the companies participating in this system are regulated by CREG resolution 011 OF 2009. The rate obtained by an annual estimate from the Invested capital, useful life, a recognized rate and income from other items [44].

Distribution cost “D” refers to the use of regional transmission system networks and the local distribution system [43].

The marketing charge “Cm” corresponds to marketers for their role as collection and intermediaries collection, as stipulated by CREG Resolution 119 of 2007, obtained by the use of the methodology of data envelopment analysis, with a margin of 15 Additional% to cover risks and invested capital and the average consumption of each invoice[43].

Through the value of the cost for losses (Lc), the marketers have recognized the intrinsic losses to the network and the equipment, utilizing estimates if there is no starting data, it is recognized 0.5% less than the operator with the lowest losses [43].

The restrictions cost “R” is made when, due to technical conditions, the operation of more expensive units is necessary than those of the optimal dispatch, having to make modifications to the generators, which leads to an operational extra cost that is determined by the system administrator of exchanges (ASIC) and applied to both regulated and unregulated users [43] .

The “Cv” is the variable component of unit cost for the service provision [43].

A. Stratification and subsidies

The stratification has the purpose to subsidize the low socioeconomic classes, classified as stratums1, 2 and, 3. They are been financed by the upper classes corresponding to stratums 4 and 5, to be intrinsic that stratum 4 corresponds to the middle class, which pays the "real" tariff value; rural areas are classified between stratum 1 and 2, while commercial and industrial entities are framed in 6 [45]. The contribution to the tariff is given in the table I.

Table I: Payment on the UC Tariff for the Stratums in Colombia.

Stratum	***Payment over the rate***	***Contribution/Subsidy***
1	0,50	50% Subsidy
2	0,60	40% Subsidy
3	0,85	15% Subsidy
4	1,00	Without subsidy or contribution
5	1,20	20% Contribution
6	1,20	20% Contribution

B. Street lighting

The public lighting service is the responsibility of the municipalities or districts, that is, the municipalities have the autonomy of quality and costs of providing the service, but must be governed by a minimum of technical criteria and a maximum price regulated by the state, calculated as enough to remunerate service providers [46].

For the most part, like the electricity consumption rate, the public lighting service is charged according to the rate criteria of the constituent class or stratum, as shown in Tables II and III.

Table.II: Public lighting tariff for Non-Residential Sectors, Colombia.

Taxpayer Class		***Monthly consumption (kWh/month)***	***Tax rate (% by consumption)***
Commercial	Level 1	< 1.000 k	6,0
	Level 2	1.000 - 2.000	6,5
	Level 3	2.001 - 5.000	6,6
	Level 4	5.001 - 10.000	6,8
	Level 5	10.001 - 50.000	7,0
	No Reg.	>50.000	8,5. Maximum 9 CMMLS
Industrial	Level 1	<2.000	6,0
	Level 2	2.001 - 4.000	6,1
	Level 3	4.001 - 10.000	6,3
	Level 4	10.001 - 20.000	6,5
	Level 5	20.001 - 50.000	7,0
	No Reg.	>50.000	8,5. Maximum 9 CMMLS
Official	Level 1	≤500	6,0

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	Level 2	501 - 1.000	6,5
	Level 3	1.001 - 2.000	7,0
	Level 4	2.001 - 10.000	7,3
	Level 5	>10.000	7,5. Maximum 9 CMMLS

*Current Monthly Minimum Legal Salary.

Table III: Public Lighting tariff for Residential Sectors, Colombia.

Strat.	***Consumption ≤ 250 kWh***	***Consumption > 250 kWh***
1	2,5% of the consumption value	6,0% of the consumption value
2	3,0% of the consumption value	6,0% of the consumption value
3	4,5% of the consumption value	6,0% of the consumption value
4	5,0% of the consumption value	
5	6,0% of the consumption value	
6	7,0% of the consumption value	

VI. COMPARISON BETWEEN ELECTRICAL TARIFFS IN THE RTE OF COLOMBIA AND BRAZIL

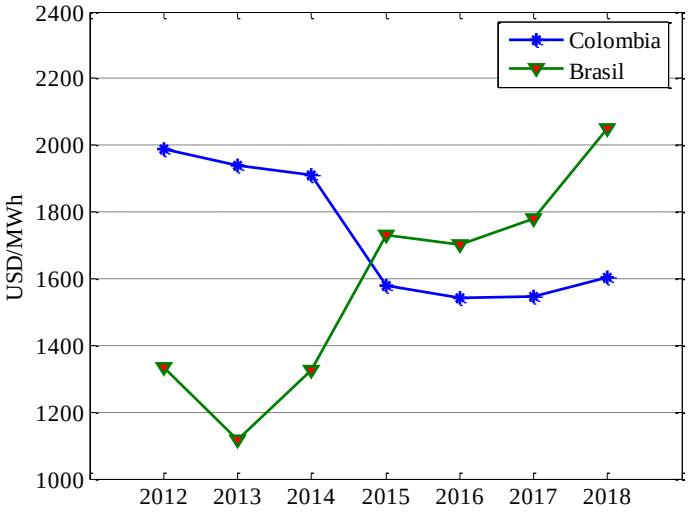

Fig.10: Unit costs of electric power in Colombia and Brazil, 2012-2018 [38] [48]–[61].

During the first years of the decade, the unit cost of electricity, was considerably lower in Brazil, compared to Colombia, a relationship that already was investedby 2015, as evidenced in Figure 10. Among the main reasons for this change, highlights issues of subsidies in the Brazilian government.

UC´s include losses related to energy transport processes. According to the data that in 2017 showed in the Rapporteurship of the World Economic Forum (WEF) on a 0-1 scale, as shown in Table IV, Colombia is ranked eighth worldwide in energy architecture, with a 0.75 score, as Brazil ranks 30th with 0.7 scores [47]. This shows that the quality of the infrastructure of the Colombian sector, allows energy losses to be lower.

Table.IV: Countries with better and worst Electrical Architecture, according to the WEF 2017.

Rank	***Country***	***Score***
1	Switzerland	**0,80**
8	Colombia	**0,75**
15	The United Kingdom	**0,72**
28	Argentina	**0,70**
30	Brazil	**0,70**
33	Netherlands	**0,69**
40	Chile	**0,67**
44	Mexico	**0,66**
45	Japan	**0,66**
52	The United States	**0,65**
76	South Africa	**0,58**
82	Honduras	**0,56**
87	India	**0,55**
95	China	**0,53**

A. Electric bills

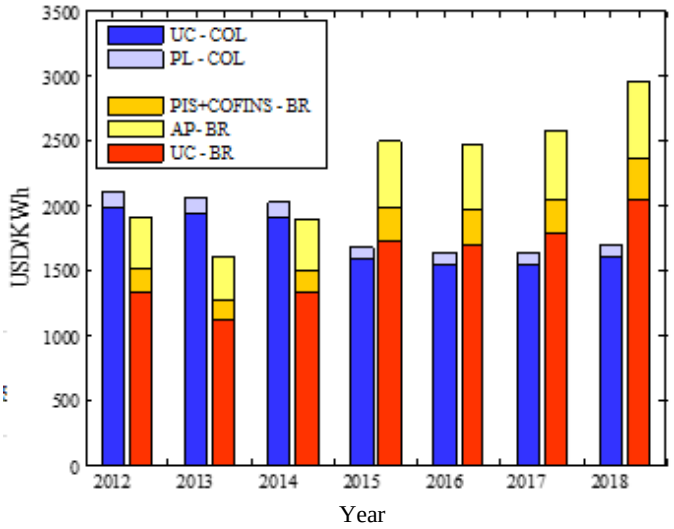

Fig.11: The total cost of electricity in Colombia and Brazil, 2012-2018. [33][38][46]–[58].

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When the electricity bill is studied as a whole, includes both public lighting services and aggregate taxes, it is denoted that, with the exception of 2012 and 2013, throughout the decade, the price of the Electricity in Brazil has been higher, creating a growing gap in the price of tariffs between the two countries, as shown in Figure 11.

It is important to bear in mind that the Unit Cost (UC) for users of the electric service includes the values related to the generation, transmission, commercialization, losses, and restrictions [52].

VII. TARIFF STRUCTURE FOR FREE CONSUMERS IN BRAZIL AND COLOMBIA

Colombia and Brazil have similarities in the aspects that differentiate the composition of the tariffs between regulated and free users, since in both cases the variation is given by the price of the energy acquired [21].

A. Brazil

From the foregoing, it is understood that in Brazil, the FTE consumer will also be obliged to pay the values related to the losses of the NIS, the System Service Burdens (SSB), DSUT (Distribution System Use Tariff), TSUT (Transmission System Use Tariff), PIS / COFINS and ICMS [21] [62].

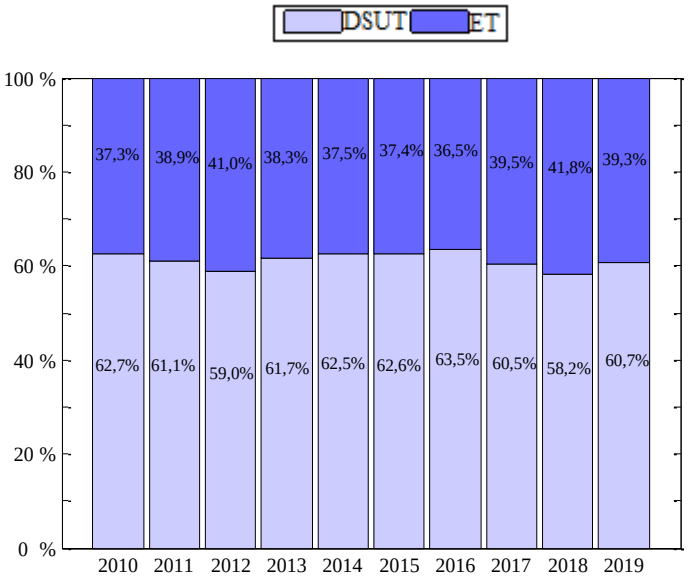

Fig.12: Relationship between the Price of the Electric Tariff (TE) and the Tariff for the Use of the Distribution System (TUDS) [63].

Table.V: Public auctions in Brasil, 2018.

Auction date	*Energy Amount (MWh)*	*Monetary Amount (USD Millions)*	*USD (million) /MWh*
04/04/2018	54.094.749,60	**1804,86**	*33,36*
31/08/2018	168.033.684,00	**6330,65**	*37,67*
07/12/2018	70.176,00	**2,68**	*38,24*
07/12/2018	6.298.296,00	**271,80**	*43,15*
TOTAL	228.496.905,60	**8.410,00**	-
AVERAGE	-	-	*38,11*

Figure 12 shows how approximately, the DSUT represents 32.1% of the total account - equivalent to approximately 60% value composed of DSUT and ET -, it is also important to take into account that on average, the ICMS, PIS and COFINS almost 30% total payment value [34] [64] - [63].

During 2018, four public auctions were held in Brazil, which totaled 8,408.67 million dollars, as shown below [65].

B. Colombia

In the Colombian case, approximately 50% of the price of energy consumption corresponds to the generation value and the other 50% to transmission and distribution costs (Figure 13), the latter being fixed, cannot be negotiated, which means that the possibility of saving is - as in Brazil –under the cost of the purchase made with the generator [66].

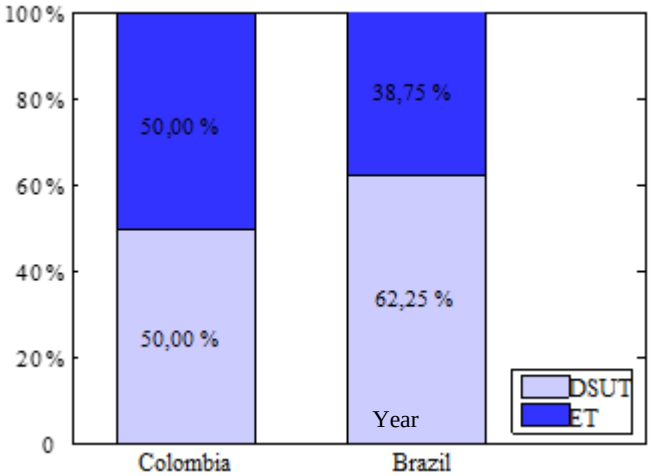

Fig.13: Average Relationship between the Prices of the Electric Tariff (ET) and the Distribution System Use Tariff (DSUT) of Colombia and Brazil between 2010-2019 [63] [66].

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During 2018, no public auctions were held, however, in February 2019 a 2022-2023 obligation allocation auction was held, in which they were awarded for a total of 69 generation units, 250.55 GWh-day, with a closing price of USD 15.1 / MWh [67] - [68].

VIII. CASE STUDY

To compare the energy markets of both Colombia and Brazil, four scenarios are carried out. The first shows the cost of active power consumption in Colombia previously specified, under the average prices of the energy traders, that is, under the condition of the regulated market, for this, an average of the annual cost of kWh in the country is obtained. A second scenario, this time considering the price under the considerations of a free consumer. Similarly, scenarios three and four will correspond to the same conditions, given in Brazil.

To make a comparison between the different scenarios, the average of the prices of the year 2018 of the marketers and the auctions of Brazil and Colombia is taken.

Based on the previous results, a comparative analysis is carried out between the types of internal markets of each country and subsequently, a comparison between the regulated and free markets of Colombia and Brazil.

The scenarios are made based on the consumption data of the Colombian company Cervalle and the calculations on the energy markets that are applied on this land, are carried out by what is presented between sections III and VII.

The Cervalle company, which has multiple pig farms distributed mainly in the department of Valle del Cauca, as well as different points of sale, among which two stand out in the city of Cali, has an approximate monthly active power consumption of 152,280, 9 kWh on farms and 27,667.71 kWh of commercial premises, according to data supplied by the company.

The data corresponding to the consumption in each of the establishments, organized according to the monthly energy consumption of each unit, are taken as shown in table VI.

Table.VI: Consumption of power Energy of the Cervalle´S Establishments.

Establishment	Consumption (kWh)
Cachorros Farm	28066,67
Sell Point 1	20896,38
Piedras Gordas Farm	19362,80
Margaritas Farm	18368,67
Cristalina Farm	12896,50
Esmeralda Farm	9792,00
Ponderosa Farm	8593,50
Arenal Farm	8118,00
Sell Point 2	6771,33
Esperanza Farm	6500,00
Guacari Breeding Farm	5866,50
Porcilandia Breeding Farm	5780,00
Bacori Farm	5110,25
Arrayanes Farm	4621,64
Porvenir Farm	3375,00
Guacari 1 Pre-bait Farm	2294,00
Flores amarillas Farm	1915,50
Bellavista Farm	1850,00
Genesus Breeding Farm	1840,67
Sortilegio Farm	1736,33
Paz De La Honda Farm	1293,00
Guacari Ceba Farm	1184,50
Santa Lucia Breeding Farm	995,25
Loma Linda Breeding Far	789,00
Guacari 2 Pre-bait Farm	748,75
Esperanza Ceba Breeding Farm	700,00
Campo Alegre Breeding Farm	281,33
Villarica Breeding Farm	184,75
los Naranjos Breeding Farm	16,33
TOTAL	**179948,70**

A. Scenario 1: Regulated Market in Colombia

To Colombia´s case, since it is a pig production company, Cervalle farms are into the industrial category, as points of sale enter the commercial one, based on the average value of consumption rates per MWh in the country during 2018, as well as the value of public lighting assumed by some municipalities, such as Cajicá shown in Tables I and II.

Thus, first, in Table VII, the establishments are cataloged to determine the additional tax to be paid.During 2018, the unit cost (UC) for regulated users was 1605 MWh [60] - [61]. Additionally, taking into account the Sections VA and VB, the values of subsidies (Sub) and public lighting (PL) are calculated and the transmission and distribution burdens (TDB) orders are approximated to the UC price, to arrive at the total monthly price of consumption of the company, shown in Table VIII.

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Table.VII: Category, level and tax of the establishments

Establishments	***Consumption (kWh)***	***Category***	***Level***	***Tax (%)***
Cachorros Farm	28066,67	Industrial	5	7,0
Piedras Gordas Farm	19362,80	Industrial		
Margaritas Farm	18368,67	Industrial		
Cristalina Farm	12896,50	Industrial		
Esmeralda Farm	9792,00	Industrial	4	6,8
Ponderosa Farm	8593,50	Industrial		
Arenal Farm	8118,00	Industrial		
Esperanza Farm	6500,00	Industrial		
Guacari Farm	5866,50	Industrial		
Porciland Farm	5780,00	Industrial		
Bacori Farm	5110,25	Industrial		
Arrayanes Farm	4621,64	Industrial	3	6,6
Porvenir Farm	3375,00	Industrial		
Guacari 1 Farm	2294,00	Industrial		
Flores A Farm	1915,50	Industrial	2	6,5
Bellavista Farm	1850,00	Industrial		
Genesus Farm	1840,67	Industrial		
Sortilegio Farm	1736,33	Industrial		
Paz de Ho. Farm	1293,00	Industrial		
Guacari Farm	1184,50	Industrial		
Santa L. Farm	995,25	Industrial	1	6,0
Loma L. Farm	789,00	Industrial		
Guacari 2 Farm	748,75	Industrial		
Esperanza Farm	700,00	Industrial		
Alegre Farm	281,33	Industrial		
Villarica Farm	184,75	Industrial		
Naranjos Farm	16,33	Industrial		
Sell Point 1	20896,38	Commercial	5	7,0
Sell Point 2	6771,33	Commercial	4	6,8
TOTAL/AVERAGE	**179948,70**	-	-	**6,8**

Table.VIII: Costs for Regulated market in thousands of USD, Colombia.

Establishments	***UC***	***Pl***	***Sub.***	***TDB***	***Total***
Ind. Level 5	126,30	8,84	25,26	126,30	286,71
Ind. Level 4	79,87	5,43	15,97	79,87	181,13
Ind. Level 3	16,52	1,09	3,30	16,52	37,43
Ind. Level 2	15,76	1,02	3,15	15,76	35,70
Ind. Level 1	5,96	0,36	1,19	5,96	13,48
Com. Nivel 4	13,79	0,97	2,76	13,79	31,31
Com. Nivel 3	13,03	0,89	2,61	13,03	29,55
TOTAL/AVERAGE	**271,23**	**18,60**	**54,25**	**271,23**	***615,31***

B. Scenario 2: Free market in Colombia

For the unregulated market, the price of the 2019 debt allocation auction, which was 15.1 USD / MWh (Section VII-B), is taken as a reference, with this value and approximately 179.95 MWh required by the 180 MWh company, the price of energy consumed in the FTE is calculated. Additionally, it is taken into account that the costs of public lighting, subsidies payable, TTSU and DTSU(TDB) remain independent of the trade environment, that is, they are the same as those resulting in the regulated market.

Table.IX: Costs for Non-Regulated Market, Colombia.

Item	***Cost(Thousands of USD)***
Consumption (MWh)	180
Unit cost (USD/MWh)	15,1
Consumption Payment (Thousands of USD)	2,7
Public L. payment (Thousands of USD)	18,6
Subsidies payment (Thousands of USD)	54,25
TDBPayment(Thousands ofUSD)	271,23
TOTAL (Thousands of USD)	**346,78**

C. Scenario 3: Regulated Market in Brazil

To obtain the value that the CERVALLE company would have to pay for its energy consumption in the Brazilian regulated market, it is necessary to take into account that in addition to the UC per kWh and public lighting, the PIS and COFINS represent a considerable fraction of the bill.

The farms belong to subcategory B2, which refers to the conventional rural rate, this subgroup in 2018 had an average rate of $1.2839 USD / kWh; As for the points of sale, they correspond to B3, a conventional industrial reference, its average price was $1.9876 USD / kWh and finally B4, of public lighting (PL), $1.7735 USD / kWh, in the latter, as it turns out impossible to know the consumption of public lighting and consequently divide it proportionally to the consumption of the establishments, 10% of the total internal consumption is considered randomly [69] - [70]. Finally, section IV is taken into account, that PIS / COFINS and ICMS (PCI) represent approximately 53% of the account and transmission burdens (TDB) 17%.

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Table.X: Costs for regulated Market in thousands of USD, Brazil.

Group	*UC*	PL	PCI	TDB	*Total*
B2	162,36	19,6	242,57	33,15	*457,68*
B3	41,32	5,5	68,11	13,58	*128,51*
Total (Thousands of USD)	**203,68**	**25,1**	**310,62**	**46,73**	***586,19***

D. Scenario 4: Free market in Brazil

For the unregulated market in Brazil, the approximation of 180 MWh was also taken, and for the prices perKWh in this trading environment, the average of the public auction values carried out during 2018 in the country was taken (Section VA), which resulted in an average of $38.11 USD / MWh, however of this value, is separated from the UC, the cost of the TUDS in accordance with the 2019 ratio shown in Section VII. Also, as discussed in the same section, the values of the RTE of public lighting and PIS / COFINS and ICMS, which totaled $ 343.39 thousand of dollars.

Table.XI: Costs for Non-regulated Market, Brazil.

Description	***Cost (Thousands of USD)***
Consumption (MWh)	180
Unit cost (USD/MWh)	38,11
Payment for consumption (Thousands of USD)	6,86
Public lighting payment (Thousands of USD)	25,1
Subsidies payment (Thousands of USD)	310,62
TUSD payment (Thousands of USD)	46,73
TOTAL (Thousands of USD)	**389,31**

E. Results Comparison

The results showed that, in Colombia, the Cervalle company having an approximate consumption of 180 MWh / month, it has a monthly expense of $615.31 thousand dollars in the regulated market, being considered the energy supplement points as stratum 6, including the values related to public lighting and subsidies that should be considered for this classification, as well as orders for the use of the system (Table VIII). If this same company makes the migration to the FTE, it would pay in the same period and for the same consumption, USD $ 346.78 thousand dollars (Figure 14), which includes the same value paid for lighting, subsidies, transmission and distribution, but a different value to the energy rate (Table IX). With this, a reduction of almost 43.65% is shown (Figures 14 and 15), which would represent $ 268.53 thousand per month and $ 3,222.36 per year.

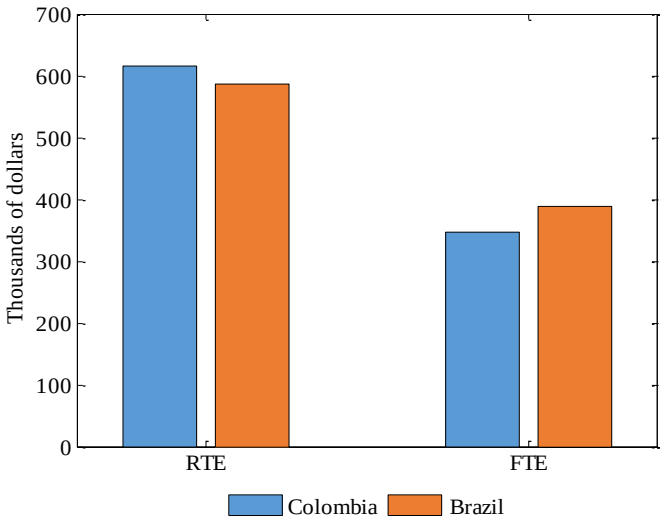

Fig.14: Comparison in thousands of dollars between the costs of the monthly energy consumption of the Cervalle Company in the CERs and FTEs of Colombia and Brazil.

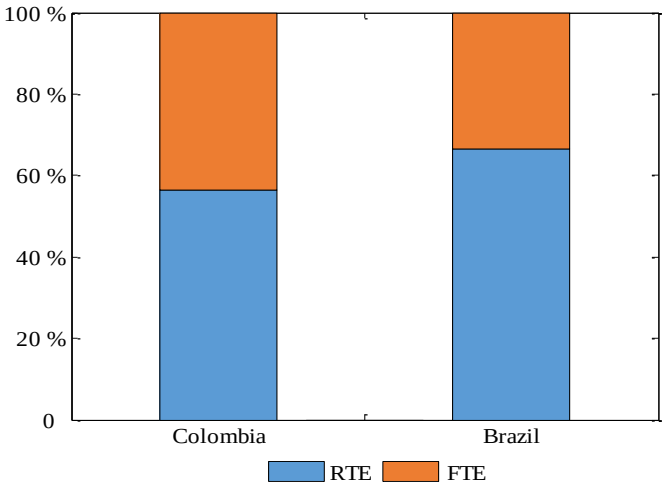

Fig.15: Percentage comparison between the costs of the monthly energy consumption of the Cervalle company in the FTE, about the RTE.

A similar phenomenon would occur in Brazil, which would go from paying $586.19 thousand dollars per month to $389.31 thousand dollars per month to $180MWh / month. Considering that the value of lighting, taxes and system use remain constant, find the rate varies between the two environments (Table X and XI). For this reason, the change to the FTE would imply a 33.59% decrease in economic

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spending, which would be equivalent to 196.88 thousand dollars per month and 2,336,560 annually.

Comparatively, in the RTE of Colombia, as companies are considered stratum 6, there is a 20% increase in the rate (in relation to the real value, which is represented by stratum 4), causing that, in comparison with the results of Brazil, the cost of energy is higher, however, and despite having to make the same amount for subsidies, when it is passed to the FTE, the price of Colombian energy is almost 11% cheaper than in Brazil. This implies that when a company moves from the RTE to FTE, in Colombia it has a greater margin of savings related to the payment for electricity consumption.

It is perceived as in Colombia the consumption itself goes from representing 44% of the payment value of the invoice when the company trades its supply in the regulated environment. This consumption happens to represent less than 1% of the account in the FTE, where the payment for the use of the system is the most representative fraction in the payment, covering 78% of the total cost for the energy supply (Figure 16).

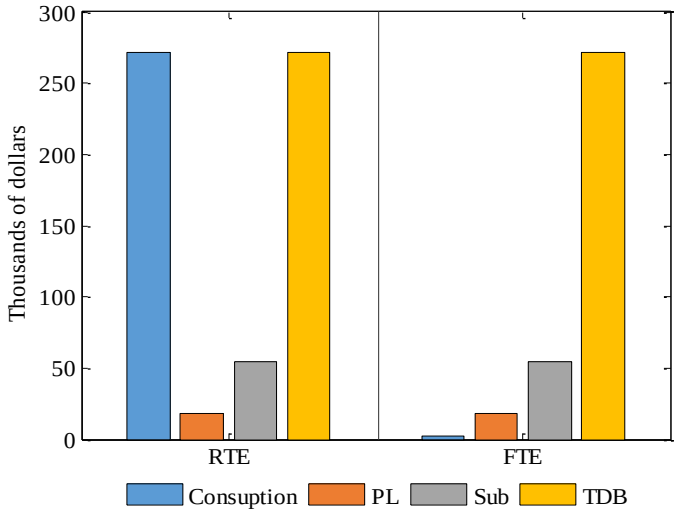


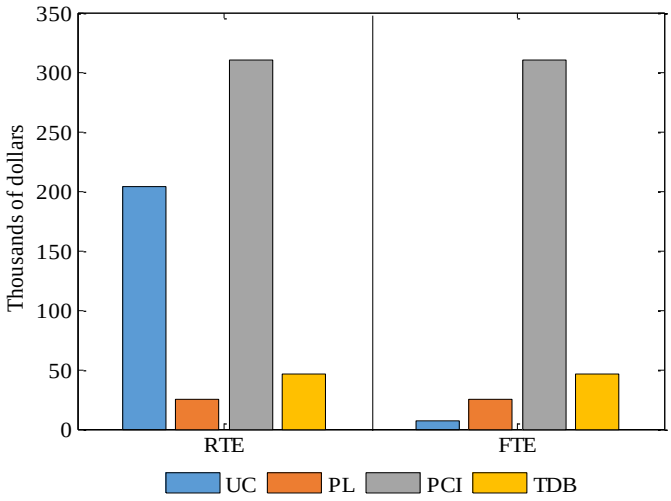
Fig.16: Differentiation of the tariff paid in the RTE and FTE, Colombia.

This shows how the concessionaires and distributors have a high impact on electricity rates, because when considering that (*i*) the values paid for lighting, system uses and taxes are fixed, and assuming that, (*ii*) these buy the energy in large volumes, with prices similar to those of public auctions, it results in the reduction of approximately 43.6% in the invoice as a whole when the energy is purchased from the FTE, refers to the payment for the services of the concessionaires and distributors. When we look specifically at the cost per consumption, we see that from $2.7 thousand dollars, it goes to $271.23, this is 100.45 times more than the value of the auction.

It was identified that, in Colombia, the cost given by the use of the system is comparatively very high, while in Brazil the plot corresponding to taxes is the one that represents the excessively high cost, comparatively (Figures 16 and 17).

In Brazil, for both the free and regulated trade environment, the largest fraction of the energy bill is related to taxes (PIS / COFINS and ICMS), here the change from the RTE to the FTE, makes consumption pass to represent 34.7% of the total invoice to 1.8% of this (Figure 17).

Similar to Colombia, it is denoted that the concessionaires and distributors have a high impact on electricity rates, since it is considered that with the exception of consumption, the other constituent rates of the bill remain constant and that these entities also buy energy at a price approximately equal of public auctions, implying that the reduction of approximately 33.6% in the total of the account, is related to the payment given to these entities for the provision of their service. At the same time, when looking specifically at the cost per consumption, we see that the value of $6.86 thousand dollars is 29.7 times higher in the CER (203.68 thousand dollars).



Figu.17: Differentiation of the tariff paid in the RTE and FTE, Brazil.

IX. CONCLUSION

Organizationally and functionally, the energy systems of Colombia and Brazil are very similar, both in the functions of

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the institutions that compose them, and the fact that the two have trade environments: regulated and free.

The differences arise primarily in the requirements to be able to purchase the energy directly with the generators that allow a decrease in the total cost of energy.For Brazil, it is necessary to have a demand over 3 MW and a voltage over 69 kV to be a free consumer or, between 500 kW - 3 MW to be a special consumer, where you can make direct contracts only with unconventional sources of energy generators. For its part, in Colombia there is no special consumer figure and, but belonging to the free trade environment, a minimum demand five times less than special users is required, that is 0.1 MW or consumption of 55 MWh-month.

From the above and adding that one of the most striking differences in the comparison between the markets of the two countries is that while in Colombia there is a tendency to decrease the UC of energy, and Brazil is increasing rapidly, what can be understood because in Colombia the number of free consumers has remained at a high and relatively constant number during the last two decades, while the number of users of the FTE of Brazil has presented a dramatic increase, mainly marked since 2016, exceeding in 2018 the amount Colombian.

The other big difference that can be observed between commercial systems is the regulated user´s categorization and the implication that it has on the cost of energy for them. In Colombia there the classification system is the stratification, in which stratum 1-3 are subsidized between 15% and 50% by stratum 5-6, which, pay an additional 20% on the value of the ET and stratum 4 pays the real price of energy; the industrial and commercial sectors are considered as stratum 6, consequently having financial repercussions on them.The classification in Brazil is more complex and based mainly on the voltage levels that are served by the consumer, being first classified as low (B) voltage, when it does not exceed 2.3 kV and high (A), when this value is exceeded; then consumers B are subclassified according to the destination of the use of energy (residential, rural, lighting, etc.), like those of group A, are again divided according to tensions. Although these classifications generate a difference in prices between users, unlike Colombia they do not have a specified percentage of increase or decrease in the ET, but their prices are regulated by limits imposed by ANEEL.

The value of energy in Colombia is given by the cost of generation, transmission orders and in some cases a fraction practically disregard taxes, while in Brazil, taxes cover more 50% of the final value of the tariff in the CER, making the average cost of energy much higher comparatively. However, through the case study, it is shown how the increases given according to classifications such as subsidies can to affect and reach the value paid by Brazil.

Another factor that strongly affects the price of energy in Brazil, is given by the “seasoning factor”, where regulated consumer rates are affected by the flags, which they are defined by the conditions of generation, going from the most favorable to the most expensive of them respectively increasing over the tariffs that go from R$ 0.01 - to R $ 0.05 per kWh of consumption.

All these components that catalog users, in the case study of the controls that, although Colombia has much lower energy rates than Brazil, these for the industrial and commercial sectorsis not reflected, because paying subsidies, resulting even - 5% - cheaper for users in the Brazilian regulated market.

The savings in the free trade environment, in both cases, comes from the decrease in the rate that would be paid to the concessionaires and/or marketers, since the payment of taxes, public lighting and use of the system remain constant regardless of the trade environment. The increase given by concessionaires and/or marketers, is raised almost 30 and 100 times in Brazil and Colombia respectively.

It was perceived that approximately total energy payment values vary between countries with approximately 10% in the FTE in favor of Colombia, this is given for the price given in the use of the system that was highly expensive in relation to Brazil

In an ideal scenario, in which users buy exactly the amount of energy needed, it was observed that the Brazilian users who make the purchase of energy in the FTE, that pay approximately 66.4% of the value paid for the same consumption in the RTE. Similarly, the Colombian user who goes on to negotiate at the FTE pays approximately 56.4% of the value of energy compared to its price as a regulated user.

With all of the above, it was identified that, in Colombia, the cost given by the use of the system is comparatively very high, while in Brazil the plot corresponding to taxes is the one that represents the excessively high cost, comparatively. Additionally, it is denoted that the price of the energy at which distributors and / or concessionaires buy and, the price at which it is sold to the user, is high multiplying this value by several tens.

The knowledge of these systems allows large (industrial) consumers to reduce the costs related to energy consumption due to the possibility of changing trade environments, consequently bringing economic risks to the same countries.

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Also, a comparison between countries allows these studies possibilities for improvements, identifying the factors that increase price variations in the market, to consumers, leading to greater competitiveness.

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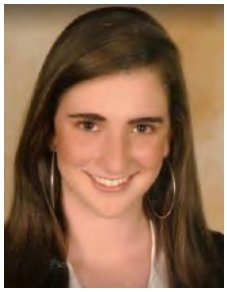

Valentina Vásquez Arangois an Energy Engineering and Master's student in the Interdisciplinary Pos-Graduation Program in Energy and Sustainability of the Federal University of Latin American Integration - UNILA. Research area: Electricity markets, Biorefineries and Biogas.

Oswaldo H. Ando Junior. Graduated in Electrical Engineering (2006) with a Specialization in Business Administration (2007) from the Lutheran University of Brazil - ULBRA with Master's Degree in Electrical Engineering (2009) from the Federal University of Rio Grande do Sul - UFRGS and Ph.D. in Mining Engineering, Metallurgy, and Materials of the Federal University of Rio Grande do Sul - UFRGS (2014). He has engineering experience working on the following topics: Energy conversion, electrical energy quality, electrical energy systems, residual energy capture, and energy efficiency. Associate Editor IEEE Latin America Magazine. Member of the Review Committee of several journals: Renewable Energy Focus (Elsevier) and IEEE Latin-American Magazine.. Ad hoc consultant FAPESC, Advisory Committee Area of the Araucária Foundation (CAA), ad hoc consultant CNPq, ad hoc advisor I + DI of the National Power Energy Agency (ANEEL).

Jorge Javier Giménez Ledesmahas a degree in Electromechanical Engineering from the University Nuestra Señora de la Asunción (2009), a master's degree (2012). and Ph.D (2017) in Electrical Engineering from the Federal University of Juiz de Fora. Adjunct Professor at the Federal University of Latin American Integration. He works on the following topics: Analysis of the protection system in computer distribution and programming systems.

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Analysis of the Impact of Implementation of a Risk-Flood Retention Basin

Gabriel Melo Lira[1], Marcia Teixeira Falcão[2], Emerson Lopes de Amorim[3], Francilene Cardoso Alves Fortes[4], Lucas Matos de Souza[5]

[1]Graduating in the Course of Bachelor of Civil University Center Estacio Amazon Engineering, e-mail: gabrielliramelo@outlook.com
[2]Professor Dr. advisor.Biotechnology and Biodiversity - Federal University of Pará. Email:marciafalcao.geog@uerr.edu.br
[3]Professor co-adviser MSc. Physics in UFRR-Boa Vista/RR.e-mail: emersonufrr@gmail.com
[4]Professor Dr. co-adviser. Agronomy in Unesp-Botucatu/SP. e-mail: lene_fortes@yahoo.com.br
[5]Professor co-adviser, Eng. Civil in UFRR- Boa Vista/RR and Specialist in Construction Management, qualities and Control of Constructioninin IPOG. e-mail: proflmatos.engcivil@gmail.com

Abstract**—** *The increase of urban population in Boa Vista/RR is occurring fast and disorderly manner, generating large urban conglomerates modifying the environment, modifying the water cycle as soil sealing. So, to check the impact of the implementation of a retention basin to reduce flood risk, this research has qualitative, bibliographical, documentary with dialogue with the community and gathering spot data, and document data from existing projects associated with the analysis of the remaining impact areas. Analyzing the study area in the neighborhood Senator helium fields in which the residents suffer water rationing the dry period, it was noted that of these, 78% regularly suffer from a lack of water, 17% spend up to three days without supply and only 5% do not suffer water rationing. Reinforcing the idea of the need for legislative framework, the occupation and use of water resources, avoiding disorderly interventions often result from urban pressures.*
Keywords**— Flood control; Urban drainage; Sustainability.**

Resumo**—** *O aumento da população urbana em Boa Vista/RR vem ocorrendo de forma rápida e desordenada, gerando grandes conglomerados urbanos que alteraram o meio ambiente, modificando o ciclo hidrológico como a impermeabilização do solo. Assim, para verificar os impactos da implantação de uma bacia de retenção para a redução do risco de inundação, a presente pesquisa possui caráter qualitativo, bibliográfico, documental com diálogo com a comunidade e coleta de dados in loco, além de dados documentais de projetos existentes associados à análise de áreas de impacto remanescentes. Analisando a área de estudo no bairro Senador Hélio Campos, no qual os moradores sofrem racionamento de água no período de seca, observou-se que destes, 78% sofrem periodicamente com a falta de água, 17% passam por até três dias sem abastecimento e somente 5% não sofrem racionamento de água. Reforçando a ideia da necessidade de enquadramento legislativo, à ocupação e utilização do recurso hídrico, evitando, intervenções desordenadas frequentemente resultantes das pressões urbanísticas.*
Palavras-chave**— Controle de cheias; Drenagem urbana; Sustentabilidade.**

I. INTRODUCTION

The problem of the increase of urban population in Boa Vista/RR is occurring fast and disorderly manner, generating large urban conglomerates modifying the environment, modifying the water cycle as waterproofing of soil. Added to this, there is the fact that the public policy of sanitation used palliative and ineffective measures to solve this problem, causing risks to human health and huge economic losses associated with the lack of concern about the urban drainage behavior and decrease infiltration area.

Faced with the above exposed problem, evaluates the implementation of a retention basin in Senator Hélio Campos neighborhood because of its flooding history, production losses, causing tangible and intangible damage to the local population. In addition to the desire of residents by efficient measures and improved quality of life.

Today, the emergence of new flows of control measures aims to circumvent the changes in hydrological cycles, trying to match the pre-existing conditions (BAPTISTA, et al., 2005). One such alternative is the storage reservoir, which retains the excess runoff during the rainy season, to further make its return to the beds of streams and rivers. One of the many types of this reservoir

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is called the retention basin open sky, which will be addressed in this work.

In this context, the objective of this research includes the analysis of the impacts of the implementation of a retention basin to reduce flood risk in the city of Boa Vista/RR, precisely at a lake located in the urban area in the boundary region between the districts Senator Hélio Campos and Laura Moreira. Search in particular, as well as conduct a historical study of the identified area; examine the use of existing pipelines in order to generate flow into the basin; consider the implementation of the basin from the perspective of sustainability and evaluate the inconvenience caused to local people by the absence of an effective drainage system.

Finally, highlighting the need for a master plan for major drainage with long-term planning, since small micro drainage projects have been implemented so that it can be supplied merely a temporary need.

II. THEORETICAL REFERENCE

Sustainable Urban Drainage

According to Pereira (2018) is another approach to urban drainage solutions being related to the concept of SUDS (Sustainable Urban Drainage System). In this case, it takes into account in the drainage system design process, the vision of sustainable development, another words, the impacts of drainage solutions should not be transferred in space or time, should be provided for measures to reduce the influence of urbanization on the hydrological cycle.

Contributing to sustainable development, drainage systems can be developed to improve the urban layout, improving the built environment. The Sustainable Urban Drainage System aims to reduce quality of life issues, as well as maximizing opportunities revitalization of urban space and increasing biodiversity (CIRIA, 2007).

Sustainable urban drainage system is tried to approach the most of the hydrological cycle of the later characteristics of the urbanization process. Making small interventions throughout the watershed that replace in part the traditional system of urban drainage (PEREIRA, 2018).

And to analyze the report of Tucci (2003) which says that the channeling of flows is inefficient, as only transfers to downstream flooding. As well as the irrationality of the projects leads to unsustainable costs and represents an extremely high damage to society as a whole over time. This further justifies this project.

Given the above, it was thought in the modern concept of urban drainage that is grounded in alternative technologies or compensatory and aims to counteract the effects of urbanization on the hydrological processes (Souza, 2008). In addition, the developed countries have sought to avoid this type of solution and encouraged a new concept of drainage, concerned about public health and environmental issues (DRUMOND, 2012).

Flood control measures

According Port and ZahedFilho (2004) the main benefits of urban drainage control measures are reducing human losses and water binding diseases, reduction of losses from downtime and disorders resulting from reduced costs for rebuilding the affected areas, more opportunities recreation, increased green spaces and urban areas, improving the protection of margins and less siltation.

For Nascimento and Baptista (2009), compensatory techniques can be no structural techniques which include the principles of prevention and the environmental education. And structural compensatory techniques refer to engineering constructions to offset the increased runoff generated by waterproofing of soil.

Thus, the above authors as they can be classified into three according to the operating principle, infiltration, retention or location of the control device, and arrest them for micro reservoir of retention, filtration tracks; Trenching infiltration; infiltration basin; retention basin; detention basins; Trenches filtration; infiltration devices, among others.

The choice of the types of techniques to be adopted depend on urban, social, economic and environmental factors. The ideal situation for the use of this type of solution occurs when the study leads to choosing the most suitable techniques are done at the same time develops the urbanization project of a new development area, allowing greater flexibility for choosing and the adjustment of compensatory techniques to the urban project (NASCIMENTOAND BAPTIST, 2009).

Legislation Related to Urban Drainage

According to Marques (2006), drainage structures and other control measures contribute to urban water management. And the precepts to be implemented depend fundamentally on the current legislation.

According to Law 10.257/2001 also known as the City Statute, which aims to guarantee the right of access to cities environmental sanitation, including urban drainage, as a basic requirement for achieving a sustainable urban environment.

As for the environmental licensing, Resolution n˚ 237/1997 of CONAMA (National Environment Council) regulates the activities subject to license by the competent environmental agency, and civil works such as drainage must be licensed. Similarly, the CONAMA Resolution 01/86, which provides for the environmental impact

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assessment sets out in Article 2˚, section VII, the preparation of an environmental impact study for sanitation activities, and drainage.

However, Cruz Souza and Tucci (2007) argue that the management of urban rainwater in most municipalities is still performed in a fragmented way and this has generated significant impacts in a way harmful to urban sustainability.

Regarding the urban drainage service, is conceptualized by Law 11,445/2007 as the activities of infrastructure and operating facilities for rainwater drainage, transportation, detention or retention for damping floods, including the treatment and disposal of drained water.

As Drumond (2012) it is clear that there is a concern on the part of the legislation to prevent the population of the drainage problems that may arise due to the incorrect occupation of urban areas.

Retention basin

Therefore, Tucci (2008) reports that although the responsibility for stormwater management within the urban area is the municipal administration, it is recognized that the vast majority of municipalities do not have staff trained to administer the urban drainage system, and less to address the control of rainwater at the source.

Given this context, he thought of the retention basin, since according to Matias (2006) retention basins a structure that aims to stabilize the tributaries rainwater flow rates, enabling the refund downstream flows compatible with the previous limit set or tax the flow capacity of an existing collector or to build.

The integration of the retention basin into the drainage system, when properly designed, contribute the following benefits: improved drainage system behavior by storage capacity and consequently decrease the flood risk; creating water reserves to do in the face of agricultural needs, occurrence of industrial and municipal fire and activities such as cleaning streets; investment costs, lower will the expansion of the existing network; and faster and simpler construction (DIAS AND ANTUNES, 2010).

Thus thought of studying the basin in the open, generally they are built on land with slopes or embankments reinforced with side shields. This type of bowl is usually linked to landscape integration concerns and appreciation of leisure time and recreational areas.

Finally, among the source control techniques constitute a key instrument for reducing the flood peak flow. Although there is legislation that does not allow a new development causes rainwater flow rates higher than those occurring before construction. This comes clearly reinforce the idea of using retention basins as a legislative measure for this purpose.

III. METHODOLOGY

The research was conducted in Senator Hélio Campos neighborhood, shown in Figure 1, focusing on the HC-13 street, parallel to the study of the lake, being the only one in the area to present a process of drainage and paving, which during the rainy season It did not meet the local flow needs, creating flooding in several locations. Featuring an area of approximately 730,90m², which is the threshold area for contribution of the basin, whereas other areas have proper place for disposal, may be lakes or streams in the area nearby.

Fig.1: Studyarea
Source: Google Earth (2019)

Thus, the research lasting about 06 months has qualitative approach, bibliographical, documentary and applying data collection techniques: dialogue with the community, on-site data collection, documentary data through existing projects and analysis of remaining impact areas.

In search of the need to build continuous water supply insufficient during the dry period was set to bowl being open and level of permanent water, with a view

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preliminary findings: low rate of infiltration, presence of lakes in the region , high water table level, vegetation surrounding the basin.

Obtaining given drainage projects by Municipality of Boa Vista/RR - PMBV promoted the observation of the destinations of the drainage and the study of areas of the region which will be the analysis, associated with the flooding map of Boa Vista/RR created in 2011, where the state was affected by high rainfall, with the level Branco river 10,2m above its normal height, flooding some areas.

IV. RESULTS AND DISCUSSION

In order to demonstrate the possibility of implementing a retention basin will open, it made necessary the historical analysis of the occupied area. As in Figure 2 (A), its natural vegetation of savannah, regionally known as drawn up, with plenty of features on water, being by lakes, streams or rivers. Such a location study presents a region of lakes, which is responsible for the source of some streams running through Boa Vista/RR.

(A)

(B)

Fig.2: A - Image of the region in 2002; B- image of the region in 2019.
Source: Google Earth (2019)

Thus it is observed in Figure 2 (B), with the uncontrolled growth in the neighborhood Senator Hélio Campos Boa Vista/RR, led to the grounding of the lower regions, not redistributing its natural storage. This is consistent with Sousa (2011) as the streams are supplied by small lakes that form springs, and today more than 90% of the lakes have disappeared because they were grounded, and the neighborhoods that have major flooding problems are in places that had the grounded lakes.

For Staevie (2011) the reason for the degradation is the settlement to the stream banks, after the emergence of new locations considered neighborhoods by the local population, construction of condominiums and structures erected on the banks of the creek. Thus, the vegetation has been extinguished, the urban solid waste dumped began to be more frequently in the waters and the impact became apparent.

It was noted in on-site visit this interference, in the flows of the most important rivers for Roraima drainage network Tacutu, Uraricoera and Branco river, a characteristic that best highlighted by the complex system of networks lake supplied by groundwater and the peaks rainfall in the rainy season.

These observations are consistent with Meneses et al. (2007), Carvalho and Carvalho (2012) to approach that during this same period, the number of lakes form on plowed one interconnected wetlands system and during the great drought period of these lakes disappear (temporary), leaving only those perennial that last all year.

Before this problem above, the study sought to determine whether the region suffering from some kind of water rationing during the dry period in Figure 1, it was observed that 49% of the weekly residents suffer from lack of water; 29% say they suffer daily with lack of water at specific times; 17% of absence of up to 3 days; 5% which does not suffer from the ration of water.

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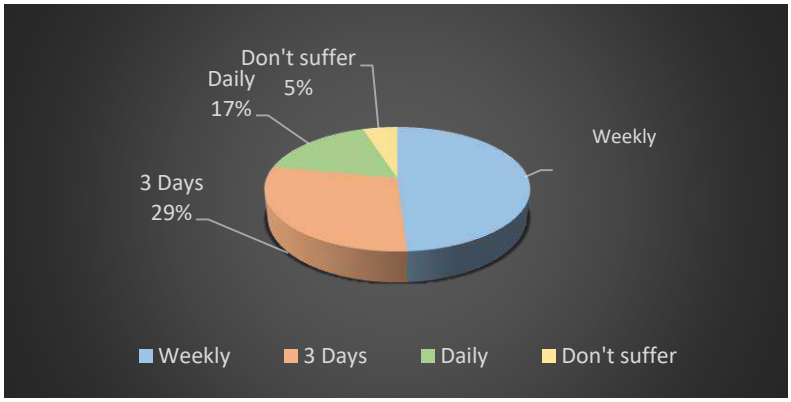
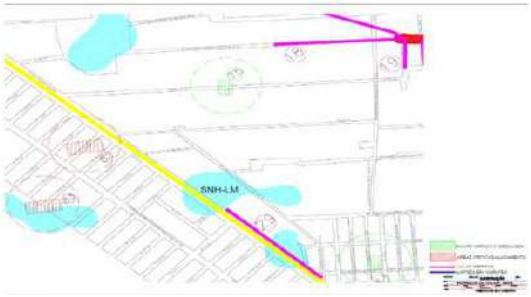


Chart 1: Rationing water during the dry period.
Source: Author (2019).

Analyzing the accounts of residents who claim that often can water on your property only in lower taps, while others stating that they do not suffer from any rationing because wells have on their properties, regardless of the distribution system. Just as there is a government policy to address and prevent the consequences of drought during the severe drought Roraima, so does the rainy season, severely punishing the poorest people, especially those living in the poorest neighborhoods.



(A)

(B)

Fig.3: A - Points of critical drainage flooding; B - HC-13 rains street.
Source: Operation Patrol Rain (2011). Source: Newspaperof Boa Vista (2019).

Thus it can be seen in Figure 3 (A) four points in their surroundings, two of inefficiency of the identified drainage green and two flooding by red, identifying the region as being prone to flooding. At these points, enabling the implementation of a retention basin, which has availability to work together with the lakes in its vicinity. May contain and then seep river network, avoiding problems with flooding in other regions, preventing the rapid flow of water to the water body.

Seen the documentary analysis of Rain Patrol operation (2011), you can see the study of lake identified on the map by SNH-LM codename in Figure 3 (A), pierced the way, invading adjacent land to it, not indifferent to the absence of information about the flooding in HC-13, mostly residential street with more than 50 households consisting of homes, houses or similar.

In the interview with residents in the study area, it can be reported that they suffer long periods by a lack of effective drainage, as shown in Figure 3 (B), the Boa Vista sheet (2019) that during the period matter already had existing drainage, the same reporting previously have an open trench of the route to the temporary flow, softening the rainy season in the region, but with enough negatives.

Subsequently, the HC-13 busy street by drainage network in place of the ditch, relocated its volume, not having the same efficiency to accomplish infiltration, transferring the problem to another ditch at the end of the street, who with his full, overflowing into the street .

For residents, the situation is not new and is repeated annually without any response from the government to provide improvements to the site. Amid the hole, a ditch covered the open sky garbage extends the HC-13 Street, which has no type of flow and gives off a strong odor

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(NEWSPAPER OF BOA VISTA, 2018).

In order to assess the inconvenience caused to the local population due to the absence of a drainage system, wondered in chart 2 on the flooding frequency on their properties, whose study area had 57 land, of which 41 residents answered the questionnaires, which 56% report annually suffer from flooding when it rains a lot in a short time; 39% report who sometimes suffer when the rainy season is rigorous; 5% report that they never suffered from flooding, but they took care with the ground grounding, drainage system, among others.

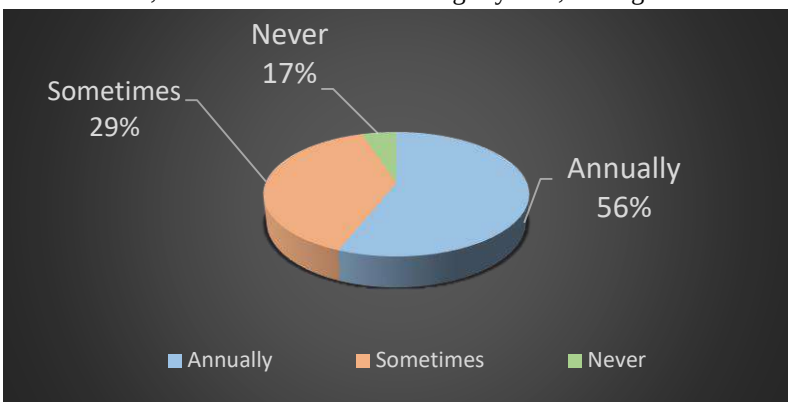
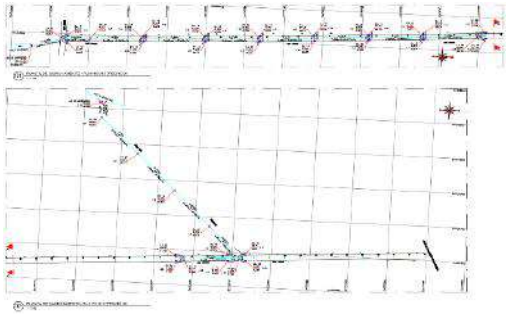


Chart 2: Frequency of flooding on their properties.
Source: Author (2019).

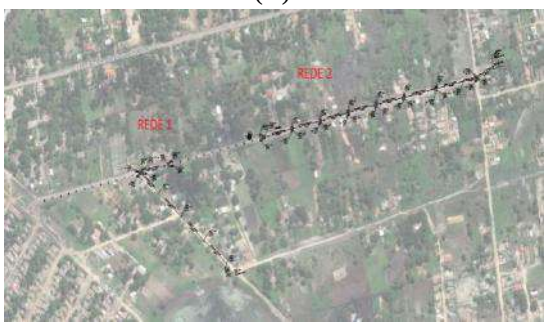
It was observe that some residents are afraid to recurrent flooding in the region, and end up seeking alternatives to try to circumvent the situation, reserving a place on their land with lower quota for temporary storage, others creating a system of channels that eliminate the accumulation water as quickly as possible, taking the fastest route to.

These results are in agreement with Farias, Veras and Paixão (2012) because the physical conditions qualitatively influenced the conditions of use and occupation, since Boa Vista/RR has a gently undulating flat geomorphology, with dissection ranging from weak to very weak, developed on sedimentary rocks, which constitute the formation of the municipality, with elevations averaging 70-80 m, ie, low slope, which favors the flooding.

Through this it became existing drainage analysis, ands results obtained by the projects assigned by the city Boa Vista/RR (2018) found that in the region of Senator Hélio Campos neighborhood, only one route has existing drainage, HC-13 street, one with an interconnected part of the lake study. In Laura Moreira neighborhood has drainage and is interconnected to the lake, but it was not available for study.



(A)



(B)

Fig.4: A-Drainage system in the study of lake; B - System map applied.
Source: Author (2019)

With implementation in March 2019, the network collects the drainage of HC-13 street works in two parts: a generating flow for the study of lake, Network 1, one for an existing ditch contained at the end of the route network 2, in all their route on the main tubing DN concrete pipe (nominal diameter) 600mm and route manhole to ward

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launch DN 800mm. In the collection system, concrete pipes DN 400mm, with interconnection in manholes. Information on the dimensions of wolves mouths were not available.

The tubing 1 generates flow of the lake with a total length 361,54m and having slope of 0,2%, according to Botelho (2011) as a standard minimum velocity 0.7m/s and 5m/s maximum, provides since a good relationship for the diameter of pipe slope is 0,11%.

This tubing has a system of collect of 6wolves mouths that serves as an indicator of operating and preliminary assessment of the lake's behavior initially with visiting rock bottom quota 80,905 and ward launch Lake 80,150, with a difference of 75,5cm.

In the tubing 2, second project ceded by Municipality of Boa Vista/RR - PMBV (2018) showed a slope of 0,25%, extension 533,25m, which presents a drowned launch, for that to be at certain times below the ditch water level . His height difference of the first manhole until the release wing is 1,315m.

Note that the difference in elevation and slope are not very disparate, so one can establish the use of mixed way, sometimes collecting and generating flow to basin, sometimes using for its flow to the ditch, as its surplus that can be infiltrated and / or covering your way to the nearest stream. Since the study of Lake quota is 80,150 and the dimension of the trench is 79,520, visiting pit 1,40m deep.

Future constructions in the study area, the Senator Hélio Campos neighborhood, can be designed to meet the needs of the basin, leaving free to the designers the ability to generate drainage flow to it. Alerting the possibility of linking the lakes next to Laura Moreira neighborhood, contributing to streams spring unidentified by name.

By seeking to propose a retention basin, analyzed the lake, which has an area of 38,98m², despite being a low value area since the total area of study, there being able to work with lakes in the area for redistribution of flow, and to a larger lake to its natural seepage or fracturing his return to the streams that previously received them, restoring its natural characteristics.

Seeking alternatives for sustainable drainage bring many benefits, it has been applied to study the retention basin the sky opened with level of permanent water, ensuring its natural storage, implemented in the existing lake, increasing its water supply capacity and approaching the maximum of particularities of the lake.

However its operation capacity is comprehensive, with the main reason to rid the flooding region, retaining water from local drainage systems. It can be used in various ways in dry period: the softening effect of water rationing, the region which is greatly affected; use the fire-fighting, very recurrent in the region; aid in family plantations that surround the lakes, especially agriculture of vegetables; supply of the water table; designing a psicultures in small areas.

Once succeeding in their execution, such containment model in origin, could become a model for other lakes in the region, with the maximum utilization of the drainage structure and standardization of services. Having ability of investment and private capital generation to the capitation resources retention basin and use of existing drainage.

These results are in agreement with Meneses et al. (2007) that due to the rapid and unplanned urban expansion, the city of Boa Vista/RR has suffered serious environmental impacts including premature extinction of many lakes and swamps and compromised quality of lake water through anthropogenic practices such as the washing clothes and launching indiscriminate wastewater in their basins.

Therefore, the pollutant control is one of key points of retention basin, whereas during the initial periods of rain, there is a "washing" roads and land, thereby bringing drainage and solid fats for the same. And one of the negative factors brought by region population of Boa Vista disinformation is the wrong use of the drainage system, mingling with the sewer system, bringing direct waste to the water system without having any treatment, a barrier would be the basin, with observation deliver a preview of the drainage system.

Envisioning greater security, its operation must comply with a very strict quality control, constant maintenance, quality control of water and pollutants, among others. It must work together with guidelines and laws, for although there the master plan in Boa Vista/RR, with legal directives about the protection of the environment, there was no master plan of the macro drainage.

Finally, it is suggested constructing a retention basin for this purpose, which may be a solution to the problem of flooding in the study area, with an additional advantage of allowing treatment of rainwater.

And it is suggested that all urban settlements and / or waterproofing causing exceed the flow coefficient of the basin or part thereof, to seek alternatives to cushion the full flow edge.

Furthermore, it is suggested further work on further deepening the impact and scale of this basin, determining the maximum output rate of the allowed retention basin; sizing the discharge device is made based on this flow.

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V. CONCLUSION

It is concluded that the implementation of this basin, when properly implemented and operated, can provide sustainable solutions, in the sense that there will be no transfer downstream to problems, thus minimizing the direct impact on the lives of those present families as it will bring many benefits reducing problems in the dry period and contributing to the drainage during the rainy season.

Highlighting the impacts of urban drainage are a direct consequence of irregular practices of land use, because if well planned and executed, will bring improved sanitation, allocating better quality of life for residents.

This study reinforces the idea of the need for legislative framework related to the occupation and use of water resources, thus avoiding the disorderly interventions, often resulting from urban pressures.

Finally, as a reference to new projects and implementation of innovative ideas drainage, it is stated that the work presented an analysis of the retention basin.

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Cytotoxicity and Genotoxicity Analysis of two Endodontic cements in Human Fibroblast Culture *in Vitro*

Eduardo Fernandes Marques, Marlon Brendo da Silva Benigno, Camila Paiva Macedo, and Larissa Bitencourt.

Abstract*— *The present in vitro study aims to evaluate cytotoxic and genotoxic potential of MTA Fillapex endodontic sealer and to compare it with AH Plus sealer. It was used human fibroblast cell lines FG11 and FG15 for this study. Cytotoxicity and genotoxicity was analysed in human gingival fibroblast submitted to growth condition with MTT test conditioned cells, respectively. Cells cultivated in DMEM means was used as command. Celular viability was mensured in 24, 48 and 72h. Results was analysed by the software Biostat 4.0 Shapiro-Wilk normality test was made but sample presented non-normal behavior. Descriptive analysis was made and its results was submitted to Kruskal-Wallis test (Dunn). All sealers and control groups presented MTT values lower in 24h period than 48 and 72h ($p<0.05$). The biggest cell viability was observed in AH Plus sealer and in control group related to MTA Fillapex in all experimental periods ($p\leq0.0002$). In terms of genotoxicity, the biggest value was mensuared in AH Plus sealer in the 24h period with significantly difference compared to MTA Fillapex and the control group ($p=0.0004$). It may be concluded that MTA Fillapex sealer showed higher cell cytotoxicity than two control groups and AH Plus sealer presented higher genotoxicity than other groups.

Keywords*— *Cytotoxicity, Genotoxocity, Fibroblasts.

I. INTRODUCTION

Seeking to seal the root canals of dental elements affected by some pathological condition of endodontic origin, the dental surgeon is the professional responsible for performing instrumentation protocols, disinfection by chemical processes and filling with appropriate materials. Of these, gutta-percha stands out as a medium that serves as the nucleus for filling the conduit (DONNERMEYER et al., 2018; ELYASSI; MOINZADEH; KLEVERLAAN, 2019).

However, it is significant to indicate that the establishment of optimal contact between the dentin wall and this central filling material should be achieved by using a low solubility sealing material (DONNERMEYER et al., 2018; ELYASSI; MOINZADEH; KLEVERLAAN, 2019). This compound should favor bacterial sealing and improve the resistance against mismatch of the entire three-dimensional obturation complex (DONNERMEYER et al., 2018).

Significant examples of these sealers are epoxy resin-based materials and associated amines in different pastes (SAYGILI et al., 2017). Of these, AH Plus cement (Dentsply, Konstanz, Germany) is the most investigated by several scientific methodologies, proving its effectiveness in dental sealing, besides having a positively influenced by other endodontic substances, such as EDTA and NaOCl. (DONNERMEYER et al., 2018).

Another standard with endodontic applications is Mineral Trioxide Aggregate (MTA), which is based on Portland cement associated with hydrophilic particles of elements such as calcium, silicon and bismuth oxide, making them suitable for dental use from their association. in aqueous vehicles (MOON et al., 2018). It is still known that MTA has good endodontic therapy properties, since it stimulates osteogenic and angiogenic cells (ALI et al., 2019). This material is commercially available through products such as ProRoot MTA (Dentsply Tulsa Dental, Tulsa, USA) and MTA Fillapex (Angelus, Londrina, PR, Brazil).

With this range of materials that assist in the root canal system obturation process, it is significant to indicate that, in addition to their excellent physical and chemical properties, they must have excellent biocompatibility as they remain in contact with periapical tissues for a long period of time. In this regard, it is known that the toxicity of the material could lead to a local inflammatory response, preventing periapical healing by inhibiting cell respiration

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metabolism, fibroblast proliferation and reducing the activity of the alkaline phosphatase enzyme involved in bone tissue neoformation. (SZCZURKO et al., 2017).

Therefore, with the relevance of endodontic cements associated with their risks to the quality of root canal sealing therapy, in view of their possible toxicity, this study aims to evaluate the cytotoxic and genotoxic potential of MTA Fillapex and AH Plus.

II. METHODOLOGY

This study was approved by the Research Ethics Committee of the São Leopoldo Mandic College of Campinas - São Paulo, with the Certificate of Presentation for Ethical Appraisal under the opinion of 63345516.0.0000.5374. Thus, the analyzes were performed in the laboratory of Cellular and Molecular Biology of this faculty.

Also at this study site, through its cell bank, the two human fibroblast culture cell lines (FG11 and FG15) were also obtained. These cells were previously isolated through the primary culture of human gums, removed from three different patients by explant technique.

Thus, in laminar flow hood, these cell cultures were maintained in Dulbecco Minimum Modification Essential (DMEM) medium (Nutricell®, Campinas, SP, Brazil) supplemented with 10% fetal bovine serum (Cultilab®, Campinas, SP, Brazil).) and 1% antibiotic-antimycotic solution (Sigma, St. Louis, Missouri, USA).

In addition, this cell set structure was kept in a greenhouse at 37 ° C in a humid atmosphere, changing the culture medium every 3 days, with the cell progression evaluated by inverted phase microscope. The suspension of these cells was obtained by trypsinization of 24 thermometric wells with trypsin, later inactivated by the culture itself.

From a material perspective, AH Plus endodontic cements and MTA Fillapex were manipulated at room temperature (25 ° C) following the instructions of their respective manufacturers: mixing equal amounts of paste A and paste B on a glass plate using a metal spatula.

Thus, obtaining a homogeneous consistency of the samples, they were inserted in silicone devices of 6 mm in diameter and 2 mm in height, allowing to be prey within 24 hours in an environment of 37 ° C with 100% humidity. . This set was further dried for 24 hours at room temperature and sterilized by 37.2 Gy gamma radiation before being added to the cell culture.

This structure was further divided so that three experimental groups were obtained, with four samples per group, so that one was the control, the second would be the association of DMEM solution with the MTA Fillapex cement and the last one would associate the DMEM solution with the one. AH Plus cement.

Thus, by assembling the experiment groups, the evaluation of cell proliferation was performed using the Trypan blue vital exclusion method at 24, 48 and 72 hours for each cement tested.

For this, after reaching subconfluence, the cells were removed from the plates by enzymatic action and the cell precipitate resulting from centrifugation by Eppendorf® centrifuge was suspended in 1 ml of medium. 10 µL was removed from the cell suspension and 10 µL Trypan Blue was added to it, and 1 µL of this solution was placed in a hemocytometer (Neubauer-Fisher Scientific chamber, Pittsburgh, PA, USA) and taken under a microscope. inverted phase for cell counting and observation.

Thus, the total number of cells present in each well at different times of analysis was obtained by the following mathematical equation:

$$\text{Total number of cells} = \frac{number\ of\ counted\ cells\ X\ initial\ volume\ X\ Dilution}{\text{Number of squares used for counting}}\ X\ 10^4$$

With this information, it was possible to perform cytotoxicity analyzes of endodontic cements also at 24, 48 and 72 hours after incubation. This process was performed by colorimetric assays with 3- (4,5-dimethylthiazol-2-yl) -2,5-diphenyltetrazolium bromide (MTT assay), a yellow substance which, when absorbed by cellular mitochondria is reduced to purple-colored formazan crystals by enzymatic action of living cells (SZCZURKO et al., 2017; ZAKERZADEH; ESNAASHARI; DADFAR, 2017).

The scientific literature indicates that this fast and accurate method of execution generates directly proportional results between the amount of purple crystals created with the number of viable cells. That is, mitochondrial activity of cells indicates their viability through optical analysis (ZAKERZADEH; ESNAASHARI; DADFAR, 2017). For this study, this quantification was performed by an ELX800 multiplier reader (Epoch biotek instruments, inc.) At 570 nm. Therefore, for this cytotoxicity assay, 110 cells per mm² were used in each well of 96-well thermometric plates incubated

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with the tested substances for 24.48 and 72 hours at 37 ° C. Immediately after, 10 µl of diluted MTT solution (5 mg / mL - SIGMA) was placed in DMEM culture medium without serum, added to the treated cultures and incubated for 4 hours at 37 ° C. After this incubation period, 100µl of 10% sodium dodecyl sulfate (SDS) solution and 0.01N hydrochloric acid were added and the experiment maintained 1 hour at 37 ° C.

From the perspective of genotoxicity analyzes, the cells were seeded on glass slide and placed on 35 mm discs at the bottom of the cell culture. These were incubated for 24 hours at 37ºC in a humid atmosphere containing 95% air and 5% carbon dioxide. Then the culture medium was replaced with diluted conditioned medium and incubated for 24h. After this period, the conditioned medium was discarded and the cells were washed twice with buffered saline.

With this, the cell culture was fixed with 1.5% formaldehyde solution at room temperature for 20 min. This content was discarded and replaced with 100% methanol solution (-20 ° C), keeping the cells at room temperature for 20 minutes so that the latter solution was discarded and the cells three times with PBS.

Thus, Hoechst's solution (Sigma, St Louis, MO, USA) was placed on the cells which were incubated for 15 minutes at room temperature. The glass slides were visualized and photographed by a fluorescence microscope. The percentage of micronuclei was determined by the number of micronucleus cells in 100 cells observed in five determined microscopic fields (at the four extreme points and in the center of the slide) at 400X magnification - Figure 1. All experimental groups were tested in triplicate.

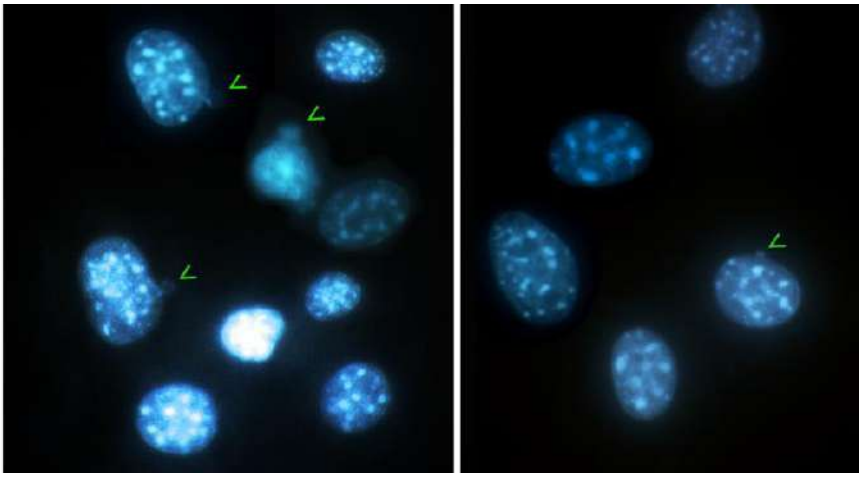

Fig.1: micronucleus formation

Thus, the results obtained were stored and analyzed in the Biostat 4.0 Program. In this system, the Shapiro Wilk normality test was performed, obtaining a non-normal distribution sample. Therefore, the descriptive analysis was performed and the results submitted to the Kruskal-Wallis (Dunn) test with a significance level of 5% ($p < 0.05$).

III. RESULTS

In the comparative scope between the evaluated cements and the control group in the first 24 hours of analysis, it is indicated that there was no significant difference in cell proliferation values ($p = 0.1930$), as can be observed by the medians of cell development in each analysis. Performed as shown in graph 1.

However, this same graph indicates that after 48 hours of experiments, there was greater proliferation in the control group, with a statistical difference presented in relation to the MTA Fillapex ($p = 0.0058$). This relationship with the control group remained active after 72 hours, but at this time, there were statistically significant differences from this group to the two cements studied ($p = 0.0140$).

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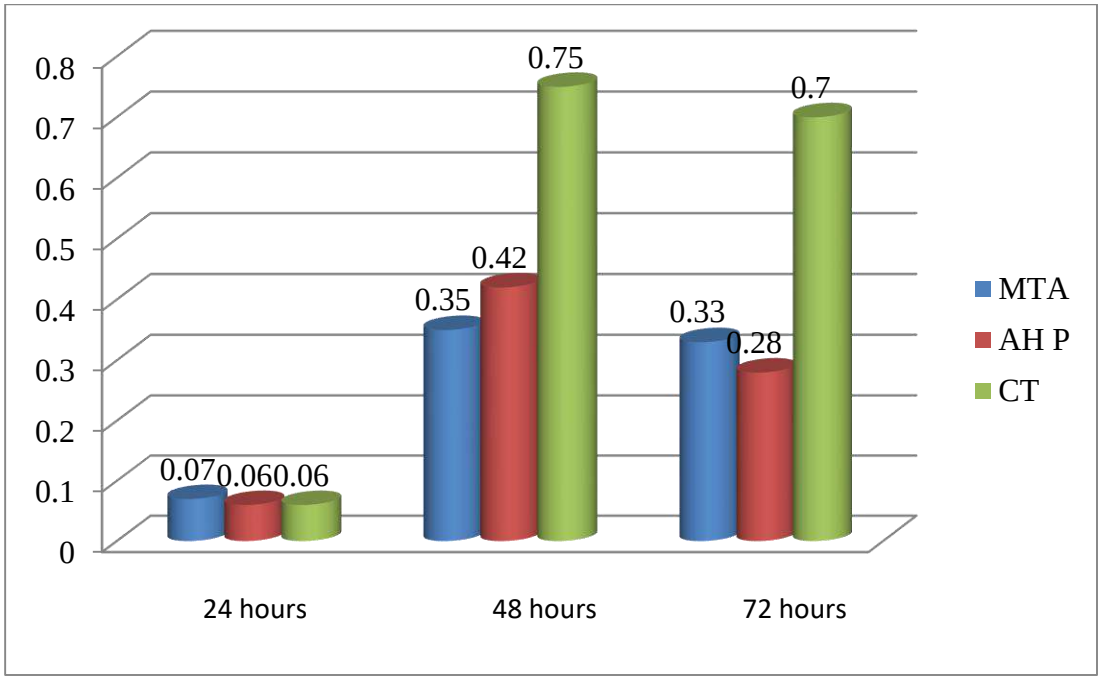
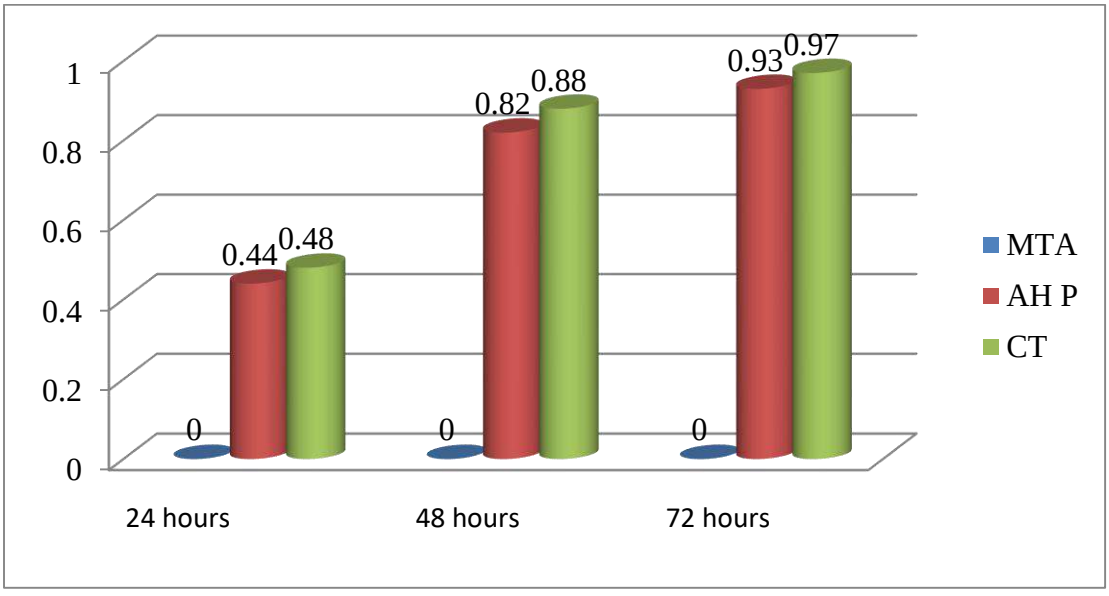
Graph 1: Median cell proliferation of MTA Fillapex, AH Plus and the control group in the same experimental period (number of viable cells x104)



From the perspective of cell viability, it is indicated that the highest values were related to AH Plus cement and the control group in all experimental periods ($p < 0.0002$), as can be shown in graph 2.

Graph 2: Median cell viability of MTA Fillapex, AH Plus and the control group in the same experimental period.



Contrary to this last analysis, Graph 3 indicates that the highest value in relation to genotoxicity analyzes were present in AH Plus cement within 24 hours, with significant difference compared to the control group and MTA Fillapex ($p = 0.0004$).

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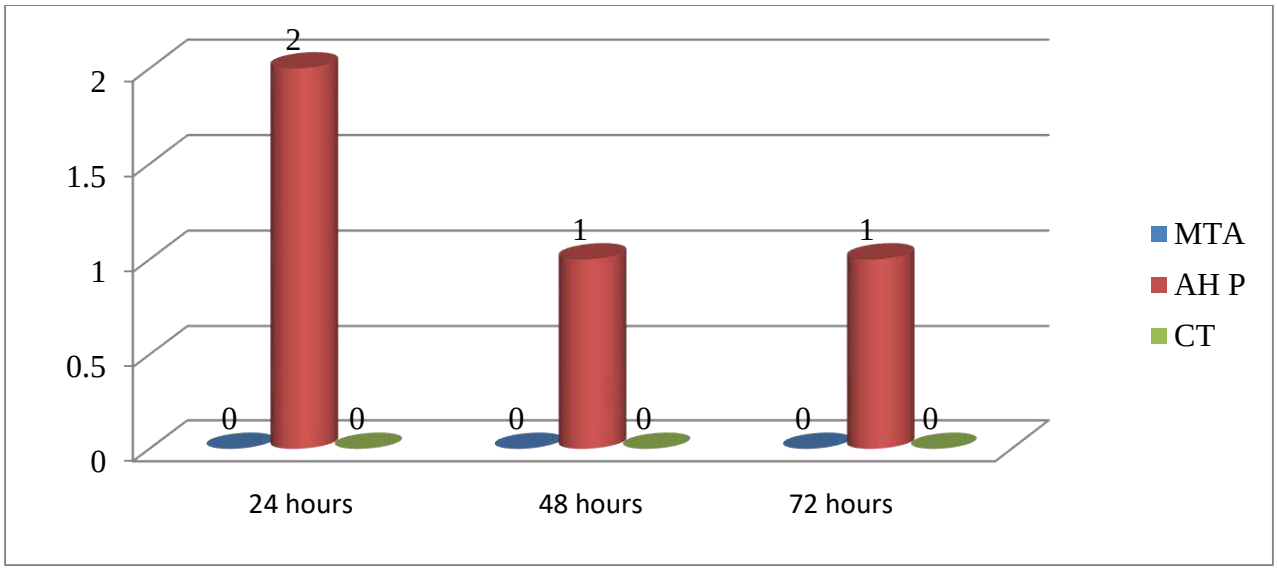
Graph 3: Median genotoxicity of MTA Fillapex, AH Plus and control group in the different experimental periods.



IV. DISCUSSION

The recognition of the need to use root canal sealers is a fact recognized in the relevant literature (VICTORIA-ESCANDELL et al., 2017). However, it is known that these materials can be expelled to the dental periapex through their communication with root canal system, delaying the healing of these areas (SZCZURKO et al., 2017; VICTORIA-ESCANDELL et al., 2017).

With this knowledge, it becomes evident the need for studies that analyze the biocompatibility of these sealers through methodologies that establish how their cytotoxic and genotoxic behavior is established, thus observing the feasibility of their use (SZCZURKO et al., 2017; VICTORIA-ESCANDELL et al., 2017).

Thus, it is necessary to use in vitro cell culture to perform these analyzes on biological compatibility of materials. Therefore, the relevance of the use of human fibroblasts, which have the ability to simulate a tissue response in vivo (SCELZA et al., 2018) is observed.

In addition, the timing of these assessments becomes significant, as in clinical practice endodontic cements are inserted into the root canal immediately after manipulation, at which time they present a higher degree of cytotoxicity (ELDENIZ et al., 2007). However, evaluations at other periods after manipulation become relevant for evaluating changes in possible toxic behavior.

Thus, with the results of this research, it can be stated that MTA Fillapex was the most cytotoxic cement of this evaluation, contradicting results obtained in other cell groups from other analyzes that infer that, even after 14 days of tissue exposure, MTA would have no cytotoxicity effect on human bone marrow mesenchymal stem cells (ALI et al., 2019).

The perspective generated by this work is in consensus with other analyzes carried out by the relevant literature, which infer that these findings possibly occur due to the presence of a higher amount of resins in the composition of MTA Fillapex cement in relation to the amount of MTA (ASSMAN, 2013).).

To this is added further analyzes which, aiming at observing the cytotoxicity of five endodontic cements (AH Plus, Endomethasone E, EndoSequence BC, MTA Fillapex and Pulp Canal Sealer EWT) using a three-dimensional cell culture model, observed that all proposed cements tested exhibited cytotoxic effects. However, MTA Fillapex was much more cytotoxic than other endodontic cements tested using the methodology employed by the authors (SILVA et al., 2016).

It is still significant to indicate that the results of this research still propose that, in the AH Plus resin cement optics, there was a good pattern of cell viability, showing no significant difference when compared to the control group and cytotoxicity between all experimental periods evaluated. Corroborating these analyzes, other studies testing the cytotoxicity of the MTA Fillapex and AH Plus cements identified that the former was more cytotoxic in all evaluation periods (SILVA et al., 2013).

However, it should be noted that these results contradict other studies, which point out the cytotoxicity of AH Plus possibly associated with its formaldehyde release

capacity, pointing out cytotoxicity moments through a seven-day evaluation using the MTT assay methodology (SAYGILI et al. ., 2017).

From the perspective of genotoxicity, the highest value obtained was concentrated in AH Plus cement within 24 hours, with significant difference compared to MTA Fillapex and the control group. This is a relevant milestone in endodontic therapy, as the eventual contact of genotoxic cement with periapical tissues may lead to damage to the DNA structure of connective tissue cells, delaying or preventing the repair process (CANDEIRO) et al., 2015).

V. CONCLUSION

From the results obtained in the present study, it can be stated that MTA Fillapex cement presented higher cytotoxicity potential on human fibroblast cell lines in all experimental periods. However, it is indicated that the AH Plus cement presented higher degree of genotoxicity from the applied methodology.

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Public habitation: construction of a system of water reuse in the search for sustainable alternatives

Ayrk Souza Barbosa[1], Emerson Lopes de Amorim[2], Francilene Cardoso Alves Fortes[3], Lucas Matos de Souza[4]

[1]Graduating in the Course of Bachelor of Civil University Center Estacio Amazon Engineering, e-mail: ayrkbarbosa25@gmail.com
[2]Professor MScadviser. Physicsin UFRR-Boa Vista / RR. e-mail: emersonufrr@gmail.com
[3]Professor Dr. co-adviser. Agronomy in Unesp-Botucatu / SP. e-mail: lene_fortes@yahoo.com.br
[4]Professor co-adviser, Eng. Civil UFRR- Boa Vista/RR andSpecialist inConstruction Management, qualitiesandControlofConstructionin in IPOG. e-mail: proflmatos.engcivil@gmail.com

Abstract*— *The problems associated with environmental impacts caused by construction have resulted in several projects built that take into account the greater efficiency of a habitation. This article aims to reuse the water gutter and air conditioned with a focus on reducing water consumption and to help in the most appropriate use of water in a popular house in Boa Vista/RR. The research was qualitative quantitative, bibliographic and field through the on-site visit. The results were that each year there would be a savings of R$92.28. It was obtained as a result it would take around 11 years and four months for the return of the amount spent on the project. Between this and that, this article will approach the lack of affordable habitation that include the use of recycled materials, reduce costs,
Keywords*— *Reuse, automated irrigation system, conscious.

Resumo*— *Os problemas associados a grandes impactos ambientais gerados pela construção civil têm resultado de diversos projetos construídos que levam em conta a maior eficiência de uma habitação. O presente artigo tem como objetivo reutilizar a água de calhas e ar condicionados com foco em reduzir o consumo de água e ajudar no uso mais apropriado da água em uma casa popular em Boa Vista/RR. A pesquisa foi quali quantitativa, bibliográfica e de campo mediante a visita in loco. Os resultados obtidos foram que a cada ano haveria uma economia de R$ 92,28.Diante disso, foi obtido como resultado que demoraria em torno de 11 anos e 4 meses para o retorno do valor gasto no projeto.Dessa forma,este artigo visa sanar acarência de moradias populares que contemplem a utilização de materiais reaproveitados, reduzircustos, além de produzir melhorias significativas na economia ao usuário da edificação.
Palavras-chaves*— *reutilização, irrigação automatizada, sistema, consciente.

I. INTRODUCTION

The environmental impacts caused by construction is a topic discussed worldwide and several actions has been take over the years. There are several designs built to take into account the greater efficiency of a habitation. However, there are still a difficulties in cost savings for generating an efficient design, which makes it, in many cases unaffordable for poor regional population.

On October 15, 2018, more than 20 neighborhoods were without water. In return the Company of Water and Sewage of Roraima –Caer, reports on Roraimaentempo website (2018), that the problems of lack of water in some neighborhoods are caused by the constant power outages, which paralyze the system.

Seeking to mitigate the reported issue in website Roraimaentempo (2018), where the lack of water and electricity is existing scenario in Boa Vista/RR, the study aims to present the reuse of rainwater in a public house in Boa Vista/RR in order to demonstrate a sustainable system that can be economically interesting.

LAMBERTS (2010) shows that a significant part of the drinking water is intended for non-potable uses such as toilet flushing, gardening, washing clothes, washing cars and sidewalks. The use of alternative sources for water supply with non-potable purposes, according Cohim; Garcia; Kiperstok (2008) can be

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mentioned the use of rainwater an intriguing practice in the search for sustainability, it is characterized for being one of the simplest and cheapest solutions to preserve drinking water. In this sense, the objective of this project also aims to reuse water from gutters and air conditioners to reduce water consumption and help in the proper use of water in a popular house in Boa Vista/RR.

The specific objectives were: to develop a design for a rainwater recycling system, air conditioning and automatic irrigation; check the water consumption reduction on site; and to evaluate the cost benefit of the project for the reuse system.

II. THEORETICAL

2.1 A sustainability in the popular housing project

Barbosa (2014) reports that currently 54% of the world population live in cities, and that will increase to 66% until 2050. The Ministry of Cities (2011) points out that there is a housing shortage in Brazil, about 5.546 million of houses and if analyzed in the disordered development of Boa Vista/RR. There are great future environmental impacts.

2.2 rainfall in Boa Vista-RR.

According to Müller (2018), throughout the year, the weather is warm, generally the temperature reach from among 24°C to 34°C. The highest rainfall season has remained, amoung between April and September (around 4,5 months), with 82% chances of precipitation in June. The minimum chances of rain occurs in January, with average total accumulation of 23 mm.

2.3 Reuse of water gutters and air conditioning.

Rostad, Foti and Montalto (2016) approach that the rainwater utilization has been a more interesting solution because of its lower cost.Besides, also, contributing to the mitigation of flow rates, the mitigation of volumes collected by the drainage system and reducingissues on sources supply.

Dufrio (2017) approachs that in a residence with two air conditioner approximately 1000 to 1200 liters of water for reuse in domestic cleaning, which also contributes to the cost of the water bill, favoring a more sustainable domestic budget.

2.4 Benefits

The websiteUse Rainwater (2017) reports that one of the best ways to save water bill is to use rainwater. This attitude may represent savings of 50% in the final cost of your account, in places with large numbers of families, such as condominiums, for example, the savings could be even greater.

According to the website Ecocasa (2017) the financial savings from the system and the reduction of drinking water consumption is that consumers think in a use of rainwater system. The waste problem of this system can mitigate with the use of inexpensive materials in a low-income housing.

2.5 Sustainable design reuse according current regulations.

The NBR-15527 standard/2015 Rain Water - Use of roofs in urban areas for non-potable purposes - Requirements, provides the requirements for the use of collected rainwater in urban areas covers.

III. METHODOLOGY

The study was conducted in a single-family residence located in the set CruvianaI neighborhood in the Boa Vista Roraima, as Figure 1.

Fig.1: Location of the experiment
Source: Author (2019).

The research was qualitative quantitative, bibliographic and field through the on-site visit. The rain water reuse project and air conditioning was based on a design available in the website Sempre Sustentável, with modifications and adaptations to implement the central drain air conditioning and adding an automatic irrigation system that doesn't use electricity to throughout its useful life, using just the gravity.

To start the project, it was explained the customer the method to be applied in AutoCAD 2017 and then submitted to the owner for approval and execution. It was chosen a water tank of 310 L, which pipes 25mm and 60mm and PVC pieces of 6 meters, avoiding scaling tubes, different connections that can cause the pressure loss and waste.

After presented the project and to saving purposes, analyzed on-site visit to the residence had an elevated location that could support the reservoir. It has

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been seen that on site there was this high surface, it was soon suggested a wooden structure as the owner said it plans to make future changes to the rooms of the house. As a result, if made according to Figure 2, a wooden structure.

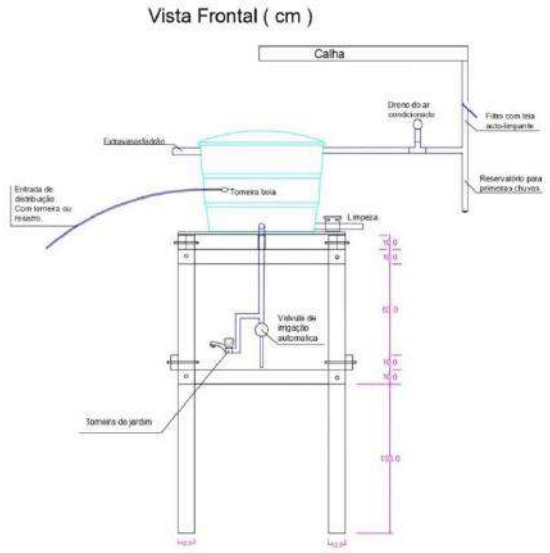

Fig.2: New post-analysis project, wooden structure.
Source: Author (2019).

With the structure ready, positioned reservoir, distribution network connections, air conditioning and gutter, executed the connection of a timer connected to crystal hose ¾ for irrigation of plants and a garden hose to wash non-potable floors and ends .

To check the reduction in water consumption, there was a monthly average cost calculation. According to Strong et al. (2014), a calculation of the water consumption can be accomplished with:

Economy = Volume x captured the Water and Sewerage Rates

The water tariff for a consumption of 0 to 10 m³, according to the Water and Sewerage Company of Roraima - CAERR (2019), is R$ 23.83 per month and the sewage is 80% of the fixed rate of water . For values greater than 10m³, following calculation is made:

$V = NI (7x^2 + 995x)/10000$

Vt=Water Account Value + 80% sewer rate

Where:

NI = Rate Minimum Consumer Category

X = Consumption in m³;

V = water Account Value in R $;

Vt = Total Value Account

According to these information, the methodof Fortes:

Economy = Volume captured x 23.83 (R$ per month)

After comparison it calculated the cost benefit of the system in the long term through an estimate taking into account the value of the work over the years, with the reduction of water consumption and benefits of an automatic collection and irrigation system.

IV. RESULTS AND DISCUSSION

In order to meet the objectives proposed, every aspect of the house had a detailed study to meet the lowest cost and the least environmental impact, but which were subsequently amended and/or adjusted to the construction of the project as approved by the owner.

It was made a wooden frame at the rear of the house, with connections of threaded bars, due to mobility can subsequently reservoir, wherein the four wooden beams (8x12cmx3m) were used as support columns vertically staked into the ground. For the positioning of the pillars it was done initially a jig for drilling holes in soil Figure 3 (A).

Fig.3: A -Feedback and positioning of the pillars; B - sections for stability;C -ready wooden structure.
Source: Author (2019).

9wooden beams (5x10cmx1,5m) were also used to be used for mooring connection with threaded rods. Figure 3A with the cutting of the bars and the use of nuts and washers, four beams at the midpoint of the full height and five beams for supporting the table cuts were also made on the pillars for better stability of the structure.

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In Figure 3B, the three boards (2x20cmx3m) were cut in half to provide 6 table 1.5m for the manufacture of the table where the reservoir is positioned figure 3C.

Finally, this structure was made for the purpose of using the force of gravity to not be necessary to use lifting power over their use of the system. However, as Lamberts (2010), build a sustainable social housing is based on social and environmental reasons.

To make the filter of gutter was used a technique similar to the website Sempre Sustentavel (2018) in which the website design was used PVC 60mm pipe water. In the design of this product was used two pieces of 20cm pipe, where the underside of a part (upper part), Figure 4A, is heated on fire to be malleable enough to enter the second part (lower part). Also in the upper part a hole was made, according to figure 4A, and then rounding the bottom.

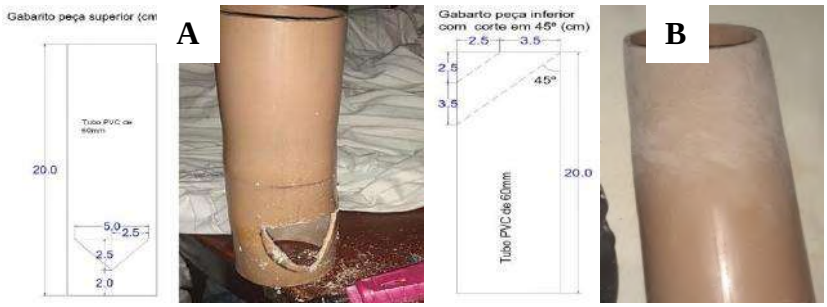

Fig.4: A - Cut triangular upper part in the discharge mouth molding process; B -We have listed the lower part 45 and screwed.
Source: Author (2019).

In the lower part was made two cuts of 45º (degrees) at a distance of 2.5 cm and then3.5 cmfrom the new end of the first section in Figure 4B. It is then screwed out to reduce its diameter to fit with clearance in the first part, being able to add a screen between the parts.

Finally, the filter was fashioned in the nozzle and fixed in the opening at the top, as mentioned above. Made in Figure 5A using the second cut made in the left lower part of the template to fit the top part.

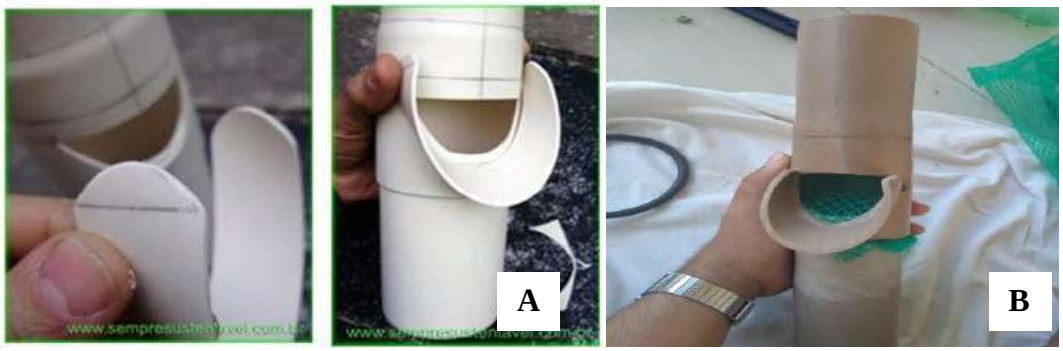

Figure 5:A - Filter nozzle construction, **B** -filter ready trough.
Source: Sempresustentável (2018). Source: Author (2019).

Then, to complete the construction of this filter, figure 5B, put mosquito screen on the tip 45º (degrees) of the lower tube. After that, put the top, with caution, to that the two parts are properly aligned. According Sempre Sustentável (2018), the filter would retain the thickest dirt as dried leaves of trees, small insects (usually dead and dry), bird feathers, feces of animals, among others, and the finer dirt, would the screen to the water separator.

In order tab water of the first rains, Figure 6A, it was necessary to make a discharge outlet and to manufacture it has been used a PVC cover and a PET bottle which has been made a hole in the PVC cover with the thread diameter to fit and the thread facing downwardly and secured with glue PVC, Figure 6A.

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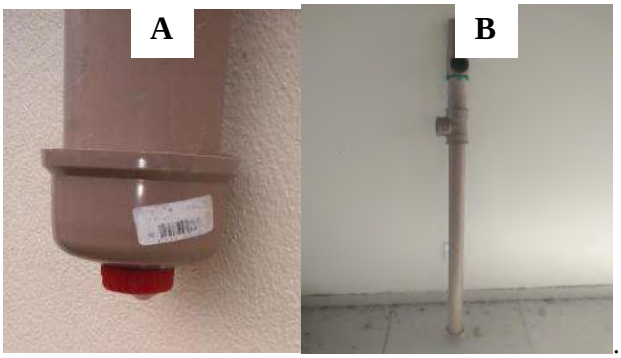

Fig.6: A - Cover separator ready; B - connected to rail filter separator.
Source: Author (2019).

According to the website Sempre Sustentável (2018), the importance of this point, Figure 6 (A), is to remove only the cap for cleaning and then connect this tab in the gutter filter Figure 6 (B).

On the issue of rainwater reuse adjustments were made in the project for greater sustainability. It was prepared a system with water box with 5 holes and placed weldable flanges adapters to the water tank, as shown in Figure 7 (A).One of these holes was made an adapted link, positioned at the midpoint Box, in a height d'wate for connection to the tap water inlet and the float switch, Figure 7 (B). The remaining connections are housing standards.

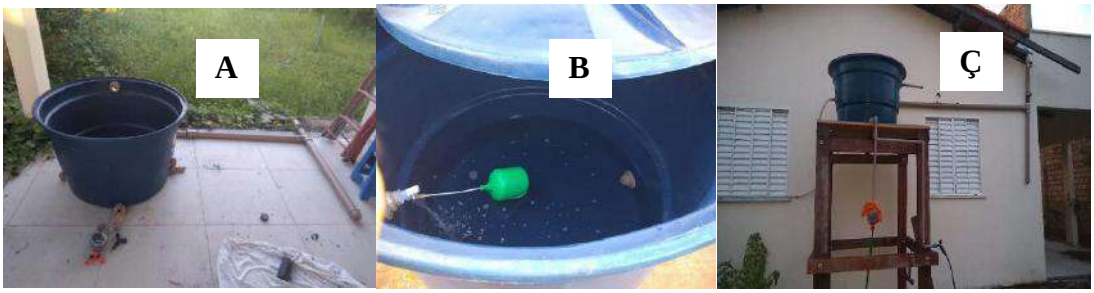

Fig.7: A - provided positioning holes and connections; B- float switch positioned at the midpoint of the height of the water tank;Ç- complete system.
Source: Author (2019).

With the structure ready, positioned reservoir, the distribution network connections, air conditioning and guter, Figure 7 (C), it is made connecting a timer connected to crystal hose ¾ for irrigation of plants and garden hose for washing non-potable purposes and floors.

The system operates to capture rainwater passing through to the filter separator of the first rain water, and then picks up water from the air conditioner, being stored in a water tank. In this reservoir water connections are to be reused as the cleaning and overflow.

There is another binding aid located in the middle of the water tank and the float switch connects to the reservoir doesn't run out of water. In addition to a distribution connection branching irrigation and to a faucet that can be used for non-potable form.

The advantage of the irrigation under gravity passing by a timing valve which requires two batteries (AAA), and set the opening time and closing the passage of water. In this system it is programmed to open 2 times a day, leaving open for 5 minutes. However, the valve can be found in the local market and is usually connected directly in distribution, but in this construction the goal was to unite the reuse with gravity without using energy in the valve.

Then the valve was connected to a hose in which the emitters are made holes, Figure 8 (A), which can be regulated individually for each type of plant. So there won't be problems to cause damage to plants by excess water. The drippers used were the adjustable from 0 to 40 liters per hour, as Figure 8 (B).

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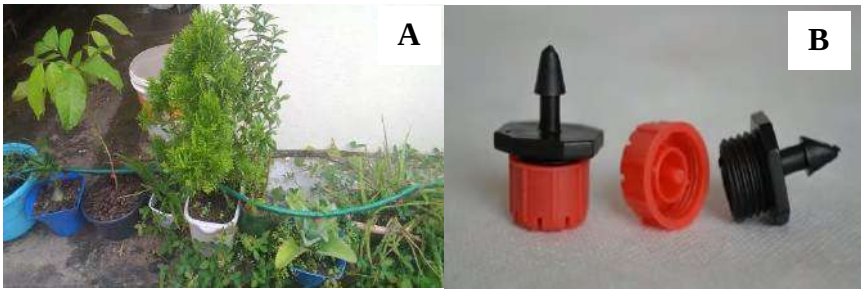

Fig.8: drip irrigation system for the plants.
Source: Author (2019).

According Esteves, Silva and Paes (2016), the costs of this technique can be high initially, but can be reduced as more flat was the area. May be employed smaller pipe diameter for a project, the pipes may represent 60 to 70% of the total cost.

It was made adjustments to the project presented in a sustainable manner, seeking pipes with smaller diameters, because the smaller the diameter of this component the lower the pump power and hence cheaper will be the initial cost and lower power consumption. However, as previously discussed, the goal was to unite the reuse rain and air conditioning water through gravity without using energy through the valve.

To check the water consumption reduction in place, made up survey after five months in which were from June to November of system use, with two months of heavy rain and the rest with little rain. The system was fed with rainwater and water from air-conditioning for irrigation and flushing. Then the method Strong et al. (2014):

310 L = 0.31 m^3→ Economy = Volume captured x 23.83

Economics = 0.31 L x 23.83 = R$ 7.3873 per month.

For accuracy of results, was obtained water bills from two months, where the first month, was consumed 11m^3.

Therefore: $V = NI (7x^2 + 995x)/10000$ → V = 28.10.

Vt = 28.10 + 80% sewage rate = 28,10 + 22,48 = 50,58

Then, an amount payable of R$ 50,58 was generated. The second month in which the consumption was 10 m^3, which falls under the minimum rate of 23.83 + wastewater that is 80% of the water value, which generated R$ 42.89. So:

With System = R$ 50.58

No system = R$ 42.89

Economy = com system - no system = 50.58 - 42.89 = R$ 7.69 per month

It was soon realized that the amount of recycled water was enough to
water bill doesn't pass to the category of up to 10 m^3, in periods of rains. For dry periods, it was used NBR 10884/89. The water was collected using a capture calculating the roof area.

It was only used one side of the house:

A = (a + (h / 2)).b → A = (3 + (0,6 / 2)). 6,18 = 21,01

According to website FazFácil (2017), it can calculate the amount of water collected per month, from the amount of rainwater per month in mm per month,but considering that 1 mm of rain in one roof square meter is equal to 1 liter.

Precipitation = 23mm; Area = 21,01

Quantity captured =area x precipitation → 483.23 Liters

Immediately dry periods the average rainfall is approximately 23mm per month, then: 7,5 months is: 483.23 x 7.5, totaling 3624.22 liters.

Therefore, if it rains at least one day in the month, one has to capture 16,1 L, removing the water that goes to the disposal of reservoir first rains, it is: 16,1L - 2.82 L = 13, 28 L for the water tank.

Furthermore, it was calculated how many liters per minute generateair conditioned. The air conditioned present in the house has the power of 12,000 BTUs. With a sample is envisioned that each time is generated 1,650L. With the air conditioned in mode on from 7 p.m. to 7 a.m. would come to this result:

1,650L in 1h

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Vc = 1,650L x 12h = 19.8 L→ Where: Vc = central arterial runoff

In the month would be about: 19.8 x 30days = 594 L

It was found through the collection, after all regular drip, the flow of drip irrigation in 10 minutes, had a rate of 2.15 L and it was enough to water the plants. Once the system has been connected two times a day for 5 min and the same flow obtained.

The cost-benefit of the popular house was evaluated, where during the rainy months = 4,5 Economy x 4,5 = 7,69 x 4,5 = R$ 34,60. In dry periods, the system would have to be back for irrigation to use, also taking into consideration that normally in Boa Vista/RR for days without rain, the system would be an aid for irrigation.

In tests the system was one month getting little rainwater, which was the month of October that ends the rainy season. This month there was little precipitation, and it was found that the system still remained approximately 110L of water, rain and even without receiving without using the connection aid. Estimates are that it could still be using over one month, so taking this into consideration:

Periods of dry 7,5 months - 2 months = 5,5 months

There would be 5,5 months until the system is being used only the air conditioned. It was found that it is enough for watering plants, because the flow of the drippers is less than the amount taken up by the central, then it follows that:

Total savings = savings = R$ 7,69 per month

So for 1 year it will have:

12 months x 7.69 = R$ 92,28

Every year there is a savings of R$ 92,28 and it was spending approximately R$ 1050,16 in the project construction. So the result is that it would take 11 years and four months for the return of the amount spent on the project.

So after all the analyzes, it was found that despite the low amplitude rainfall in this period, the system was able to store enough water to demand the same customer after 5 months of use, 2 lots of rain and 3 low, the system remained relatively full reservoir even with frequent irrigation and use for washing floors. A few times it used the system of aid, which comes from the distribution network by float switch.

With the costs in Annex I, obtained the amount of R$ 1050.16 which was relatively low and affordable to low-income people, taking into consideration that some of the materials used can come from recycling and that it was made more structure face due to the accuracy of mobility, which raised the final value system.

Regarding the consumption of water, where the water bill is in the range of R$ 50,58 per month, it was found estimated reduction in the range of 15,22% per month, which for a low-income family is significant . It was also made a brief interview with the client in order to verify compliance with the system and her expectations.

According to her:

> "This project is extremely necessity for all of us. I'm very pleased with this project because this water is for me to water my plants, to do house cleaning service, always counting on having water that can be used in several ways. This project met all my expectations and have water all the time. Because to my home stay, constantly, without water or is very weak, I aim to even get water my plants, this project met my needs. I recommend to all the people who do this project, in their homes, sites and gardens for that much worth it. ".

V. CONCLUSIONS

As an experimental design of a junction of several systems into one, which was based on the website Sempre Sustentável(2018), some adjustments were made in the project. It can be said that the system showed satisfactory cost benefit, as well as customer satisfaction.

There is a great need for affordable housing that include the use of materials reused in order to reduce costs. In this way it was used mostly purchased materials, such as hardwood or first class, water tank and pipes with the National Meteorological Institute, Quality and Technology (Inmetro) and who followed ABNT NBR 5626: building installation of cold water, the costs of maintaining the system became air relevant value because the materials that were reused has a very low cost, high durability and abundant in a habitation.

It is also suggested the creation or study of this system on a larger scale for deployment in shops, schools, gardens, farms, among others, probably where the system will be better spent and greater economy.

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Thus, even with the total savings per year vary according to the capitation and the value of cubic meters consumed by residence and the size of the reservoir, there was a relatively significant savings that allows for the return of the amount invested in building the system and from that generate profit with continued system operation.

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Annex I

For blueprint already developed front view, it will be used:

materials	Quantity (Uni)	Values (R$)
wooden beams 5x10cm x1,5m;	9	101.25
Screw 4.5 x 45	6	0.84
Clamp U type (L) 2.1 / 2	4	6.12
clampingbushing 08 N	6	0.84
wooden beams 8x12cm x 3m;	4	172.80
Parquet board 2x20cm x 3m	3	49.86
Thread sealing12mm;	1	2.36
PVC pipe welded 25mm 6m	1	12.36
PVC pipe welded 60mm 6m	2	170.60
Tap p / 25mm black garden	1	3.24
TE weldable25mm	1	1.18
TE weldable 60x25mm	1	17.06
Extra Sealer w / wood 3,6L	1	64.71
Reelwool9cm	1	8.33
25mmsphericalrecord	1	12.36
Sextnut. Zinckey ½ ¾	10	19,60
Hose ¾ x 2mm	25	81.00
Blue Glovebrass25mm	1	6.48
90 25mmkneesweldable	2	1.70

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Watertank 310L	1	110.17
WasherZinc flat	10	3.30
Adapter flange welded w / water tank	5	56.35
PVC glue 75g	1	3.71
Float w / watertank ¾	1	7.65
zincthreaded bar	3	29.13
sprinkler - timer Aqualin	1	120.00
mosquito net	1	reused
Pet bottle	1	reused
Nozzle adjustable dripper 0-40 Liters / Hour	10	5.00
TOTAL	-	1050.16

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Teacher's life stories in different cultural Educational contexts, as a prerequisite for choice of Profession

Juarez Francisco Da Silva, Evelise M L Portilho

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Abstract**—** *The objective of this article is to identify, using teachers' descriptions of memories in elementary education, the experiences that contributed to their decision to become teachers. Memories were solicited from teachers participating in a continuing education program, who at the time of the study from 2014 to 2016, taught at four institutions in the metropolitan region of Curitiba in the Paraná state of Brazil. Hermeneutic phenomenology served as the basis for interpretation of the memories. The study identified that consciously recognizing inspirational moments in one's personal history allowed for understanding of and a better relationship to the one's work environment.*

Keywords**— Learning, Life story, Teacher, Elementary Education, Hermeneutic Phenomenology.**

I. INTRODUCTION

Currently, the teacher profession assumes more and more importance in the creation of citizens for the social world, requiring ongoing research that provides for continued reflection on the demands of each era in their respective contexts. However, above all, this profession contributes to the formation of individuals with coherent opinions who are capable of consciously recognizing the relations that they establish with their surrounding community.

The research that began this article – Learning and Knowledge in Continuing Education – created a continuing education program for teachers at four learning institutions including: elementary school, high school, early childhood education, and special modality. Participating teachers totaled 45, all of whom teach in the Curitiba metropolitan region of the Paraná state of Brazil. The referenced proposal of continuing education is guided by the necessity to shift away from the education model in which the participants are merely listeners to a model where they participate, and together with their pairs, the teachers of a determined school, discuss, reflect, and propose new ways of practicing such a model.

Therefore, various research instruments were used that favored awareness and self-awareness of pedagogy practice. In recalling the influences that led to participants' choice in becoming a teacher, they were asked to recall memories from their elementary education. This involved teachers describing their history, highlighting their most important learning moments, and the memories they have kept for personal significance.

The use of the word "choice," here does not indicate the process of each teacher and whether this choice was intentional or circumstantial, if he or she was directly or circumstantially influenced to become a teacher. The research sought to identify these particular reasons in interpreting the memories. Memories about life stories point to

> the practice of constructing and deconstructing the teachers' meanings, through narratives that show changes in the reflective comprehension of their own conceptions, facilitating the creation of an emancipatory consciousness, which can be an effective alternative for teacher education (SAMPAIO et al., 2018, p. 243).

In this case, the use of autobiography narratives presents itself as a methodological option with the purpose of unraveling diverse meanings that constitute a teacher's identity. Thus, for Sampaio et al. (2018), the narrative of memories promote a reflective state in the author, since it

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revitalizes one's memories of significant facts that can be reported.

This research about teachers' life stories has the objective to identify indicators that guide the professional choice of becoming an elementary teacher in different cultural educational contexts. The indicators presuppose that one's interpretation of memories about people, lived experiences, and other perspectives all influence one's decision to choose this profession.

II. MEMORIAL AS AUTOBIOGRAPHIC COMMUNICATION

Memorials are texts written in the first person, the same way as letters, confessions, diaries, and memories (Vieira, 2017). This genre of writing about one's self exposes the subject's reasons for its bias and subjectivity. When the individual expresses their subjectivity through experiences, they transmit their knowledge, their dreams, all of the energy of the writer. This goes beyond the written language as some images and symbolic representations cannot be captured into words. According to Bueno et al. (2006), using memorials as narratives written about the life stories of authors, and autobiographical studies, have gained prominence in Brazil as a methodology of scientific investigation in the area of education.

To be a human, to tell your story through memorial, appears to unite and organize the experience in relation to the memories of past events, recreating a path through your life that shows the construction of one's personal and sociocultural reality. Biological processes and sociocultural phenomenon, for Damásio (2018), do not explain the complex social relation with which our mind becomes involved, since there exist codes of conduct that attempt to maintain a homeostatic environment. In general, we are not isolated individuals nor are we in a single place, in any specific moment we are catalyzers of experiences that guide our lives that are also molded by particular circumstances in each era and place.

Narration written as a memorial is a sequence of facts and images transmitted by representations that occured over a given time period. According to Bruner (1997), it's a set of linguistic structures and psychologies transmitted culturally and historically according to the abilities of each individual. These allow for the comprehension of the dynamics of meaning creation and interpretation of oneself and lived contexts. It is a version of reality, since its acceptance is by convention and not empirical verification and logical precision. As such, Brunner (1997) proposes ten steps to evaluate a detailed memorial narrative, in no particular order, but recognizing that they all form a system as follows:

1 – Narrative diachronicity: involves the exposition of events that occur with the passing of time;

2 – Particularity: are specific events that are ostensive references;

3 –Intentionally statedbonds: refers to how people act in scenarios and events are pertinent to their respective intentional states;

4 – Hermeneutic composition: there is a difference between what is expressed and its possible meaning, highlighting the absence of a single means of determining meaning;

5 – Canonicalization and violation: refers to unjustified inclusion of certain events;

6 – Referral: acceptance of a narrative cannot depend on its correct reference to reality, since this is evaluated by its likelihood;

7 – Generalizability:is the mode of constructing situations as a mental guide;

8 – Normativity: the form changes to conform to the moment's concerns and surrounding circumstance;

9 – Context sensitivity and negotiability: allows for cultural negotiation, which, when successful, allows for cultural coherence and interdependence;

10 –Narrative accession: create something quite varied called "tradition."

The memorial, however, is a narrative capable of evoking, through a succession of facts, a certain real or imaginary world, understood as a scenario in a given time and space invoked and symbolized by the author. That which symbolizes is that which approximates (CAMPBELL, 1997), despite the individual not rationalizing the experience. It is always a relationship established in the form of a metaphoric reality.

The metaphor is a native language of myth and is responsible for the vigor of directing an individual's energy, according to da Silva (2016). It begins with the relation between the depth of the experience and the individual's vocabulary, and in a more contemporary mode, renews the context of the complex unit since what it means to be human is to be in a constant learning dialogue. In the learning process, complementarity over ideal self-education is conceived as a process that establishes itself as a mediation of reality in the function that qualifies it, in a work that evokes the very history of the human being. It is important to consider being a human in its totality. This comes despite the

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possible arbitrary moment in which one writes his or her own story in the form of a memorial and thus exposing oneself to the other in an autobiographical communication process through the mobilized conscious through memory of something that left a markas a result of their life story.

III. METHODOLOGY

This research, which is of a qualitative nature, involved content analysis following the interpretation of hermeneutic phenomenology categories as proposed by Ricoeur (2013). It was done with 45 teachers that work in four different education institutions across elementary, high school, and special education.

Hermeneutic phenomenological epistemology is an area of knowledge that encompasses the phenomenon as it appears, since all evidence for it derives from a dialogical process between the object and the researcher. Hermeneutics interprets the phenomenon as it appears in the analysis, according to Ricoeur (2013), this includes the complete scenario of observation, from the researcher until the object in the respective scenario as well as the result of this relation.

In the schools that participated in the continuing education program and were a part of this research, 12 teachers worked in special education, 33 worked in elementary and high school education institutions. Despite all being located in the Curitiba metropolitan region, they were located in geographically and culturally different contexts. The first school, denominated as A, possesses more than a thousand enrolled students for elementary and high school education, 8 teachers participated from this school in the continuing education program in 2014. The second school (school D) had 10 elementary school teachers participate in the continuing education program in 2014. The third school, which we call H, which receives students for infantile education, special modality, had 12 professors participate in the continuing education program in 2015. The fourth school, denominated R, with more than 700 students enrolled in elementary education had 15 teachers participate in the continuing education program in 2016.

The Continuing Education program offered by the Pontifícia Universidade Católica do Paraná-PUCPR is carried out in each education institution through seven meetings, on different days, lasting two hours each. The structure of the meetings conforms to the following steps: 1) Review of the previous task; 2) group dynamic; 3) Presentation of the day's theme via reference and content review; conversation circle; presentation of the week's task, and metacognitive evaluation.

Metacognitive evaluation is an instrument that the participating teacher of the day's activity offers through written observations of the environment, the content, group activities, and of him or herself in a reflective process. According to Flavel (1971, apud Portilho, 2011, p.106), the name is attributed to knowledge that someone has about their own cognitive processes, or any other subject related to them.

In the first meeting, the task solicited from the teachers was the written autobiographical narrative termed memorial, which deals with the written memories that the person has about the facts of their life that contributed to their decision to become a teacher. The task was worded as such, "You will write a narrative telling your professional history in such a manner as to highlight the most important learning moments that you have lived (family, friends, school – from infantile education through until your college graduation and first professional experiences), focusing on those that contributed to the education of the professional that you are today."

For the interpretation of the memories, four readings were performed for each one, in alphabetical order ascending one day and descending on the next with a three-day interval between each reading. The readings were always conducted at the same time of day: early in the morning, in a state of low-stress in order to facilitate the supposed distancing recommended by the chosen methodology. This also helped to capture the phenomenon of the relation established between the memorial and the researcher. With the readings of the memorials, the researchers established the possible and pertinent relations among the preformed skills, the emotions, and habits written in the memorials as well as all the categories suggested by hermeneutic interpretation.

The hermeneutic phenomenology, according to the presuppositions of Ricoeur (2013), served as the basis for interpretation of the memories, considering what was clear in the interpretation, in the text, and at the heart of the historicity experienced by the teachers. There are five previously established categories to guide this process, they are:

1) The effectiveness of language as discourse – something happens when someone speaks or writes, and this is necessary to consider when dealing with a distinction that has a temporal origin and manifests itself in the present. This involves the quantity of data offered to the reader such as, incomplete phrases or lack of words, which do not allow for a more detailed observation. It also involves the richness of details or lack thereof in a story of lived experiences.

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2) The discourse as work – formed by the composition of the genre, the individual's style that reveals the nature and composition of the work. Here transparency and disposition of the author in telling significant experiences recovered by memory at the moment of writing and if the discourse describes situations capable of forming a complete story.

3) The relationship between speech and writing – is the result of the relationship that is established between the written text and reading as a speech, producing an autonomy in interpretation with meaning that does not reduce, but as observation of the author's intentional perspective. With group reading it is possible to identify the environmental culture, since the place of speech of each author announces a specific mode, with or without the flexibility to transpose.

4) The world of the text – it is the comprehension or capture of a written objective expression and is accessible through the structure of the written work as a reference to the world of the author taken to its most extreme conditions. In the world of the text, the reported experiences announce the manner in which the author is directly related to what is reported, i.e., how he or she perceives this relationship and the intensity with which the reported experience means in some aspect.

5) Comprehension before the work – this deals with what the text offers as a mediator of the own reflections of the reader, so that he or she understands themselves in the face of the provocations of the work, since it is inherently a subjective undertaking. This is an observation that reveals to the reader what attracted his or her attention for different reasons when reading the text, since it is where the experiences reported in the text are combined with previous observations.

After all of the meetings were done in each school, the research group returned to the respective schools for the meeting termed "Returning," in which, in addition to the presentation of the results, there was a discussion about future referrals. The research counted on the approval of the Ethics in Research with Human Beings Committee in Pontifícia Universidade Católica do Paraná (CAAE nº 03851312.1.0000.0020).

IV. DESCRIPTION AND INTERPRETATION OF THE RESULTS

In each teacher's narrative it was possible to observe their respective life story, as solicited, for the construction of the memorial. The interpretation of this research tool followed the categories previously established by the hermeneutic phenomenology of Ricoeur (2013), described in the methodology section.

Category 1 – The effectiveness of language as discourse: considers the quantity of revealed information that are described. The teachers of school H were found to not have written the age or in which life moments some experiences occurred. At this school, all of the participating teachers were female, the memorials were written weekly, between two and twelve lines. There were not many details, and motivation for choosing to become a teacher was quoted in short sentences, as was the case of the teacher here denominated as R, "I chose to become a teacher out of the love of conveying what I know to others."

Of the ten teachers of school D, three of them were male and seven were female, only one teacher wrote their age. In the memorials of the nine teachers, some wrote about experiences from childhood up until adulthood, going over some moments that considerably contributed to the choice of the profession. All ten teachers wrote in an objective manner about their most important moments for choosing the profession. The teacher, denominated P wrote, "At 5 years old, I received a chalkboard, a piece of chalk and an eraser, my most meaningful present. Everyday I would repeat the lessons to my sister and dolls."

At the school identified as A, among the eight teachers that participated in the program, two were male. At this school, the reports were more detailed with age information estimated for when the significant events occurred from childhood to their college such as for teacher L, "My school life began early in a nursery, […] I enrolled in college and before I finished, I began tutoring."

In the other school, termed R, all teachers were female. The reports were detailed about the period at which they began teaching and also included experiences about their current jobs. Teacher D described how her professional life began in childhood, "Daughter of divorced parents, my mom worked as a housekeeper […] at 12 years old I already reconciled to work as a nanny and a housekeeper. At 15, I was already studying at night and working all day long as a receptionist. I entered the municipal network and await the result of a public entrance exam."

Three schools, R, A, and D exhibited this category. The teachers of these schools demonstrated this by reporting on the local culture where they lived their first experiences. They dynamically reflect upon that which they write via complementary phrases and explanations. In the case of school H, the language as discourse category appears distant or appears separately from the author and reader. This means

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that in this school the teachers in question do not demonstrate clearly the language of a respective culture nor seem to present a language that they identify with the profession. This is interpreted as teachers attempting to acquire a language that does not represent them, and they have difficulties in doing so, but the reasons for this were not identified.

Category 2 – Discourse as work: this category identifies the use of words and phrases that show the differences in distant regional cultures due to the way they write. It also accomplishes this from the relative disregard for conjunctions between phrases and punctuation as prescribed by the orthographic norm. This lack of concern could result from the emotions generated by remembering the facts of his or her life without a care for cultural norms.

In the school denominated A, among the eight teachers that turned in the memorial task, five admitted that they had not planned to become teachers, but in one way or another, they did. Teacher P related their experience, "An old colleague invited me to teach, I was a little reluctant, but due to their persistence I ended up accepting."

For the teachers at school R, this category was evident the moment that the author faced a challenge in life, supposedly also being there in all of the previous experiences leading up to becoming a teacher. Teacher L described this as, "when I decided to do pedagogy, I heard many competent people say that it was college for those who did not know what to do. I like what I do, despite the many problems that happen day to day."

Apparently, the memorials from school H were written and turned in without any review of the text. In some cases even it was not possible to identify the level of importance of some experiences in the lives of the teachers. This was due to the fact that they did not write about situations in their lives, despite vaguely mentioning one or more experiences that seemed incomplete or were not clearly identified. Such memories were made up of short phrases negating the possibility to visualize more than one scene of the reported experience. This way of writing also demonstrated the low motivation of the teacher to reflect, and consequently, compromised their professional improvement since the memorial sought to redeem their work related experiences. Teacher L, for example, reported "[…] that it was when I met my brother's teacher, I left my classroom. I really wanted her to be my teacher, afterward I began to play at home."

At school D, the memorials evidenced situations associated with emotional memories. It seems that these teachers were motivated to write about their past experiences and associating them with the moment in which they wrote, allowing the reader a fuller interpretation. Teacher C wrote, "Every time I return as a student, I improve my relationships as teacher and colleague, this is why I always strive for new knowledge.

The teachers demonstrate discourse as work by the way they interpret their particular experiences. The described scenarios, associated with the emotion of the memory and the manner in which they are described indicates that the teachers were motivated to join the profession by concerns and motivation, not as a result of stagnation or apathy. They appear to be involved in and established in the subjects of the profession.

Category 3 – The relationship between speech and writing: this relationship is apparently clear and was found in all schools. This is due to the fact that it promotes, in the observer, a sense of understanding of the writer's place of the memorials. At school A, the reports indicate very different ways of writing about similar experiences. Still, it also reveals that the respective experiences come from teachers with large differences in behavior, given how they relate to a situation, even though they work in the same school. For example, teacher M reported that they consider themselves a good professional with a sense of humor and that they seek different forms of evaluation in order to help the students in areas in which they struggle, but does not identify their educational background. Their colleague, teacher S, described only the programs and years they finished without contextualizing their experiences as was solicited, again highlighting the different means of discourse. In interpreting the intentionality of these two teachers, one notes that the one deals with how they deals with others, without describing one's educational background, while the other only reports their educational background, without outlining the way they deal with others, in this case, their students. The life experiences in this school, as written examples, seem to form an environment that is conducive to the diversity of attitudes and spontaneity to deal with others without generating large conflicts, even though it had the most dissimilar people.

The teachers of school H showed a certain distance from what is possible or viable for the profession. This is especially the case given that they did not show clear purposes and ways of writing their respective commitments with a tendency towards the improbable. It seems that commitment is so encompassing that it is unlikely to be accomplished. This is shown by teacher C who wrote that "[…] what brought me to choose the teaching profession was

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my desire to change some things that bothers. I believe that the teacher is responsible for the transformation of a nation […]."

In the group of teachers at school R, this relationship between speech and writing conforms to the hermeneutic phenomenology categories. Phrases were described that expressed the happiness in choosing the profession, especially because they had opportunities and experiences in other professions that allowed them to make personal comparisons. Common phrases in these memorials were "[…] the years passed and after ten years I participated in another entrance exam to be a teacher where I teach until today and I am very happy."

At school D, the intentionality of the teachers was evident. Their writings provoked in the reader the possibility of interpreting the teachers as imbued with a sense of future motivation. This was manifest in the case of teacher V, "[…] I have been in the profession for thirteen years and nearing retirement. I love to give classes, but I do not feel fulfilled in the face of the problems and challenges the education system faces at the moment, there are not reliable or consistent solutions […]. Despite everything, I am happy, and I do what I can and what is possible."

In this category, the teachers at the schools A, D, and R demonstrate autonomy as they can observe their professional horizons, since they can glimpse their emotions in the profession and in what they believe as subject of their own history. The teachers at school H also possess, in a certain way, the motivation to exercise the profession, even though they do not make it clear to the reader how they intend to do so, but the text is interpreted as pronouncing a special intentionality in what they produce in their work.

Category 4 – The world of the text: the category that seeks to identify which stimulus the teacher considers in their life experience to be that which motivated them to choose the profession. It is also concerned with the teacher's perception of him or herself in their current work condition. This is the case of the teachers at school H that showed to be complete professionals willing to do the task without many questions or demands for improvements. They seem to be satisfied or comfortable in the manner in which they do their work. As teacher M reports, "[…] I chose to be a teacher because I like to learn."

For other reasons, the teachers at school R expressed their distresses and constantly suggested improvements. These teachers began their professional careers elsewhere. The same temperament to criticize that generates some work conflicts also seems to show a high level of dedication to the profession and they had certainty in why they choose the job. Teacher S reports that "[…] I am fully convinced that my profession is everything I dreamed of; we face arduous challenges in daily life [...], I can say that I live for love and tomorrow I will feel fulfilled when, in fact, they realize the true value of the professional that we are and still can be."

In the memorials of school A, regarding this category, there was apparently not much willingness on the part of teachers to improve. Even though some expressed discontent, they were not in the mood to produce more and demand improvements in themselves or their work environment. This is described by teacher E, "[…] I dreamed of a public job, I never thought of teaching. I keep studying because I know knowledge is a horizon."

At school D, the teachers reported the life experiences in which they chose the profession. They also reflected on experiences that gave them new meaning. Teacher R writes "[…] an intense and productive period. The [university] transformed me into a teacher excited about the opportunity to teach. The contact with some professors was definitive for my education and made me realize the need for constant improvement."

In the world of the text, the teachers reported the influences of their respective teachers and professors throughout their lives, especially in childhood. They also reported other stimuli such as their parents, their friends, and the various experiences that, in some way, led them to choose teaching. They widely reported that some experiences were significant and positive, even unpleasant ones, since these experiences served to reorient something in their lives. In some way, they chose the profession in order to do it differently than they had experienced. These experiences, interpreted as indicators of looking at the profession of teaching, drew the attention of these people who are capable of transforming a difficulty into motivation.

Category 5 – Comprehension before the work: the memorials of school R offered reports of experiences that indicated major efforts by the teachers in choosing and continuing in the profession. As observed in the report of teacher D, "[…] I opted to be a sewer for the first 40 years, but always with a desire to teach as a source of solidarity, not as a profession, but at 50 I graduated in Pedagogy […]" The statement by teacher K, "[…] I was brought up by my grandmother and when she became sick and passed away, I missed my classes at school X, … I was in a different place, with no support, and with a huge hole in my heart … but I finished the program I was doing […]" These were some of

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the difficulties that these teachers experienced in their upbringing with the possibility of choosing other professions with which they were acquainted. However, it is as teachers that they recognize the challenges ahead of them, even when they do not know how to confront them, but they describe themselves as satisfied and always looking to improve.

The participants at school H demonstrated an emotional distance in the continuing education program, since their reports about their childhood and reasons for choosing teaching were generic and short. This can be observed in teacher I, "[…] I chose to become a teacher from an early age, I played with my sister and brothers when I was a kid." Another teacher, denominated E wrote, "[…] to be a teacher does not mean that only you teach, nor should it be this way! […]" In a certain way the group of teachers were not available for the exercises of a deeper professional reflection, or they had difficulties in expressing their personal experiences naturally to others not from their daily lives.

In the memorials of the teachers from school A it can be seen that they are professionals in a working environment, some clearly defined in the profession and others passively dealing with the day-to-day. Apparently, there seems to be a division in the group of teachers between those dedicated to the profession and those there by other circumstances. This was described by teacher G, "[…] I did not intend to be a teacher, since I did not believe I was qualified and prepared, but some life events led me to teaching […]." The teacher termed V wrote that their descriptive memorial had the objective to present the academic and professional trajectory up until to the present, and wrote about their programs, dates, and institutions where they had studied. Another teacher reported about their life background that led up to them achieving their professional goal and highlighted, "I feel proud of myself for navigating all the development phases of our children […] I am a teacher!" Another teacher was thankful for the opportunities they had in life, despite the difficulties in constructing their professional career, "I thank all the people that contributed to my education and believed that even with family problems it is possible to win." The difference in the way they describe the reasons for choosing the profession and their level of satisfaction can lead to difficulties in fostering the motivation necessary to improve the group's environment. Still, this group wrote extensively about their life experiences, highlighted the important moments, and the influences that led them to choose this profession.

At school D the memorials offered the reader the experience to understand before the work and also indicated that the teachers did this exercise before writing the texts. This is captured by teacher R, "[…] I opted to study a language program. A bit of influence from my mom as well as perceiving a personal and professional appeal in education." Another teacher termed R highlighted that "[…] I really liked the school, but I could not attend very often, I depended a lot on the work of my mother […]. When I could go, I was lent a notebook, I worked hard, and always got good grades. For this, first I received a prize called, 'Smooth Path Primer' and for reading without stuttering I received a book from the teacher called 'The Circus'. Of all the good memories I have, this was what determined my passion for reading and stayed with me for the rest of my life." In this school, the memorials report many experiences leading up to the choice of teaching, highlighting that they understand the reason for this choice and cause the reader to reflect on the subjectivity of the choices.

For this category the memorials offer many experiences that clearly led to the teachers' choices to join the profession, it is possible to interpret a number of life events that led to this choice. Still, it is also clear that other teachers do not know why they chose this profession nor believe the profession is ideal for them or knowing how to modify this belief.

United all the hermeneutic phenomenological categories in each of the four schools, utilizing the memorials written by the teachers, the following interpretations become clear. School H demonstrates a language that indicates a group of teachers with similar purposes and apparently with objectives outside of the profession. The texts are not clear enough and indicate that they are thinking of modifying what is not within the purview of the school, using a quick, shallow description of subjective aspirations that are too broad and beyond the environment in which they operate. The reflections on their educative environment do not appear in the memorials and cause discomfort to the reader, leaving unclear what conclusions to draw about the group. It is possible that these teachers did this work in a mechanical way without reflecting about possible improvements. It is also possible to interpret that the group puts itself at the disposition of some other professional and doing so does not seem to cause anxiety or estrangement, nor is it questioned. What can be concluded from the group of teachers, as reported by their experiences, is that they suffered in the past. However, their current situation does not compare in terms of difficulty to that which they have already lived.

The memorials of school D are described in such as detail that the reader can visualize and imagine complete

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experiences in order to understand the author. The reports show the individuality of each author and their respective relationships with the work environment. The reports form a set of reflections showing how the teachers' perceive the development process beginning from childhood up until the current moment in the profession. They appear to be a group that reflects on their memories as an aid to not give up easily on the challenges, and it seems, they cannot development more due to lack of institutional or governmental support. It appears they do not know how to confront some circumstances arising from the education policy system. They are able to criticize but cannot offer solutions.

The group of teachers from school A suggest, through the interpretation of the memorials, that each teacher possess a personal dynamic that they do not expose to the group. This causes distancing and passivity in the actions of all. Moreover, they try to do their jobs independently, but normally do not tend to confront one another. This can be interpreted as a group that does not reflect very much and has little interaction in trying to improve things, but this does not generate conflict among the members. The memorial slogan caused some disquiet among the majority of the teachers, that tried to describe experiences among themselves that did not match. This could mean that some of the facts did not occur. The group also showed little appetite to dedicate themselves to the task, especially those that had not desired to be teachers.

In school R, the group of teachers that responded to the memorial showed a large critical capacity towards their work environment, but they tried to resolve everything within their group. Apparently, the other teachers that were not in the continuing education program and did not participate are apathetic and distant from the participating group. This leaves the impression that there are two groups in the same school and that one denominates as it has previous work experiences before becoming teachers. The reports are ample and deep, showing the complete content of some experiences, especially concerning those that led to the choice of becoming a teacher. From this group, one of the main facts that emerges is how they are thankful in their writings for everything that they have experienced, which in one way or another, contributed to their professional choice.

This research shows, via the hermeneutic means of interpreting the memorials, that in general the education of a person is not an isolated process. Rather, it occurs within an objective space, and through subjective choices, the influence of others, the circumstances that present themselves, in some manner lead to a person's decision.

V. CONCLUSIONS

From the readings of the memorials, it is possible to confirm that the life stories of professors is very relevant to the study of the profession, since these experiences are the foundation of the professional who then directly educates other professionals. Although, according to Rego (2014), memorials have not been sufficiently researched in education, despite being a genre of writing often solicited in selection processes or for career advancement.

The large social relevance of the teaching profession demands that more research be done to increase the preparation process, with all of its tangible and intangible demands that make up a professional. This is the case whether in continuing education of the teacher, as an end in itself, or connecting pertinent knowledge available for the teaching context.

As Sampaio et al. (2018) affirms, current studies point to the fact that using memorials in teacher education promotes interaction between the teacher and their work environment. In order to write a memorial it is necessary to find the words that fit the personal vocabulary, that itself was created during the experiences. Yet, it is necessary to have a willingness to remember personal experiences and relay this to the reader.

When reading memorials, it is not possible to clearly identify how the writer reflects and is self-aware; however, according to Ricoeur (2013), a human being can know him or herself indirectly in terms of the objective world and his or her actions in it. The memorials point to the necessity of teacher participation in continuing education programs in such a way as to optimize reflections about one's actions, in one's work with their peers, aiming to improve and transform one's pedagogic practices.

Pedagogical practice is directly dependent on what we are as a person (NÓVOA, 2013, p. 15). That is why the educator's education, according to the epistemologies that underlie the conclusions presented here, entails the impossibility of separating the personal self from the professional self.

The knowledge of history and the knowledge of oneself as an individual who acts in a profession of connection between what one learns, the object one learns and the one who learns while transmitting knowledge, seem like necessary characteristics for the execution of a teacher's work. It is the connector, someone who constantly reconnects the present while focused on the future, paying attention to those acquired past experiences. The principle of reconnection, for Morin (2008), is the necessary

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consideration to integrate a knowledge that should not be isolated from its object nor hide its essential character, as information acquires meaning in through knowledge. It is an event that acquires meaning in the historical conditions in which it appears and helps integrate phenomenon.

The interpretation of the memorials, according to the hermeneutic phenomenology, aptly fulfills the general objective of this scientific exercise and confirms that this epistemology can offer consistent elements or categories to interpret the reports. Even considering that human life shows itself differently to each person, the perspective of a professional seems to underlie that each person can understand a life story. Even so, each person's revelations follow their life experiences, and this complex perspective develops next to each individual's background, consequently, it reveals itself in the choice and exercise of one's profession.

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Prevalence of depressive and anxious disorders in an area of the Family Health Strategy in the Southern Region of Tocantins

Mariana Ferreira Bucar*, Sávia Denise Silva Carlotto Herrera*, Alice Magalhães Faleiro, Elisa Palmeira Calil Fonseca, Caroline Rufoni, Vinicius Lopes Marinho, Yuniel Martínez Hernández, Warly Neves de Araújo*, Florence Germaine Tible Lainscek

*Corresponding Authors: marianafb28@gmail.com (Mariana Ferreira Bucar), saviadenise@hotmail.com (Sávia Denise Silva Carlotto Herrera), warlynevesaraujo@gmail.com (Warly Neves de Araújo)
Emails: alicefaleiro@hotmail.com (Alice Magalhães Faleiro); elisapcf@hotmail.com (Elisa Palmeira Calil Fonseca); danny.926rc@gmail.com (Daniela Rodrigues de Castro Silva); vinicius.marinho22@gmail.com (Vinicius Lopes Marinho); dryuniel@gmail.com (Yuniel Martínez Hernández); fg.tl@hotmail.com (Florence Germaine Tible Lainscek)

Abstract*—Introduction:** *Mental disorders are among the main causes of morbidity today and represent 22 to 25% of the care provided by the Family Health Strategy. Among them, depressive and anxious disorders are emphasized.* ***Objective: *To verify the prevalence and clinical-epidemiological profile of patients with depressive and anxious disorders and to analyze access to the mental health care network in an area of the Family Health Strategy in the southern region of Tocantins.* ***Methodology:*** *This is an analytical, observational, cross-sectional research of patients with anxious and depressive disorders of the Seville Basic Health Unit in Gurupi-TO, from August to October 2018. Through a form completed by the physician during consultations, with variables: epidemiological, chronic diseases, life habits, psychiatric disorder, non-pharmacological and pharmacological treatments. Descriptive analysis of the data with the help of Microsoft Excel.* ***Results and Discussion:*** *141 patients participated in the study, with a prevalence of 5,59% of depression and anxiety. Mostly with anxiety, women, brown race, age group from 18 to 29 years and 50 to 59 years, occupation of the home, with incomplete second degree, and with partner. Presenting systemic arterial hypertension and diabetes mellitus as comorbidities, they did not adopt physical and pleasurable activities such as non-pharmacological treatment, on regular use of antidepressants and/or anxiolytic, and follow-up only in the basic health unit.* ***Conclusion:*** *the prevalence of patients with anxiety and depression was 5.59%, the study contributed to the characterization of these patients, providing information that can be used to improve mental health care.*

***Keywords*—Family Health Strategy. Primary Health Care. Research on Health Services. Mental Disorders.**

I. INTRODUCTION

The perception of behavior went through several classifications during history. Currently, the term "mental disorder" or "mental disorder" is used in order to reduce the stigma of psychological conditions [1].

Mental disorders are considered one of the main causes of morbidity in current societies [2], represent four of the top ten causes of disability [3]. They reach biological, cultural, social, economic and political dimensions [4], contemplating the whole biopsychosocial landscape, and still very neglected [5].

According to the World Health Organization (WHO), one in four people in the world will be affected by a mental disturbance at a given stage of life [5]. Studies show that there are millions of patients with mental illness in the world, there is also a progressive increase in [6] [7] [8].

Among mental disorders and behavior, depressive and anxious disorders stand out, which in turn many people are diagnosed simultaneously with both conditions [7]. The current criteria for the diagnosis of mental disorders are characterized by the 5th edition of

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the Diagnostic and Statistical Manual of Mental Disorders [9].

Depressed mood, loss of interest or pleasure, feelings of guilt or low self-esteem, feelings of uselessness, change in sleep pattern or appetite may be present in those diagnosed with depressive disorders. While anxious disorders refer to feelings of fear and anxiety, being classified into disorders: generalized anxiety, panic, phobias, posttraumatic stress and others [10].

In 2015, there were 322 million people in the world living with depression, with a prevalence of females and peak age group between 60 and 64 years, and of these, approximately 15% were in the Americas. In Brazil, it reached 11.548.577 people, which corresponded to 5,8% of the population [7]. By 2020, depression is estimated to reach second place in the Disability Adjusted Life Years ranking after cardiac ischemic diseases [6] [8].

Regarding anxiety disorders, while 264 million of the world's population had these disorders, 21% of them belonged to the Americas and 18.657.943 were Brazilian in 2015 [7].

Mental disorders are of paramount importance to public health, due to their chronic and disabling nature, and because they are related to increased risk for communicable and non-communicable diseases, and also these patients are more likely not to adhere to treatment, which negatively affects their health [4] [11].

Borges [12] and collaborators point out that "current public policies in mental health in Brazil recommend that people with mental disorders be followed concomitantly in primary health care and in specialized units".

The integration of the health network occurs through the reference and counter-reference process between the different levels of complexity of the services. However, it is emphasized that there is a failure in this process among the services of the network [13].

It is observed that treatment for these patients is usually available for cases of greater severity or requiring hospitalization and that comprehensiveness in meeting the needs of the population and the inequalities of the health and disease process, still need to be improved [6] [14].

So that mental health care will materialize through its strengthening and its articulation with primary care [15]. Primary health care should allow the first access of people who demand mental health care, due to the ease of access of teams to patients [16].

Therefore, the Family Health Strategy (FHS) is considered one of the gateways for patients with psychological complaints [12]. On average, 22 to 25% of the people assisted by the FHS present mental disorders and require comprehend - sive and continuing health care [15]. The greater proximity of the FHS, daily and continuous can determine more appropriate management of mental disorders in the long term and also identify the relationship with environmental, family and community factors [17].

Given the various challenges of primary health care, it is necessary to know the profile of depressive mental disorders and anxious in primary care for the identification of the current reality. Since there is a shortage of epidemiological studies of psychiatric disorders, making this research timely.

Thus, the present study describes the prevalence and characterizes the clinical-epidemiological profile of patients with depressive and anxious disorders, as well as analyzes their access to the mental health care network in an area of health strategy of Family from the southern region of Tocantins in order to guide prevention projects, contribute to the health promotion and quality of life of these patients.

II. MATERIALS AND METHODS

The analytical, observational and cross-sectional research was carried out at the Seville Basic Health Unit in Gurupi – Tocantins, from August to October 2018. This study strictly obeyed Resolution number. 466/2012 of the National Health Council and approved by the Ethics Committee on Research in Human Beings (CEP) of Gurupi University (UNIRG) under opinion number. 2.820.700/ 2018.

Data collection occurred during the medical consultation based on the form containing epidemiological and clinical variables – gender, marital status, skin color, age group, occupation, schooling, residents of the house, family income, housing, chronic diseases, life habits, psychiatric disorder, non-pharmacological treatment and pharmacological treatment, and access to the health network – use of health resources and need for referral to other health levels in the last 12 months. The collection occurred from 8/27/2018 to 31/10/2018.

The sample of this study consisted of 141 patients diagnosed with anxiety disorder and/or depressive disorder confirmed during consultation and/or medical records of both sexes, aged 18 years or older, and who voluntarily signed the Free and Informed Consent Form

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(FICF).

Patients with other mental disorders, and disabilities, physical or intellectual disorders were excluded to provide the information requested in data collection, and those who were not in the unit area and who only attend for prescription renewal.

After data collection, the data was transferred to the Google Forms platform form and transposed to a spreadsheet in Microsoft Excel®. The prevalence of anxious and depressive disorders was calculated, considering the population universe of 2.520 patients.

And the absolute and relative frequencies of each variable analyzed were calculated considering the sample of 141 patients. Presented the results descriptively, mentioned in the text and in tables - Table 1 describes the epidemiological profile of anxious and depressive disorders, Table 2 refers to the housing conditions of these patients and Table 3 characterizes the non-treatment pharmacological and pharmacological.

III. RESULTS AND DISCUSSION

The Seville Basic Health Unit of Gurupi - Tocantins serves approximately 11,500 inhabitants. During the data collection period, 2,520 patients over 18 years of age were treated, where only 141 patients with anxious and depressive disorders signed the FICF fulfilling the inclusion criteria of this study, there were more patients diagnosed with AD and DD, however, because they did not accept, they were excluded from the study.

The prevalence of anxiety and depression disorders was 5,59% in the population studied. It is noteworthy that the sample consisted of convenience encompassing only patients diagnosed with mental disorders who attended medical consultations in August to October 2018.

The Mental Health Care Protocol states that the overall prevalence of anxiety disorders in the adult Brazilian population is 18% and that in all countries depression reaches up to 11% of the population at a certain time and throughout life, 20%. There is also a relationship of approximately 60% comorbidity between depression and generalized anxiety in primary care [18].

The prevalence rate in this study was lower than expected. The limitations of the results are recognized because it is a cross-sectional study, and the data are measured only once and be delimited to a region of the urban area of a single city and by sampling being for convenience and not active search.

Tied to this, it is believed the short period of time of data collection; the great demand only for renewal of prescriptions rather than new consultations for clinical evaluation; refusal to participate in research for fear and prejudice; not every population in the studied area attends the basic health unit; and the stigma and ignorance of mental disorders; all this influenced the results. Regarding the epidemiological profile of patients with anxious and depressive disorders in this area of FHS in the southern region of Tocantins it was observed that the majority were: women, brown race, age group from 18 to 29 years and 50 to 59 years, occupation of the home, second degree marital status with partner (Table 1).

Table 1. Epidemiological profile of patients with anxious and depressive disorders in an area of Family Health Strategy in the Southern Region of Tocantins, 2018.

SEX	**n**	**Relative frequency (%)**
Female	113	80,1
Male	28	19,9
AGE GROUP	**n**	**%**
18 the 29 years	35	24,82
30 the 39 years	18	12,77
40 the 49 years	24	17
50 the 59 years	35	24,82
60 the 69 years	15	10,64
70 years or more	14	9,93
SKIN COLOR	**n**	**%**
Yellow	5	3,55
White	21	14,9
Black	33	23,4

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Brown	82	58,2
OCCUPATION	**n**	**%**
Student	25	17,0
Signed wallet	21	14,0
Standalone (a)	13	9,22
From home	50	35,0
Unemployed	13	9,22
Retired (a) / Pensioner	19	13,0
SCHOOLING	**n**	**%**
Illiterate (a)	5	3,55
Incomplete first degree	48	34
Full first grade	11	7,8
Incomplete second degree	11	7,8
Full second degree	33	23,4
Incomplete higher education	21	14,9
Complete higher education	12	8,51
MARITAL SITUATION	**n**	**%**
Single (a)	42	29,8
With companion (a)	67	47,5
Divorced/Separated (a)	15	10,6
Widower (a)	17	12,1
RESIDENTS IN THE HOUSE	**n**	**%**
1 person	16	11,35
2 or 3 people	80	56,74
4 people or more	45	31,91
FAMILY INCOME	**n**	**%**
≤ 1 minimum wage	57	40,4
1 to 2 minimum wages	2	1,42
2 to 3 minimum wages	61	43,3
4 to 6 minimum wages	14	9,93
≥ 7 minimum wages	7	4,96
HOUSING	**n**	**%**
Own	111	78,7
Rented	25	17,7
Borrowed/donated	5	3,55

Legend: n = number of patients.

In this study, most individuals with mental disorders belonged to females (80,1%), 51,1% (n = 72) diagnosed with anxious disorders, 12% (n = 17) with depressive disorders and 18% (n = 25) with both. Only 14,9% (n = 21) males had anxious disorders and 4,3% (n = 6) depressive.

Females are considered a predictor factor of greater search for health care [19]. Studies show that in Brazil, but women seek health services more than men [20] [21]. Mental disorders are present in up to 20% of women and mood and anxiety disorders are more common, [22] corroborating the findings of this study.

As well as depression, which is also more common among women, white race, adults with shorter school education time and people who do not have a stable marital relationship, causing a negative impact for their patients and family members [6] [11]. Regarding age group, there was a predominance of anxiety and depressive disorders between 18 and 29 years and 50 years; followed from 40 to 49 years (17%); 30 to 39 years (12,77%); 60 to 69 years (10,64%); and 9,93% in those aged 70 years or older. Regarding race, there was a predominance of brown with 58,2%, followed by 23,4% black patients, 14,9% of the white race and only 3,55% yellow.

In a medium-sized municipality in the Midwest region of Brazil, the highest prevalence of common

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mental disorder was in women, divorced or separated, yellow race, age group from 18 to 59 years, occupation of the home, with 4 to 7 years of study, monthly income of up to 1 salary of minimum and who lived in borrowed or donated housing [4].

In the evaluation of individuals with mental disorders of a reference unit for family health program in Santa Cruz do Sul, Rio Grande do Sul, it was found that 69,4% were female, with an average age of 37,96 years, and 62,9% attended the first degree incomplete, and 94,6% had monthly income of up to three minimum wages [23].

A higher relationship between mental disorders in this study was observed with the occupation of the home 35% (n = 50), followed by 17% (n = 25) of students, 14% (n = 21) with signed portfolio, 13% (n = 19) retired (a) or pensioner, 9,22% (n = 13) of self-employed (a) and 9,22% unemployed (a).

In another study conducted in primary care, the predominant categories among patients with Common Mental Disorders were "from home" and self-employed. The authors explain that this tendency to mental disorders is related to the fact that women who perform domestic activities, isolate themselves at home and give up the consequent socialization of a professional environment. While those so-called self-employed, that is, informal workers experience situations such as uncertainty about the work situation [4].

The level of education found in this study was the second incomplete grade corresponding to 34% of the total, followed by that with a complete second degree (23,4%), incomplete higher education (14,9%), and complete higher education (8,51%). Those with complete first grade and incomplete second grade represented 7,8% each, and only 3,5% illiterate.

In Lucchese study [4]and collaborators found that respondents who were less likely to have common mental disorders reported having four to seven years of studies, and that the lower the number of years of study, the lower the number of years of study, the more than a factor related to the presence of no due to the difficulty of insertion in the labor market. As Silva says [24]et al. that as the level of education decreases, the probability of presenting higher levels of depressive symptoms increases.

Regarding marital status, it was observed that the majority had a partner (a) representing 47,5% of the 141 patients, 29,8% were single, 10,6% divorced/separated (as), and 12,1% widowed (as). Like most patients with anxious disorders in another psychiatric outpatient study, she was married or living with someone as if married (63,1%) [25].

For some authors, marital dissatisfaction is related to depression in women and dysthymia in men. Therefore, married women would have a higher risk of depression than single women, as well as divorced women [24].

In this study, it was verified how much family and housing conditions, that patients with mental disorders lived with 1 or 2 more people, mostly with family income of 2 to 3 minimum wages (43,3%) and who lived in their own home (78,7%).

Patients with anxious and depressive disorders describe the number of residents in the house in 56,74% as 2 or 3 people, followed by 31,91% as 4 people or more, and only 11,35% reside alone. Most patients in this study have their own home (78,7%), and the others live in rented homes (17,7%) and borrowed or donated (3,55%).

Family income corresponds to 2 to 3 minimum wages in 43,3% of patients; followed by 40,4% living on less or 1 minimum wage; 9,93% with 4 to 6 minimum wages; 4,96% with 7 or more; and 1,42% between 1 and 2 minimum wages. It is believed that individuals with incomes of up to one minimum wage were more likely to develop Common Mental Disorder [4].

Among the 141 patients, the prevalence of patients with anxious disorders was 66% (n = 93), depressive disorders 16% (n =23) and 18% (n = 25) had both diagnoses.

It was found in this study that 39% (n = 55) of patients with depressive and anxious disorders practiced physical activity, 16% (n = 22) used alcoholic beverages, 13% (n = 18) smoked and 3% (n = 4) used illicit drugs. Authors state that smoking is directly related to anxiety disorders, especially in females, and also with depressive disorders, especially major depressive disorder [26].

In a study with patients with depressive disorders, 23% stated that they used tobacco and 2% of alcoholic beverages. Smoking interferes with neurotransmitter metabolism and alters cytochrome P450 enzyme activity [24]. In another study, it was noted that 26,3% patients with anxiety or depressive disorders were smokers [25].

Regarding the comorbidities of this study, 38% (n = 53) have systemic arterial hypertension (SAH), 12% (n = 17) diabetes mellitus (DM), 10% (n = 14) hypothyroidism and none of the patients reported the diagnosis of dementias. While in Machado study [27]and collaborators, clinical data from elderly people with anxious disorders showed that 31% reported presenting SAH.

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About anxious and depressive disorders according to non-pharmacological and pharmacological treatment (Table 2), it was noted that 14% (n = 20) of patients with anxious disorders practiced physical activity; and 14,4% (n = 2) of those with depressive disorders practiced physical activity and pleasurable activity. Among the classes most cited as pharmacological treatment are anxiolytics and antidepressants and although most consider their adherence to regular treatment, they stated only partial improvement.

Table 2. Characterization of the treatment of patients with anxious and depressive disorders in an area of Family Health Strategy in the Southern Region of Tocantins, 2018.

	Anxious disorders		**Depressive disorders**		**Anxious and depressive disorders**	
	n	**%**	**n**	**%**	**N**	**%**
NON-PHARMACOLOGICAL TREATMENT						
Physical activity	20	14 %	9	6,4 %	7	5 %
Pleasurable activities	14	9,9 %	3	2,1 %	4	2,8 %
Physical and pleasurable activities	7	5 %	2	14,4 %	1	0,7 %
No activity	51	36 %	9	6,4 %	13	9,2 %
They did not report	1	0,7 %	0	0 %	0	0 %
PHARMACOLOGICAL TREATMENT						
Anxiolytics	10	7,1 %	2	1,4 %	1	0,7 %
Antidepressants	25	18 %	9	6,4 %	12	8,5 %
Association and/or other classes of medications	9	6,4 %	9	6,4 %	7	5 %
No medication	49	35 %	3	2,1 %	5	3,5 %
They did not report	0	0 %	0	0 %	0	0 %
ADHERENCE TO PHARMACOLOGICAL TREATMENT						
Regular use	30	21 %	18	13 %	11	7,8 %
Irregular use	9	6,4 %	0	0 %	4	2,8 %
Abandonment or suspension	14	9,9 %	1	1,7 %	5	3,5 %
You're not in treatment	40	28 %	4	2,8 %	5	3,5 %
They did not report	0	0 %	0	0 %	0	0 %
RESPONSE TO PHARMACOLOGICAL TREATMENT						
No improvement	2	1,4 %	0	0 %	1	0,7 %
Partial improvement	23	16 %	7	5 %	13	9,2 %
Total improvement	19	13 %	13	9,2 %	6	4,3 %
You're not in treatment	47	33 %	3	2,1 %	5	3,5 %
They did not report	2	1,4 %	0	0 %	0	0 %

Legend: n = number of patients. % = relative frequency.

Approximately 50% of patients with mental disorders do not perform physical and/or pleasurable activities, as well as in an- other study in Itapuranga-GO that considered low the practice of physical exercises and

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also suggests that physical activity helps in the rehabilitation of patients with psychological disorders, acting as a "catalyst for interpersonal relationships and stimulating the overcoming of small challenges" [24].

Regarding pharmacological treatment, about 40% were not on use of any medication. Most patients with anxious disorders used antidepressants (18%) and anxiolytics (7,1%). Furthermore, 6,4% cited other pharmacological classes and/or drug associations, such as antidepressant with anticonvulsant; anxiolytic, antidepressant and antipsychotic; anxiolytic and antidepressant; anxiolytic and anticonvulsant.

When asked about adherence to pharmacological treatment, 4,8% (n = 59) stated regular use of medications, 9,2% (n = 13) irregular use and 15,1% (n = 20) abandoned or suspended treatment. Some of the justifications for the abandonment of treatment were: fear of prejudice and influence of the family.

Non-adherence to pharmacological treatment is a complex and universal phenomenon, and when it comes to psychiatric therapy, a worsening of diseases with possible relapses and increased time for recovery is noticed [28].

The improvement in pharmacological treatment was considered total in about 26% (n = 38) of patients and partial by 34% (n = 43). In their minority, they reported not getting improvement. Corroborating the interviewees from another study that the highest prevalence occurred among patients who improved (74%) [24].

Some researchers say that 3% of the Brazilian population, that is, 5 million people, needed continuous care for severe and persistent mental disorders, and another 9% need eventual care related to less serious disorders, totaling 20 million Brazilians [28].

Primary health care is the level of the health system responsible for providing the population with the necessary care for their most common health problems, including preventive, curative, rehabilitation and health promotion measures [8].

Data such as these demonstrate the need for a well-structured mental health care network for better monitoring and promotion of quality of life.

Regarding the care network for mental health patients, in the last 12 months 14% (n = 27) required care with psychiatric specialist and 2,83% (n = 4) emergency care.

In the sample of this study 70,92% (n = 100) were followed only in the basic health unit; 23,4% (n = 33) performed psychotherapy; 13,47% (n = 19) attended the mental health outpatient clinic, and only 2 patients were psychosocial care centers (CAPS).

Since 11,34% (n = 16) claim to have achieved referral to other levels of care by the SUS, 8,51% (n = 12) did not achieve referral, and 68,8% (n = 97) did not require access to other health levels.

Regarding the time of referral for psychiatric specialist, 0,7% (n = 1) was attended from 15 days to 1 month; 1,41% (n = 2) between 1 and 2 months; 3,54% (n = 5) between 2 and 3 months; 4,96% (n = 7) had not yet been attended. And 81,5% (n = 115) were not referred to the psychiatrist.

While the referral time for care with a psychologist was for 0,7% (n = 1) up to 15 days; 1,41% (n = 2) between 15 days and 1 month; 0,7% (n = 2) from 1 to 2 months; 0,7% (n = 1) from 4 to 5 months; 11,3% (n = 16) were not seen and 79,4% (n = 112) were not forwarded.

In a research in the Family Health Program in Santa Cruz do Sul, Rio Grande do Sul, patients with mental disorders presented a higher number of consultations with general practitioners and/or family physicians, specialists and emergency in the last 12 months, as well as schedules for some type of health service [23]. The physician considered general practitioner is the most active in mental health in Brazil and other countries, such as England, USA, and Canada [24].

Despite all impasse, it was observed that most patients performed follow-up only in the basic health unit, demonstrating the resolution of primary care in the southern region of Tocantins. However, it was observed that there is still difficulty in accessing other levels of care that provided specialized care with psychologists and psychiatrists with an average delay of 2 to 5 months.

IV. CONCLUSION

Knowledge of the profile of patients and the environment in which they live becomes strategic for planning and improvements in mental health. In this study, there was a prevalence of anxiety and depressive disorders of 5,59%. And the profile of patients with anxious and depressive disorders of a Family Health Strategy area in the southern region of Tocantins was presented, which corresponded to women, of the brown race, aged 18 to 29 years and 50 to 59 years, of the home, with incomplete second degree, and with companion.

Mostly diagnosed as anxious disorder, presenting systemic arterial hypertension and diabetes mellitus as comorbidities, did not adopt physical and pleasurable activities such as non-pharmacological treatment, on

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regular use of antidepressants and/or anxiolytic, with clinical improvement considered partial and follow-up only in the basic health unit.

Mental disorders in primary health care are common, it is remarkable in this scenario the non-adherence to treatment, difficulty in referral to specialized care (psychiatrist and psychotherapy) and still family disarrangement due to difficulty in care of these patients. Conferring a great impact on the lives of patients with mental disorders.

The results demonstrated the importance of epidemiological studies in mental health with the identification of risk groups in the studied region, which will allow discussion with the health team in search of strategies for prevention and health promotion. In addition, they revealed the reality of access to specialized care.

The importance of primary care in the studied area as a gateway to and offering health services to the community is emphasized. However, there is a need for articulation to facilitate access to specialized consultations promoting integrality in mental health care.

It is believed that the presence and valorization of professionals with their own training at this level of the health system is a differential in the quality of mental health services. As a suggestion for future research to be conducted, it is necessary to identify the general reality of primary mental health care and also implement instruments for screening mental disorders.

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Appling Data Mining Technique for Crime Prevention: The Case of Hossaena Town Police Office

Fantaye Ayele

Lecturer: Department of Information Systems, Wolaita Sodo University, Addis Ababa, Ethiopia
Email: fantaye.ayele16@gmail.com

Abstract**—** *The Law enforcement agencies like that of police today are faced with large volume of data that must be processed and transformed into useful information and hence data mining can greatly improve crime analysis and aid in reducing and preventing crime. The purpose of this study is to construct predictive models that could help in the effort of crime pattern analysis with the aim of supporting the crime prevention activities at the Hossaena town police office. For this study, a six-step hybrid knowledge discovery process model is followed, due to the nature of the problem and attributes in the dataset. The classification technique such as J48 decision tree and Naive Bayes used to build the models. Performance of the models is compared using accuracy, True Positive Rate, False Positives Rate, and the area under the Relative Optical character curve. J48 decision tree registers better performance with 96.34% accuracy. Lastly for extracting the knowledge the researcher develop the prototype for the user for support the decision which crime is assigned under the serious, medium or low for this purpose the researcher generate the prototypes.*

Keywords**—Classification; Crime; Data Mining; Hybrid; WEKA.**

I. INTRODUCTION

Data Mining or Knowledge Discovery in Databases (KDD) in simple words is nontrivial extraction of implicit, previously unknown, and potentially useful information from data [1]. It deals with the discovery of hidden knowledge, unexpected patterns and new rules from large databases. According to [2] Data mining is one such tool that has evolved to play a role as an instrument to discovery patterns buried in large databases. Data mining is the "exploration and analysis of large quantities of data in order to discover meaningful patterns and rules".

Along with the prevention and investigation of crime, police makes use of previous crime reports and data as an input for the formulation of crime prevention policies and strategic plans [3]. It is obvious from the outset that to make use of data and records, relevant data have to be kept and managed properly. For this reason the Hossaena town police office have been collecting criminal records since its establishment and have maintained numerous criminal records consisting of fingerprints, names, photographs, and general descriptions of criminals.

Human beings want to live and labor in a place where they are safe. They want to ensure that there is a worried body that defends their lives as well as their belongings from possible risks.

According to [3] In fact, one of the core purposes of any government is to ensure that law and instruction for the security of its citizens are put in place. In other words, faraway from creation and performing of laws for the avoidance of crime, governments must start agencies and establishments, which apply these laws.

Data mining tells important things unknown to the user or what is going to happen in the future. The central element to data mining is modeling. Modeling is simply the act of building a model in one situation where you know the answer and then applying it to another new situation.

II. STATEMENT OF THE PROBLEM

Crime is a complex social phenomenon and its cost is increasing due to a number of societal changes and the like, and hence, law enforcement organizations like that of police need to learn the factors that constitute higher crime trends[3]. To curb this social evil there is always a need for prudent crime prevention strategies and policies. Understanding and processing of criminal records is one method to learn about both crime and individuals who involve in misdeeds so that police can take crime prevention measures accordingly [4].

However, in the case of Hossaena town police office there are no modern tools and techniques that can support

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in managing crime records properly and efficiently. As a result almost all the decision-making processes of the office are not supported by tools and techniques that could extract patterns from previous crime records. Consequently, training programs, resource deployment, crime prevention and investigation strategies are being pursued on the basis of crime incidents rather than crime patterns and trends. Thus, one can observe the cost of those entire activities that do not rely on sound justifications.

Therefore, this study is launched to identify appropriate tools as well as to develop models that could extract crime patterns from the criminal database which supports the decision making process of crime prevention.

III. OBJECTIVE OF THE STUDY

A. General objectives

The general objective of the study is to construct predictive models that could help in the effort of crime pattern analysis with the aim of supporting the crime prevention activities at the Hossaena town police office.

B. Specific objectives

To accomplish the above stated general objective, the following specific objectives are developed:

- ✓ To understand the area via an extensive literature review.
- ✓ To find out classification algorithm that more suitable to build predictive model for crime prevention.
- ✓ To evaluate the performances of the model.
- ✓ To develop a prototype

IV. RESEARCH METHODOLOGY

This paper was used a Hybrid data mining model which is a six step knowledge discovery process model. Due to the nature of the problem and attributes in the dataset, classification mining task were selected to build the predictive model. **Fig. 1**,

V. EXPERIMENTATION AND ANALYSIS OF RESULT

In this study an attempt is made to explore crime data to identify regular patterns in order to determine crime level. The purpose of experiments in classification is to find model that is able to predict the cream level of crime as low, medium and serious by taking selected variables as inputs. This paper incorporated the typical stages that characterize a data mining process.

A. Experimental Design

In this study, all experiments are done based on the final processed dataset which contains 5,000 instances and 12 attributes. The algorithms used during predictive model building experimentations are found in Weka 3.8 version. This version works on many file formats than its antecedents and it is compatible with CSV file format. Thus, changes the dataset from excel to ".arff" file format which is necessary in the previous versions. The prepared dataset is saved using CSV file extension format. **Fig. 2**,

B. Model building

Model building is one of the major tasks which are undertaken under the phase of data mining in Hybrid data mining methodology. To build the predictive model, J48 and naive Bayes are trained and evaluated. For training and testing the classification model the researcher used two methods. The first method is percentage split method, where 75% of the data used as training and the remaining 25% testing. The second method is K-fold cross validation methods the data was divided into 10 folds, some fold is used as testing and the remaining folds are used as training. When we compare the result of experiment 1 with all attributes and 5, 000 instances are used.

Experimentation I: J48 decision tree

In the experiment I; the first scenario #2 of this experiment, 10-fold cross validation registered the best performance with 96.34% accuracy and 0.963 % TP rate. The Accuracy and WTPR all models indicate the performance of the model in accurately classifying new instances in classes of crime level and it is calculated to be: 96% with misclassification of 4%. In the second scenario #1; 75/25 percentage split registered the performance with 96.24% of correct classification with error rate of 3.4% and 0.962 for WTPR. **Tab. 1**,

Finally, 10–fold cross validation test option the J48 learning algorithm is the best model scored an accuracy of 96.34%. This result shows that out of the total training datasets 4817 (96.34%) records are correctly classified, while only 183 (3.66%) of the records are incorrectly classified.

Experimentation II: Naive Bayes

In the experiment II; the first scenario #1 of this experiment, 10-fold cross validation registered the best performance with 83.6% accuracy and 0.836 % TP rate. The Accuracy and WTPR all models indicate the performance of the model in accurately classifying new instances in classes of crime level and it is calculated to be: 83% with misclassification of 17%. In the second scenario #2; 75/25 percentage split registered the performance with 82.34% of correct classification with error rate of 17.7% and 0.823 for WTPR. **Tab. 2**

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Finally, 75/25 percentage split test option the Naive Bayes learning algorithm is the best model scored an accuracy of 83.6%. This result shows that out of the total training datasets 1045 (83.6%) records are correctly classified, while only 205 (16.4%) of the records are incorrectly classified

C. ***Model Comparison***

In this research work, several experiments had been carried out with two classification algorithms, i.e. J48 decision tree algorithm and Naive Bayes classifier to build a predictive model that predicts the Cream Level in crime Dataset. From the experiments all attributes were identified to make sound rule and better accuracy. Selecting a better classification technique for building a model, which performs best in handling the prediction and identifying significant attribute of crime level of crime prevention is one of the aims of this study. **Tab. 3**

Finally, the accuracy achieved on selected feature was 83.6%, 96.34% for Naïve Bayes and J48, respectively.

D. ***Evaluation of the discovered knowledge***

At this stage in the data mining task a model was built to have high quality from a data analysis perspective. Besides, it is important to thoroughly evaluate the model and review the steps executed to construct the model and to be certain that it achieves the business objectives. At the end of this phase, a decision on the use of the data mining results is reached. This is performed based on the domain expert's advice and the parameters set and the researcher's personal judgment. It is good to see the meaning of the patterns generated by decision tree.

Generating Rules from Decision Tree

The model developed by J48 classifier was selected as the best model for this study. The generated rules were evaluated by the domain expert. The domain expert agreed on the relevance of the rules, but suggested that further analysis should be performed. The domain expert selected 25 rules that used to develop prototype.

E. ***Prototype development***

The final objective of this study was developing a prototype interface that assists physician easy access to the identified knowledgebase. The final selected if-then rules are used to implement the selected best models. Therefore, only twelve rules which are suggested to be important by domain experts are placed in to this prototype which means all the rules for predicting tumor states of a patient can't be answered by this prototype. **Fig. 3**

VI. CONCLUSION

The purpose of this study was to explore the applicability of data mining techniques in the process of crime prevention for the Hossaena Police office. Hybrid data mining methodology basically follows an iterative process consists of: Business understanding, Data understanding, Data preparation, model building, evaluation and use discover knowledge. The models were built on the preprocessed crime prevention dataset with two different supervised machine learning algorithms i.e. J48 Classifier and Naïve Bayes using Weka 3.8 machine learning software. Although both techniques have shown promising results, the decision tree data mining technique was found more appropriate to the crime prevention problem as the accuracy rate was relatively higher in both experiments. Moreover, decision tree seems applicable due to the fact that in contrast to neural networks, it expresses the rules explicitly. These rules can be expressed in human language so that anyone can easily understand how and why a classification of instances is made. The most effective model to predict prevention of crime with crime level appears to be a J48 classifier implemented on 10-Fold Cross Validation with a classification accuracy of 96.34% and still much remains to fill the gap of 3.66% misclassified cases. This means the selected model can also predict crime level correctly medium as medium or vice versa wrongly with a rate of 3.66%.This has its own implication in reality. Misclassifying medium as low/Serious means leaving infected person to transmit the disease where as that of low/Serious as medium is adding tension to crime. Finally, prototype interface develop are developed and the performance of the system.

A. Abbreviations and Acronym

CCI: Correctly classified Instance, ICI: Incorrectly classified Instance, W: Weighted Average, TPR: True Positive Rate. FPR: False Positives Rate, ROC: Relative Optical character curve, PR: precision rate, RR: Recall rate, FR: F-measure rate. ARFF: Attribute Relation File Format, DM: Data mining, WEKA: Waikato Environment for Knowledge Analysis

B. Figures and Tables

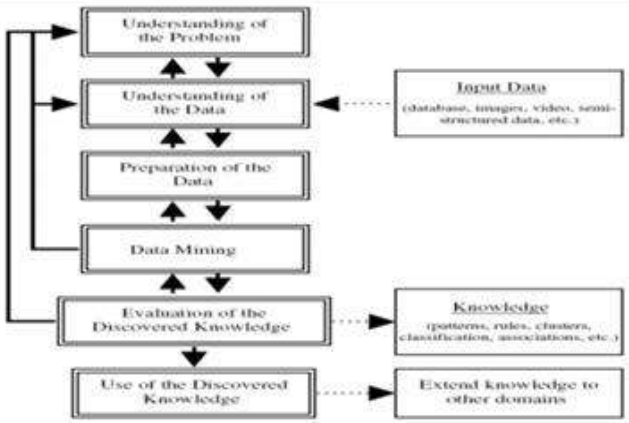

Fig.1. Hybrid-DM Process Model [5]

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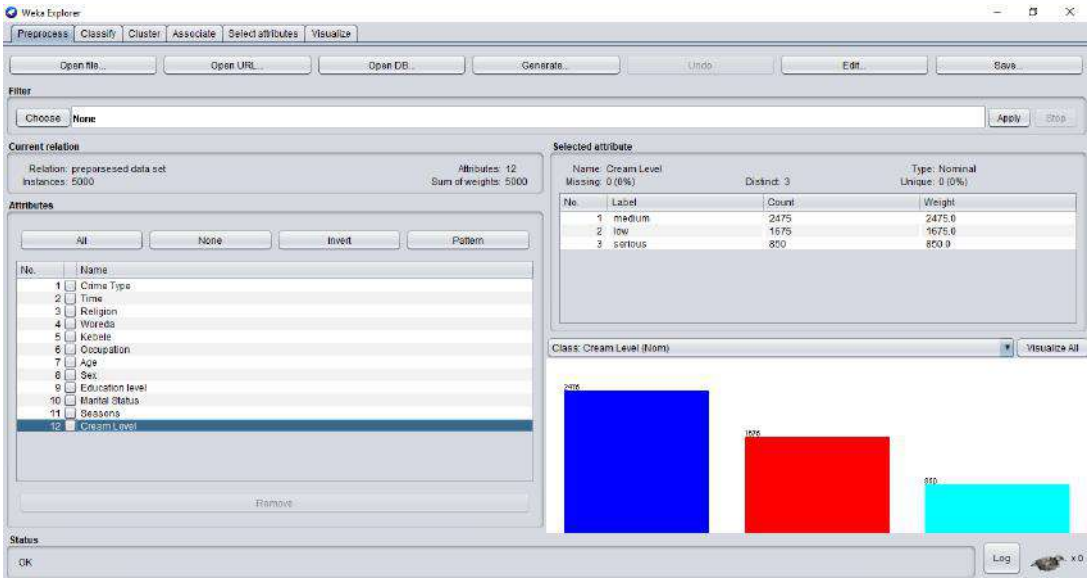

Fig.2: Weka Explorer window showing the number of attributes and instances.

Fig.3: prototypes graphic user interface (GUI)

Table.1. Summary of Experiments I with J48 decision tree

Exp I (test model)	**Accuracy**	**Time Taken**	**Tree Size**	**Leaf Size**	**W TPR**	**W FPR**	**W PR**	**W RR**	**W ROC**	**CCI**	**ICI**
J48 75/25 percentage split	96.24	0.01	59	46	0.962	0.034	0.964	0.961	0.996	1203	47
J48 10-fold cross validation	**96.34**	0.03	59	46	**0.963**	**0.030**	**0.964**	**0.963**	**0.995**	4817	183

Table.2. Summary of Experiments I with Naive Bayes

Experiment II	**Accuracy**	**Time Taken**	**Av TPR**	**Av FPR**	**Av PR**	**Av RR**	**Av ROC**	**CCI**	**ICI**
Naive Bayes 75/25 percentage split	**83.6**	0	**0.836**	**0.119**	**0.837**	**0.836**	**0.920**	1045	205
Naive Bayes 10-fold cross validation	82.32	0.01	0.823	0.129	0.824	0.823	0.911	4116	884

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Table 3: The selected Models Comparison

Selected Model	Accuracy	Time Taken	Av TPR	Av FPR	Av PR	Av RR	Av ROC	CCI	ICI
J48 10-fold cross validation	**96.34**	0.03	**0.963**	**0.030**	**0.964**	**0.963**	**0.995**	4817	183
Naive Bayes 75/25 percentage split	83.6	0	0.836	0.119	0.837	0.836	0.920	1045	205

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Analysis of building on Sloping Ground subjected to Seismic Forces

Mojahid Islam[1], Siddharth Pastariya [2]

[1]M. Tech. Scholar, Department of Civil Engineering, Sri Aurobindo Institute of Technology, Indore, India.
Email: mislam15394@gmail.com
[2]Assistant Professor, Department of Civil Engineering, Sri Aurobindo Institute of Technology, Indore, India.
Email: siddharth.pastariya123@gmail.com

Abstract*— *In the current scenario appealing architecture along with high rise buildings is not limited to plain terrain but also extended to the hilly terrain keeping in mind the problems aroused and their effects. This paper presents the comparative analysis of various configurations of 15 storied building with to be found on varying slope with different plan and different structural arrangements situated on seismic zone III. This study compares various reinforced concrete models framed and analyzed their response against dynamic loading to identify and struggle the worst possible scenario. The study is carried out for a combination of four different slopes and different building configuration by response spectrum analysis method and various parameters are compared against various constraints and results obtained from various building cases illustrates that the most optimum case is building C1 and C2 for both step back and step back set back configurations.

Keywords*— *Multistorey building, hill slope angle, seismic response, sloping ground, response spectrum, optimum case, setback case, step-back setback case.

I. INTRODUCTION

Seismic history of India shows that the zones of higher seismic activity and higher magnitudes are mostly presents in hilly terrains of northern and north-eastern regions. As well these places are more likely attracts peoples from plains for different purposes varying from adventure, tourism, religious and also for resolving problem of habitat due to decrease in habitable land in the urban areas. These all purposes may lead to resolve the problem of migration of peoples from hilly regions due to lack of resources which may provide aids to comply their basic needs.

But tendency towards sloping terrain may raise the load on these places and to accomplish this load we need to accommodate more buildings but due to the topography of hilly terrain we could not effortlessly use space everywhere. So we have to move towards multistoried high-rise building to resolve this problem. Also structural stability of the structure will be next problem in the arena to combat various constraints either it may be the typical topographical conditions or it may be the seismic proximity of the area which will be variable from place to place.

These glitches may be sorted by adopting proper and suitable building configuration as per need keeping in mind the economy of the project and the construction practices which will be the ultimate concluding factor that may leads to stability or proximity to the building.

II. CONFIGURATION OF BUILDING IN HILLY TERRAIN

Configuration of the structure infers that the structural and architectural arrangement building might possesses in the sloping regions. Depending upon the arrangement of bays fundamentally there are two prominent types of configurations consisting of:

i) Step back type of configuration: The building arrangement in which horizontal plane remains same but on the lower part it will maintain slope as per terrain or topography of the area.

ii) Setback and step back type of configuration: In this building configuration the structure is arranged in stepping pattern in which the horizontal plane is not remains same along with lower part of the structure.

III. OBJECTIVES OF THE PRESENT STUDY

Research review from various papers provides that the construction on hilly terrain is not a daily task but needs the firm structural arrangement especially for variable slope. So the building is analyzed for four different slopes 10˚, 20˚, 30˚ and 40˚ along with a regular building rested on flat terrain against various parameters. The key objectives set for the analysis are:

1. To analyze and determine the maximum displacement in longitudinal and transverse directions.

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2. To find and compare base shear in both X and Z direction.
3. To compare the maximum of axial forces in column at base.
4. To compare and analyze the shear force and bending moment.
5. To explore the optimum case among various structural arrangements to resist the seismic hazard and structural irregularities.

IV. METHODOLOGY AND MODELING

A 15 Storied multistoried building is configured comprising of 5numbers of equally spaced bays in both the direction of 4 m with a constant floor height of 3.66m and ground floor of 4.58m. Total of 5 cases in step back and 5 cases for step back set back cases including building rested on flat ground as well as sloping ground as illustrated in in tables mentioned below along with figures of structural arrangements. All the cases are analyzed and studied as per Indian Standard Code IS 1893 (Part1): 2016 against various seismic parameters and constraints for earthquake Zone III by response spectrum analysis method by "STAAD Pro V8i" software to explore the possibilities to resist the deformation and withstand against seismic and structural hazards.

Table 1: Building Data

Parameter	Assumed data
Length of building	20m
Width of building	20m
Height of building	59.48m
Floor to floor height	3.66m
Beam sizes	350mm X 550mm
Column sizes	550mm X 600mm
Slab thickness	165mm
Shear Wall	200mm
Depth of foundation	3.66m
Material properties	Concrete(M25)
Support	Fixed

Table 2: Earthquake Parameters

Parameter	Assumed data
Soil type	Medium Soil
Seismic zone	III (Z = 0.16)
Response reduction factor (Ordinary shear wall with SMRF)	4
Importance factor	1.2(For Residential and commercial building)
Damping ratio	5%
Fundamental natural period of vibration (Ta)	0.09*h/(d)0.5 Ta_x= 1.197seconds Ta_z=1.197seconds

Following are the cases taken for analysis against various parameters possess following building and seismic data used for analysis of the step back configuration are tabulated below:

Table 3: Different cases with respect to building configurations for Step Back Cases

S. No.	Model Configuration Cases	Abbreviation	Degree
1	15 storied regular building rested on flat ground.	A0	0 degree
2	15 storied sloping building having step back configuration rested on 10˚ slope.	A1	10 degree
3	15 storied sloping building having step back configuration rested on 20˚ slope.	B1	20 degree
4	15 storied sloping building having step back configuration rested on 30˚ slope.	C1	30 degree
5	15 storied sloping building having step back configuration rested on 40˚ slope.	D1	40 degree

Following are the cases taken for analysis against various parameters possess following building and seismic data used for analysis of the step back configuration are tabulated below:

Table 4: Different cases with respect to building configurations for Step Back Set Back Cases

S. No.	Model Configuration Cases	Abbreviation	Degree
1	15 storied regular building rested on flat ground.	A0	0 degree
2	15 storied sloping building having step back set back configuration rested on 10˚ slope.	A2	10 degree
3	15 storied sloping building having step back set back configuration rested	B2	20 degree

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	on 20˚ slope.		
4	15 storied sloping building having step back set back configuration rested on 30˚ slope.	C2	30 degree
5	15 storied sloping building having step back set back configuration rested on 40˚ slope.	D2	40 degree

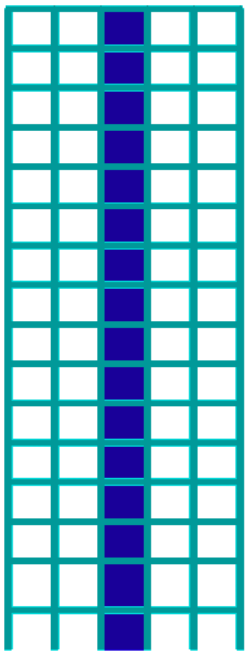

Fig. 1: Building A0

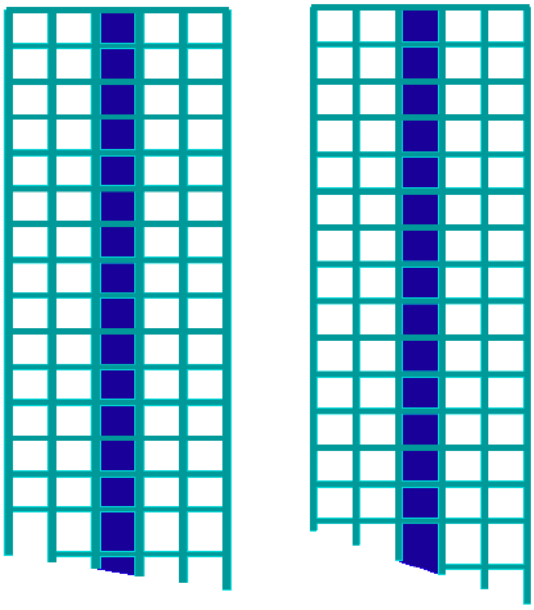

Fig. 2: Building A1 and B1

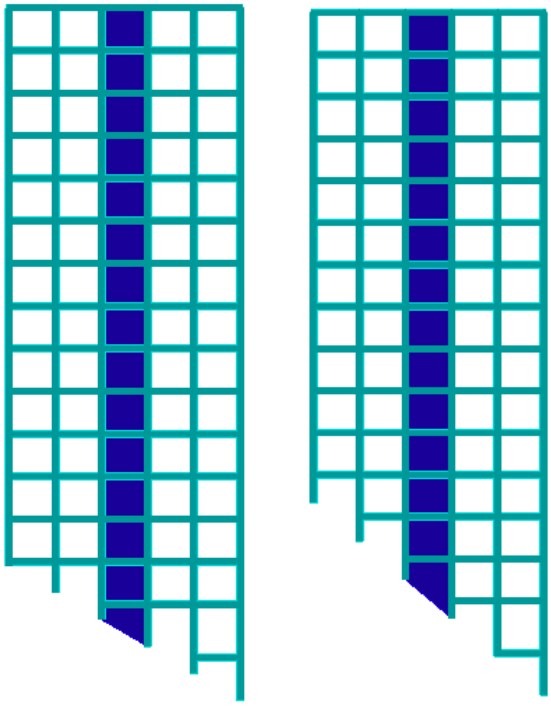

Fig. 3: Building C1 and D1

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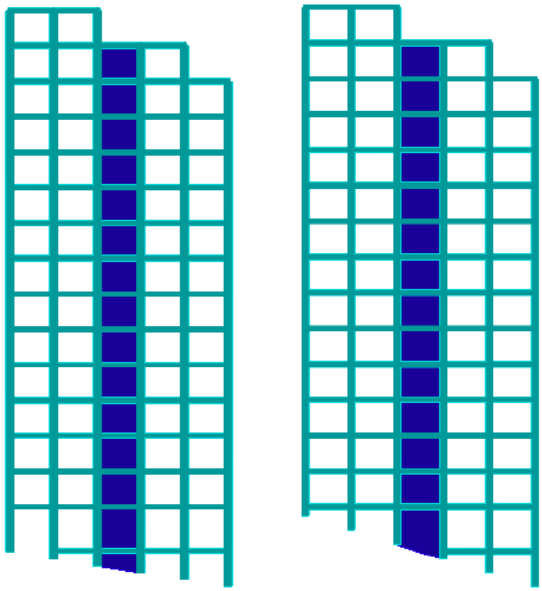


Fig. 4: Building A2 and B2

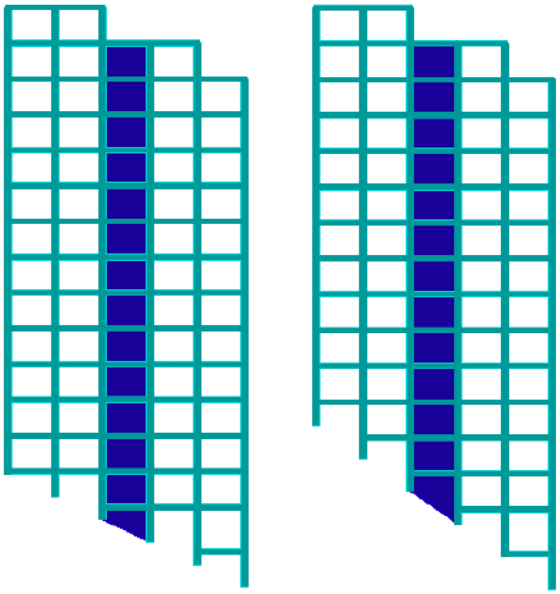


Fig. 5: Building C2 and D2

Table 5: Loading Details

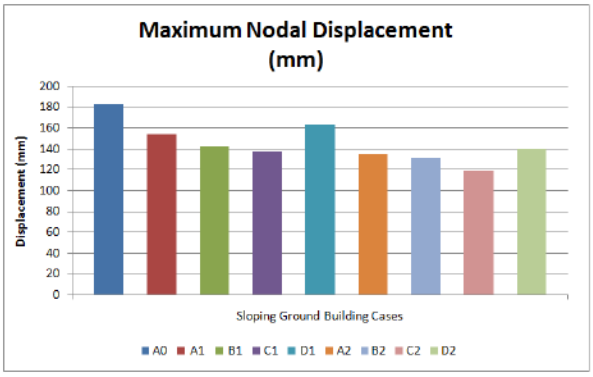
Parameter	Assumed data
Floor Finish Load	2.2 KN/ sq. m.
Wall load (Exterior)	17.12 KN/m
Wall load (Interior)	9.52 KN/m
Wall load (Parapet)	2.38 KN/m
Water Proofing	0.5 KN/sq. m.
Imposed Load (Floors)	4 KN/sq. m.
Imposed Load (Roof)	1.5 KN/sq. m.

V. RESULTS AND DISCUSSION

In this research study various cases are analyzed as per IS 1893:2016 (part-1) by response spectrum method for seismic zone V against all constraints as mentioned in the objectives. Dynamic analysis was performed against various seismic parameters for multiple load combination for all the models consist of structure on normal ground, step back configuration and step back & setback configuration. The parameters taken for comparative examinations for individual cases are maximum nodal displacement, maximum axial force, maximum shear force, maximum bending moment, maximum torsional moment, and base shear by tabular and graphical form.

Table 6: Maximum Nodal displacement for various building cases

Building	Displacement (mm)	Building	Displacement (mm)
A0	182.637	A0	182.637
A1	153.778	A2	134.821
B1	142.528	B2	130.763
C1	137.539	C2	118.595
D1	162.410	D2	140.241



Graph 1: Graphical representation of Maximum Nodal Displacement for all building cases

Table 7: Maximum Base Shear in X & Z direction for A0 to D1 building cases

Building	Base Shear X (KN)	Base Shear Z (KN)
A0	3334.25	3334.43
A1	3784.90	3784.79
B1	4535.20	4348.43
C1	3461.08	3519.05
D1	5227.73	4928.65

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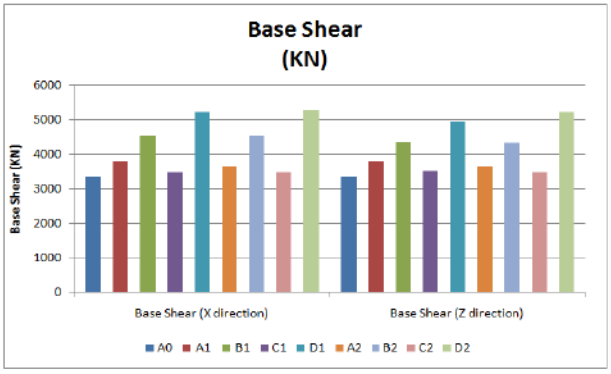
Table 8: Maximum Base Shear in X & Z direction for A0 to D2 building cases

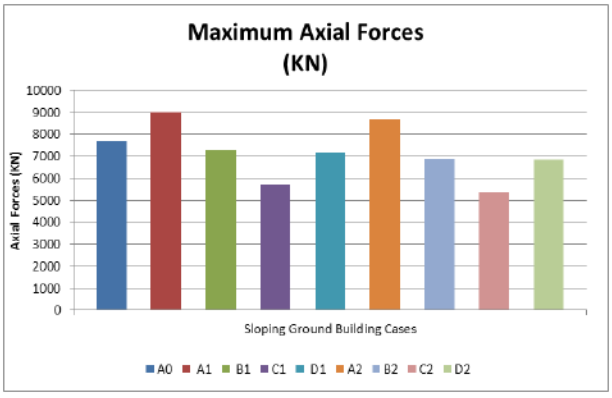
Building	Base Shear X (KN)	Base Shear Z (KN)
A0	3334.25	3334.43
A2	3625.40	3625.20
B2	4545.66	4322.67
C2	3454.85	3474.36
D2	5259.98	5213.47



Graph 2: Graphical representation of Base Shear in X & Z direction for all building cases

Table 9: Maximum Axial forces for various building cases

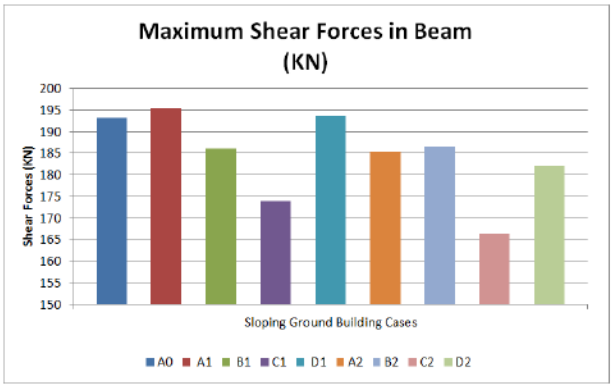
Building	Axial Forces (KN)	Building	Axial Forces (KN)
A0	7709.861	A0	7709.861
A1	9017.059	A2	8670.360
B1	7275.176	B2	6859.171
C1	5732.039	C2	5379.167
D1	7167.571	D2	6843.198



Graph 3: Graphical representation of Axial Force for all building cases

Table 10: Maximum Shear Force in Beam for various building cases

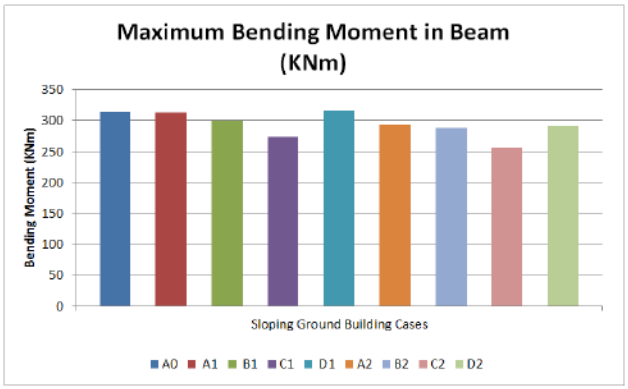
Building	Shear Forces (KN)	Building	Shear Forces (KN)
A0	193.225	A0	193.225
A1	195.407	A2	185.299
B1	186.121	B2	186.381
C1	173.915	C2	166.246
D1	193.526	D2	181.950



Graph 4: Graphical representation of Shear Forces in Beam for all building cases

Table 11: Maximum Moment in Beam for various building cases

Building	Bending Moment (KNm)	Building	Bending Moment (KNm)
A0	314.255	A0	314.225
A1	313.177	A2	292.659
B1	299.627	B2	287.991
C1	274.144	C2	256.061
D1	314.976	D2	291.165



Graph 5: Graphical representation of Moment in Beam for all building cases

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VI. CONCLUSIONS

Till date various researches have been done on multistoried building rested on hilly or sloping terrain but there had not been any study that enhances the vision of extent in terms of height analyzing parameters with such diversity. After analyzing various parameters from above results following conclusions are drawn from this research work:-

1. After comparing various sloping cases with A0, it has been concluded that the nodal displacement is found minimum for building C1 and C2 with efficiency of 75.30 % for C1 and 64.93 % for C2 respectively.
2. On analyzing base shear values the best case which has found out by comparing all buildings rested on sloping ground is building C1 3.80 % less efficient and C2 3.61 % less efficient which is nearly equal.
3. On comparing axial force values for all the cases it has concluded that the building C1 and C2 generate lesser axial forces with efficiency of 74.34 % and 69.77 % as compared to A0.
4. Subsequently analyzing shear force values in beam parallel to X and Z direction of A0 with other cases, again building C1 and C2 shows the least values with efficiency of 90% and 86% among all the sloping ground cases and for this parameter, building C1 and C2 is most efficient.
5. Again for bending moment parameters for beams, building C1 and C2 shows least values with efficiency of 87.23% and 81.48 % and shows itself as most efficient case.
6. It has been concluded from this study, out of all the cases with different configuration of step back & step back along with setback in the plain and sloping terrain with variable slope, building C1 and C2 is found most efficient as per lowest parametric values.

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A Review on Economical Design of Intz Water Tank as per IS-875-III, for Wind Speed in India

Sapan Chawla[1], Sagar Jamle[2], Kundan Meshram[3]

[1]M. Tech. Scholar, Department of Civil Engineering, Oriental University, Indore (M. P.), India
Email: sapancivil@gmail.com
[2]Assistant Professor, Department of Civil Engineering, Oriental University, Indore (M. P.), India
Email: sj.sagarjamle@gmail.com
[3]Associate Professor, Department of Civil Engineering, Oriental University, Indore (M. P.), India
Email: kundan.transpo@gmail.com

Abstract *— Overhead Water Tank had been the primary and the most fundamental piece of pretty much every task. Because of increment of population consistently, it is important to offer water request to the different purposes, for example, mechanical use, cultivating, residential use, for drinking reason and so on. The capacity of water is principal done by introduction of Overhead Water Tank. The piece of land has been seen expanding step by step over some stretch of time and it is important to productive utilization of a large portion of its part inside the limit that is a significant issue. Various works dependent on various stockpiling tank criteria alongside the perspectives on different specialists are referenced in literature survey. The paper contributes by breaking down the past work finished with the similar investigation of cost adequacy with linkage to the gap of the study and proposed work.*

Keywords *— **Footing, Overhead Water Tank, Wind component, Wind Pressure.***

I. INTRODUCTION

The water supply demand has now increased when compared to previous year data. Due to increase of population and shifting of people day by day leads to increase the water demand for drinking, domestic use, industrial along with commercial use. The water tank has now become the essential component of every structure just because to fulfill the water needs.

Water tanks Classification as per size are as follows:-

1. Rectangular water tanks
2. Circular water tanks
3. Spherical water tanks
4. Intz water tanks

Water tanks Classification as per material are as follows:-

1. Steel water tanks
2. Composite alloy based water tanks
3. R.C.C. water tanks
4. P.S.C. water tanks
5. Traditional brick wall type water tanks
6. Plastic water tanks

Water tanks Classification as per location are as follows:-

1. Overhead water tanks
2. Tanks resting on ground
3. Overhead water tank

Since Overhead water tank has many advantages are as follows:-

1. To store different types of liquids.
2. To store liquid products that contains high vapor pressure.
3. To store a huge amount of water.
4. To collect, save and store runoff water from channels connected from large catchment areas.
5. To transfer inside water pressure directly to the soil.
6. It can easily be cleaned and maintained.
7. The space above the water tank can be utilized hassle free.

II. LITERATURE SURVEY

A concise review of previous studies conducted on the tuned mass damper on different structural configuration. This literature review also comprises past studies on diverse application of sensations of tuned mass damper. This literature review on new contribution associated to sensations investigation of building structure with tuned mass damper.

Following are the closures reliant on the arrangement and examination finished in this endeavor: as the breeze speed and seismic zone increases for a comparative bearing breaking point volume of cement and nature of steel both are extended. We have seen that, as the breeze speed grows the breeze control on sorting out keeps

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extending for different cases. We separated that the breeze load has been extended by directly around 15-18% for every circumstance. We come to understand that the seismic weight in case-4 has been extended practically on numerous occasions when appeared differently in relation to case-1 in tank full condition. Additionally, the seismic weight in cas-4 has been extended on numerous occasions in tank void condition. From chart-3, we inspected that for different cases the minutes at face of props, from most negligible backings to top outer props has been extended right around various occasions for each circumstance. Furthermore, we see that the torsional minute has been extended practically on different occasions as the breeze speed increases. we dismembered that the supreme weight on segments in first story keeps growing for every circumstance, anyway the hard and fast weight on second and third story remains for all intents and purposes predictable for every circumstance, we separated that the hard and fast minutes on area on first story keeps growing in each cases.as the breeze speed keeps extending the stack on boat foundation keeps extending for every circumstance by pretty much 2-5 %. We examined that the full scale minutes on barge foundation has been extended by 15 % as the breeze speed increases for every circumstance. As the store and minutes on foundation keeps extending for every circumstance the size of barge foundation keeps growing. For every circumstance, as the breeze speed keeps changing or growing the breeze minute decided [Nitesh J Singh, Mohammad Ishtiyaque].

From as of late referenced down to business appraisal and assessment a piece of the terminations can be made as looks for after for same most distant point, same geometry, same stature, with same organizing framework, in a similar zone, with same significance factor and reaction decrease factor; reaction by comparing static strategy to dynamic technique separate incredibly. It also express that paying little mind to whether we consider two cases for same point of confinement of tank, change in geometric features of a holder can show the noteworthy change in the response of raised water tank. All the while static response shows high scale regards that of the dynamic response. it happens on account of the different picks of time allotments. for static examination water-structure joint effort shows that both water and structure achieve a pick at the same time in light of the doubt that water is clung to the holder and goes about as a structure itself and both structure and water has same immovability, while in ground-breaking assessment we considered two mass model which shows two various robustness for both water and structure in this way pick of time for both the parts are particular in this way fundamental timespans are different for both static and dynamic assessment.be that as it may, auxiliary timespan in powerful investigation is more prominent than both basic timeframe on the grounds that water in the upper district (convective area) stays in un damped condition (sloshing condition) for some additional time. As the limit expands distinction between reaction increments. Increment in the limit shows that contrast between static reaction and dynamic reaction is in expanding request. Itself it shows that for enormous limits of tank static reaction not exact but rather it is to some degree on the higher side, and whenever examined by static technique and planned by the equivalent can give over balanced out or state over fortified area however it will be uneconomical. Subsequently is code arrangement of static investigation are confined for little limits of tanks as it were. During the wind rash weight is constantly more prominent than convective weight for little limit tanks, yet it is the other way around for tanks with enormous limits. Consequently static examination for huge limits tanks can be uneconomical as all the water mass acts itself as a convective. This announcement indicates that if enormous limits tanks are structured by static technique twisting in the compartment can be seen simultaneously of breakdown of arranging. Enormous limits are subject of creating high weights on the divider and the sections of the holder, if the hydrodynamic components are overlooked during the examination they will influence enthusiastically and breakdown of the structure can happens. From charts 18, we can likewise say that the indiscreet weight for various limits fluctuates with enormous contrast; and yet convective weight for various limits meets at a similar point [Gaikwad Madhukar V, Prof. Mangulkar Madhuri N].

All around, the improvement material-yields for all water vessel limits would be built up on the decision of the course of action contemplations, with the extents of their associate fragments. Thusly, there exists the believability of having a proportionate cutoff and close to geometrically encircled water tanks yet with some quantifiable separation in material necessities. for example, a tank divider orchestrated as a cantilever would devise a decently separate material-aggregate when separated and its material fundamentals, at whatever point composed as a two-way spreading over divider, (with respect to rectangular tank) or ring (or band) divider, (stressed round tank). Additionally, it may be plainly observed that material required for the improvement of rectangular water tank is similarly more than those required for aberrant ones yet ease of headway is progressively badly designed in backhanded water tank when showed up diversely in

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connection to that of rectangular water tanks [Ajagbe W. O., Adedokun S. I. and Oyesile W. B.].

It very well may be seen from the prior code is 1893: 1984 can utilized just single level of opportunity and from the later existing tank contrasted and water code is 1893 (section 2): 2007 draft code it can pursue the two mass modular. The conveyance of incautious and convective hydrodynamic weight is spoken to graphically for comfort in investigation, the indiscreet hydrodynamic weight on divider and base of existing water tank is bring down the qualities when contrasted with zone-4 is 33% and with zone-5 is 55% . the convective hydrodynamic weight on divider and base of existing water tank is bring down the qualities when contrasted with zone-4 is 34%and with zone-5 is 56%. The most extreme hydrodynamic weight of existing water tank is bringing down the qualities when contrasted with zone-4 is 44% and with zone-5 is 63%. The sloshing wave tallness of the current tank is inside the free board and in the zone-4 and zone-5 the sloshing wave stature isn't with in the free board [D. Kumara Swamy, V. Srinivasa Rao].

The procedure suggested in is: 1893-1984 considers the tank as single degree of freedom system (lumped mass model) which is applicable to closed tanks completely full of water. Hence for tanks with free water surface, two mass idealization of tank are used which is incorporated in is: 1893-2002 draft code (part 2).is: 1893-2002 (part 2) has considered the sloshing motion of water surface. Due to effect of sloshing, convective pressure acts on the tank which were not given due consideration in the analysis of tank using lumped mass model concept of is: 1893-1984. With the thought of convective hydrodynamic weights, bases shear and base minute's qualities increments extensively which were very little for lumped mass admiration of tank. Subsequently the bases shear and base minute. A value acquired from two mass romanticizing for example according to seems to be: 1893-2002 (section 2) are progressively reasonable. Henceforth convective weights assume a significant job in seismic examination of the raised water tank. Base shear and base minute qualities got from two mass glorifications are far more prominent than that in lumped mass model. Thus forward profound respect of water tank as single degree of chance system isn't fitting for seismic examination of water tanks. Therefore two mass profound respects should be used for dynamic examination of water tanks. The hydrodynamic pressures calculated using is: 1893-1984 code provisions are by considering the rigidity of the tank wall whereas those calculated using is: 1893-2002(part 2) code provisions are by considering the flexibility of the tank wall. The impulsive pressures obtained considering flexibility of wall are very large as compared to those obtained by lumped mass model. the impulsive hydrodynamic pressures obtained by two mass model concept are almost sixteen times more than that obtained using two mass model concept. Hence lumped mass model underestimates the impulsive pressure values. from the graphs, it is clear that shaft type arranging ought to be maintained a strategic distance from beyond what many would consider possible sooner rather than later to keep away from harm to the water tanks and consequently anticipate loss of lives [Pradnya V. Sambary, D. M. Joshi].

Based on above study, following are few conclusions.in all the three types of soil conditions, up to 30 m3 capacity static wind load is governing, in all other cases dynamic wind load is governing dynamic wind load as per is 875-1987 (part iii) is giving higher forces compared to the is 875 draft (part iii).for soft soil the effect of wind force for 50 m/s wind speed is quite significant as compared with the wind forces in zone ii, iii, and iv.in medium soil for wind speeds 47, 50 m/s is more effective as compared with the wind forces in zone ii, iii, and iv. for hard soil with wind speeds of 47, 50 m/s is more significant as compared with the wind forces in zone ii, iii, iv, and v. the results presented in this paper can be utilized in deciding the governing load case for design of staging. However results are based on data (structural) considered and may vary with different sizes and configuration [Chintha Ravichandra, R. K. Ingle].

In light of the work exhibited in this examination, geometry of water tank can influence base shear. The ground supported circular tank has less base reactions. Since, it is better than ground supported rectangular tank.in case of elevated tanks the base shear and base moment of circular tank exceeds rectangular tank by 1.37% and 3.69% respectively. The elevated rectangular tank is better than elevated circular tank. in the case of elevated rectangular tanks the base shear obtained from manual dynamic analysis at full tank condition exceeds 6.5% and base moment exceeds 0.1% from software dynamic analysis but in the case of ground supported circular tanks the base shear obtained from manual dynamic analysis exceed software dynamic analysis by 4% and base moment lags 6 %.the manual dynamic analysis and software dynamic analysis performed are found to be comparable [Nandagopan .M., Shinu Shajee].

In unique examination we consider two mass model which shows two distinctive solidness for both water and structure thus pick of time for the two segments are extraordinary. The rash weight is constantly more noteworthy than convective weight. The imprudent too the convective hydrodynamic weight on divider continues

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expanding with y/d proportion. The estimation of weight on base piece continues expanding with increment in level measurement in barrel shaped segment [Kulkarni Reshma, Prof. Mangulkar].

Wind powers diminishes with increment in arranging tallness in light of the fact that as organizing stature builds the structure become increasingly adaptable. Subsequently timespan increments because of which auxiliary reaction factor diminishes from lower to higher organizing tallness. Maximum column forces will reduces as staging height increases up to a width to height ratio of 2 to 2.5 after that the forces are stable [Nishigandha R. Patil, Dr. R. S. Talikoti].

By and large, when wind happen significant disappointments of raised water tank occur because of disappointment of supporting frameworks, as they are to take care for seismic powers. In this manner supporting structures of raised water tanks are very powerless under sidelong powers because of a wind. Seismic examination and execution of raised RC Intz water tanks have been displayed in this investigation for outline kind of arranging design Displaying is performed utilizing Staad professional programming. Further, the conduct of raised water tank with arranging design is dissected utilizing lumped mass model and two mass model techniques. it very well may be seen from the investigations that raised water tank with outline kind of arranging perform better by following draft code is: 1893 (section 2) rules than prior rules because of the accompanying attributes.

From the correlation of indiscreet and convective method of vibration it was seen that timespan, base shear, base minute got by convective method of vibration is more noteworthy than rash method of vibration. Horizontal power is more in tank full condition when contrasted with tank void condition and thus tank full case is considered for seismic investigation. Base shear got by two mass models is seen as expanded by 36% when contrasted with lumped mass model strategy. Toppling minute got by two mass model strategies is seen as more prominent than the minute got in lumped mass model technique by 41%. Results from the examination propose to think about convective and incautious segments in seismic investigation of tanks. The convective weights during winds are significantly more in extent when contrasted with incautious weights and its impact is a sloshing of the water. The hydrodynamic weight got by two mass models is more than that got by lumped mass model. For raised tanks, the two level of opportunity romanticizing of tank ought to be utilized for examination as opposed to utilizing single level of opportunity of admiration of tank as the impact of convective hydrodynamic weight has been remembered for the investigation of the tanks. The most extreme estimation of powers and minutes acquired from Staad ace advises the greatest burden to which the tank is oppressed and subsequently basic. the check for basic individuals from Staad expert likewise uncovers that the tank is steady for most extreme powers and minutes [Kaviti Harsha, K S K Karthik Reddy, K S Kala].

The organizing obstruction under parallel stacking can be fundamentally improved by giving shear dividers situated close to the focal center bit of arranging. Parallel dislodging for model m1 is 5 to multiple times the other three models; however the base shear for model m1 is least because of its decreased seismic weight. For fringe and inside section the most extreme powers for example bowing minute and shear power is seen as least for model m2. The sections gave along the outskirts of building have been focused on increasingly because of arrangement of bracings [Nishigandha R. Patil, Rajashekhar S. Talikoti].

III. GAP OF THE STUDY

Following are the points to be notes while doing literature survey work:-

1. Study of mix design in water tank.
2. Study of different height of water tank.
3. Study of different ground angles of water tank.
4. Study of different earthquake zones of water tank.
5. Study of different capacity of water tank.
6. Study of different Bottle size of water tank.
7. Study of different country of water tank.
8. Study of different IS CODES of water tank.
9. Study of footing size as per different wind zone and speed.
10. Study of footing size as per different speed.
11. Study of column frame spacing and supports.
12. Study of thickness of raft foundation.
13. Study of wind pressure.

IV. CONCLUSIONS

Subsequent to looking into the beforehand work done on water tank, it has been reasoned that the different works having a place with various research moves toward that pertinent physically, by programming and together by physically and programming. The accompanying ends developed during the already work done are as per the following:-

1. The FEM technique is the best strategy to know the precise pressure hypothesis and gives the accurate area of different sorts of stresses.
2. Programming examination and plan technique approach has been demonstrated to be a best and practical

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methodology by contrasting the manual customary methodology with structure a water tank.

3. The tank ought to be practical; for that the ideal element of the various parts of the equivalent ought to be given.
4. Weight inside and outside the tank prompts fluctuating elements of the tank.
5. The contextual investigation mirrors the definite circumstance of the area where the tank made, the power of careful soil pressure at that area and measures prompts cost decrease can be resolved not hypothetically yet for all intents and purposes also.

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Basic life support: A Literature Review about its relevance and level of knowledge of Health Professionals

Andressa de Oliveira Gomes*, Laiza de Sousa Araujo*, Marcella Soares Carreiro Sales, Adriana Arruda Barbosa Rezende, Warly Neves de Araújo*, Daianne Pereira Nascimento, Ananda Caroline Barreira da Silva, Adelma Martins Pereira, Jefferson Rodrigues de Souza, Pricila Zancanella, Mylena Galdino de Melo, Edilane Floriano da Silva, Ligiane Rodrigues de Souza, Jacqueline Aparecida Philipino Takada

*Corresponding Authors: aog55@hotmail.com (Andressa de Oliveira Gomes), laizasaraujo@gmail.com (Laiza de Sousa Araujo), warlynevesaraujo@gmail.com (Warly Neves de Araújo)
Email: marcellacarreiro@bol.com.br (Marcella Soares Carreiro Sales); drikas.arruda@gmail.com (Adriana Arruda Barbosa Rezende); daybianca27@hotmail.com (Daianne Pereira Nascimento), anandacarolinebarreira@gmail.com (Ananda Caroline Barreira da Silva), adelmamfisio@gmail.com (Adelma Martins Pereira); jefferson_rodrigues09@outlook.com (Jefferson Rodrigues de Souza); prizancanella@gmail.com (Pricila Zancanella); my_llena05@hotmail.com (Mylena Galdino de Melo); edilanesul@hotmail.com (Edilane Floriano da Silva); ligianers@hotmail.com (Ligiane Rodrigues de Souza); jackfisio59@hotmail.com (Jacqueline Aparecida Philipino Takad)

Abstract*—Introduction:** *Basic Life Support (SHL) is the set of measures for the care of patients in cases of cardiorespiratory arrest (CRP). In the aforementioned protocol, the primary sequence of resuscitation is defined to save lives, including immediate recognition of the disease, activation of the emergency response system, early cardiopulmonary resuscitation (CPR) and rapid defibrillation. Legal aspects infer that all health professionals should know how to recognize a PCR and treat it, that is, every health professional should have full dominion over the SBV.* ***Objective: *To analyze in the literature the relevance of the SBV and the level of knowledge of health professionals on the respective theme.* ***Methodology:*** *This is a systematic and descriptive review, carried out through searches for bibliographic references of relevant studies, in the online databases LILACS, SCIELO and other sources of information such as literary collection of Unirg University and Dialnet. The inclusion criteria were: free sources published between 2000 and 2017 in English and Portuguese. Excluding any material that did not meet the inclusion criteria.* ***Results:*** *Studies show that BvS is the basis of emergency care and its applicability correctly improves the prognosis of CRP victims. They also emphasize that training directed to professionals, encouraging the updating in CPR favors better quality care and outcome to the victim's health.* ***Conclusion:*** *The SBV can be considered the pillar for emergency care to patients diagnosed with CRP. However, the lack of theoretical baggage since the first graduation steps and the lack of constant updating make the performance of numerous health professionals in relation to the aforementioned protocol be desired, thus harming the user of the services health care.*

***Keywords*—Keywords: Basic Life Support, Cardiorespiratory Arrest, and Knowledge.**

I. INTRODUCTION

The Basic Life Support (SHL) consists of the identification and initial care of patients who were victims of cardiorespiratory arrest (CRP) and subsequent mobilization of the care team through the beginning of chest compressions, airway opening, ventilation, and early defibrillation [1].

Cardiorespiratory arrest (CRP) is defined as the stop of mechanical activity of the heart, confirmed by the absence of signs of circulation. It may result from a cardiac electrical event and can be characterized as a wristless ventricular tachycardia, bradycardia,

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ventricular fibrillation, pulseless electrical activity or yolia [2].

For the recognition of a CRP, one should first evaluate the reactivity of the victim and then observe if there is presence of respiratory and central pulse movements, synchronously [1].

To try to recover the spontaneous circulation of the patient, cardiopulmonary resuscitation (CPR) maneuvers should be performed, which are part of an agile, accurate, combined and standardized intervention, in order to achieve success in its reversal [3].

CRP is an emergency situation, with different epidemiological data, depending on the environment of its occurrence, whether extra or in hospital [1]. It is considered one of the largest emergencies in which a health professional can face each other throughout their performance, requiring them, rapid and effective conduct for reversal of the picture and better prognosis of the victim [2] [4]. For the SBV to be performed efficiently, it is necessary to rapidly identify CRP and perform CPR maneuvers. If chest compressions are not performed correctly, there may be necrosis of myocardial tissue, loss or absence of cerebral oxygenation, thus leading the patient to death or even irreversible brain lesions [5].

When CRP occurs, patients depend on the harmonious interaction of a multidisciplinary team of professionals, which may include physicians, nurses, physiotherapists, among others. What requires the team scientific knowledge and updated technical skills in order to make it capable of performing actions necessary excellence and success in the service provided [1].

In this way, health professionals should be alert to easily recognize the signals of CRP and thus succeed in care through SHL. Since the mortality rate of CRP is high and every minute in CRP 10% of the probability of reverting to the situation is lost [6].

Therefore, this work aims to analyze in the literature the relevance of SHL and the level of knowledge of health professionals on their theme.

II. MATERIALS AND METHODS

The research is characterized as a systematic and descriptive review carried out through searches for bibliographic references of relevant studies, in the online databases of the Latin-American literature and the Caribbean in Health Sciences (LILACS) and Scientific Electronic Libray Online (SCIELO) and other sources of information such as literary collection of the library of Unirg University, Dialnet and other loose online publications.

The inclusion criteria were: free sources published between 2000 and 2017 in English and Portuguese. Exclusion criteria were publications lower than in 2000, from languages other than Portuguese and English and paid. The keywords used were: Basic Life Support, Cardiorespiratory Arrest, and Knowledge.

The data collection period was from August to October 2019. After the selection of the material and reading the data, they were analyzed and discussed in order to offer a greater notion about the knowledge of health professionals about the SHL and its respective relevance.

Because it is not a study with human beings, the present study did not need to be submitted to the ethics and research committee, according to resolution 466/12.

III. RESULTS AND DISCUSSION

The crossing of the descriptors and the use of the filters made it possible to obtain a total of 36 references from which 15 were discarded because they did not fit the inclusion criteria. Thus, the sample of this study had 21 references, according to the inclusion criteria and keywords.

In Brazil, about 630 thousand people die each year with a diagnosis of sudden death. This makes cardiovascular diseases caused by cardiac arrhythmias and acute myocardial infarction become a relevant public health problem. About 50% of deaths of these individuals occur before the victim arrives at the hospital or receives care [1] [2].

In the population-based study conducted in Japan by Kitamura *et al* [7] CRP prevails in individuals with a mean age of 66.8 years, male and asystole is the first detected rhythm. The research also points out that the hospital admission rate after CRP is 29.2%, with a survival of one month, which represents 5.3% of cases and achieving favorable neurological outcome in only 1.3% of the victims.

The average survival in cardiorespiratory arrest in an extra hospital environment is 6,4%, ranging from 1,0% when the initial rhythm is asystole, reaching 16,0% when the initial rhythm is ventricular fibrillation. However, because it is influenced by several factors, survival can reach high rates of 74.,0% in patients with defibrillated ventricular fibrillation in less than three minutes [8].

Berg *et al* [9] points out that the SHL is considered the basis for care in cases of CRP and in it is defined the primary sequence of resuscitation to save lives, including immediate recognition of the disease, activation of the

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emergency response system, early CPR performance and rapid defibrillation.

According to Silva and Machado [10] the American Heart Association (AHA) Guidelines were developed so that health professionals perform cardiorespiratory resuscitation (CPR) properly and can be based on science in order to reduce death and disability.

AHA [1] points out that to perform the recognition of a CRP, one should first evaluate the reactivity of the victim and then observe if there is presence of respiratory and central pulse movements, synchronously.

In order not to delay the onset of chest compressions, the opening of the airways should be performed only after applying the first thirty thoracic compressions. Ventilations should be performed in a ratio of 30 compressions for 2 ventilations, providing sufficient amount of air to promote chest elevation. Being contraindicated hyperventilation, as it can increase intrathoracic pressure, decrease preload and consequently result in decreased cardiac output and survival [11].

Nursing professionals are usually the first to recognize and begin CPR maneuvers. However, all health professionals should know how to quickly and safely recognize CRP and treat it [12]. Fact reaffirmed by Timerman *et al* *[13]* in his study by citing that all health professionals should be able to provide basic life support and automatic external defibrillation, if necessary, to an emergency victim.

In a study conducted by Zanini *et al* *[14]*, with nurses and nursing assistants, there was a 73,7% percentage of the hit regarding the identification of CRP signals considering the absence of carotid pulses.

Brião *et al* *[15]* applied a questionnaire containing questions related to the care of patients in CRP, with the objective of identifying the level of knowledge related to this subject among nursing professionals before, immediately after and six months after and six months after Training. Initially, a theoretical step was performed on the knowledge of basic and advanced life support, followed by a practical activity, involving adequate care for the patient until the arrival of advanced support. Before training, the performance of nurses in the theoretical CRP test was lower. After being trained, 90% of these professionals achieved the recommended index for satisfactory performance. However, there was a decrease in the number of correct answers after six months.

Pereira *et al* *[16]* found that the majority of professionals interviewed (51%) believe that they are unaware of the modifications of AHA protocols, while the minority (49%), but representative, claims to have knowledge related to the subject, although insecurity and the absence of permanent health education are factors considered definitive.

Landers [17] points out that there is often unsatisfactory training since graduation in relation to knowledge about CRP and CPR maneuvers. According to the author, they have been applied in a non-superfluous way of the needs of the academic, who later reflect on professional experience, without offering subsidies for the harmonious correlation between theory and practice.

According to Tadini work [18], the physiotherapist is inductivist because he has an important role in maintaining the airways, ventilatory care and caring for serious patients and in emergency situations, should be able to recognize CRP and provide ready effective care to the victim.

Galinski *et al* *[19]* they perceived incompetent knowledge of the SBV sequence by physicians and nurses, where in the face of a CRP, 50% would open by air, 75% would start by ventilation, 86% would start external cardiac massage, while only 42% would call help.

For Corrêa *et al* *[20]*, regardless of the professional category, all health professionals have a duty to recognize such situations, and also have an obligation to recycle themselves on the subject of.

Thus, in order for a CPR to succeed and increase the patient's life prognosis, it must permeate a sequence of systematized procedures based on theoretical knowledge and practical skills of health professionals [4] [21].

IV. CONCLUSION

According to the results obtained in the studies evidenced, it can be concluded that the SHL protocol is a theme of great relevance. The same is a pillar for quality emergency care and increases survival rates of patients diagnosed with CRP. However, the lack of theoretical baggage from the first stages of graduation and constant updating make the performance of the numerous health professionals in relation to the aforementioned protocol be desired. Thus harming the user of health services. Due to these findings, changes in the theoretical baggage of academics and permanent updates of health professionals may be the transformative key to better health care to society.

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Salient Calculation at the Single Offshore Breakwater for a Wave Perpendicular to Coastline using Polynomial Approach

Syawaluddin Hutahaean

Ocean Engineering Program, Faculty of Civil and Environmental Engineering,-Bandung Institute of Technology (ITB), Bandung 40132, Indonesia
syawaluddin1@ocean.itb.ac.id

Abstract— *Coastal protection planning using offshore breakwater requires an estimation on the formed salient. There are research results using physical model as well as field observation on the relation between the length of breakwater and the position of breakwater with the formed salient. The relation, however, is qualitative in nature.*

This research develops a calculation method for a formed salient in single offshore breakwater as a result of a wave that is perpendicular to the breakwater. The model is developed based on the characteristic of stable coastline, i.e. stable coastline that is parallel to the wave crestline forming it, whereas the salient equation is approached with polynomial.

The equation provides a good result, i.e. the measurement of salient that is very much in accordance with the result of previous research using physical model or field measurement.

Keywords— ***Offshore Breakwater, Coastal protection planning, Polynomial Approach, surf zone area.***

I. INTRODUCTION

Many coastal protection using offshore breakwater or detached breakwater have been constructed. The construction is in the form of breakwater that is parallel to the coastline, within the surf zone area with a quite close distance with the coastline. At the coastline protected by offshore breakwater, sedimentation will occur where the sediment deposit is called salient (Fig.1). The efficiency of breakwater is measured from its salient condition. Although it is called offshore breakwater, the real location is quite close with the coastline in order to produce salient or tombolo, where the incoming wave is almost perpendicular or even perpendicular to the coastline. Therefore, this research formulated salient equation for the incoming wave perpendicular to breakwater and the coastline.

An important factor in offshore breakwater planning is the formation of salient, where the success of this coastal protection is in the formation of the salient. The dimension (small and large) of a salient is expressed by the distance of the top of salient with the original coastline, i.e. Y_S (Fig.1.)

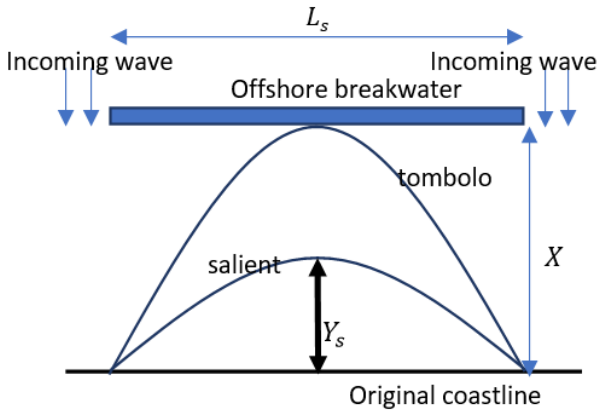

Fig.1. Offshore breakwater and salient

Quite a few researchers have conducted research on the measurement of salient Y_s, but it is only qualitative in nature. Those researchers are among others: Ahren and Cox (1990), Leo C. Van Rijn (2013), Inman and Proudcy (1966), Nir (1982) and many more whose research results will be discussed in Chapter III. The result of the research is presented in the form of a comparison between the length of breakwater with the breakwater distance to original coastline $\left(\frac{L_S}{X}\right)$ with salient type, but it is only qualitative and is not expressed as a relation between $\frac{L_S}{X}$ with the salient height Y_S. It is stated that the bigger the value of $\frac{L_S}{X}$ the higher of salient height Y_s will be where in a

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quite big value of $\frac{L_S}{X}$ the tip of the salient will be so close to or reach breakwater, where the sediment is called tombolo. The salient calculation can be done using numerical model, using GENESIS software as in the US Army Corps of Engineer (1993).

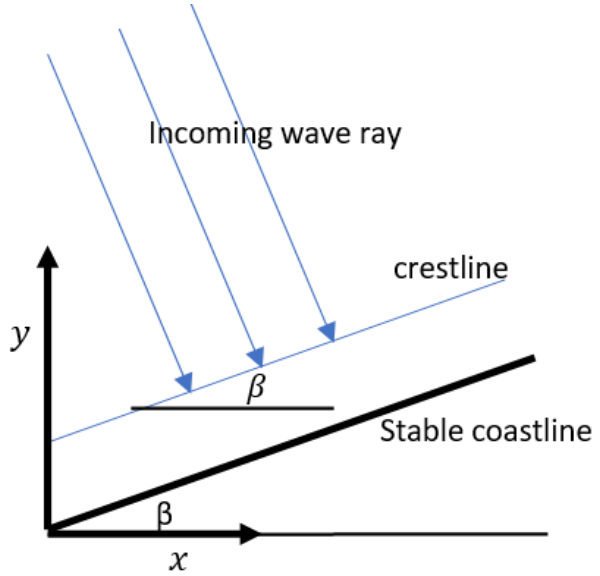

Fig. 2. Stable coasline with its forming crestline.

This research is developed based on the static equilibrium condition, where the tangent of the stable coastline is similar with the tangent of its forming crestline (Fig.2) with the goals of obtaining practical method in conducting salient measurement, i.e. the peak ordinate of salientY_S. Salient equation is approached with polynomial of degree 10 so there are 11 polynomial coefficients that must be determined. The calculation of polynomial coefficient is done using the characteristic of stable coastline as has been mentioned.

II. STUDY ON THE CHARACTERISTIC OF STABLE COASTLINE

This section will show that stable coastline condition is parallel with crestline, using longshore sediment transport equation and an example of geometry stable coastline exists in the nature.

2.1. Review of longshore sediment transport equation formula.

Coastline changes are mainly caused by longshore sediment transport, where evolution coastline model, such as GENESIS uses longshore sediment transport equation as the basic equation. The longshore sediment transport equation is a function of the angle between crestline of the breaking wave against coastline, where if the crestline is parallel to the coastline, it will produce zero longshore sediment transport or no erosion and sedimentation or the coastline is in stable condition.

a. Kamphuis' Longshore sediment transport formula, Kamphuis, J.W. (1991)

$$Q_{ls} = (C_K K_K H_b^2 T^{1.5} m_b^{0.75} D_{50}^{-0.35}) sin^{0.6}(2\alpha_b) \quad ...(1)$$

Q_{ls} longshore sediment transport rate, $b =$ subscript denoting breaking condition; a complete information can be seen at Kamphuis, J.W. (1991). The concern of this equation is the element $sin^{0.6}(2\alpha_b)$, whereα_b =angleof breaking waves to local shoreline. In this case, if$\alpha_b = 0$, the tangent of crestline is parallel or equal to the tangentof the coastline, then $Q_{ls} = 0$.

b. Longshore sediment transport of SPM (1984).

$$Q_{ls} = \left(\frac{K_C}{16\left(\frac{\rho_s}{\rho}-1\right)(1-p)}\sqrt{\frac{g}{\gamma}}\frac{H_b^{3/2}}{2.386}\right) sin\,(2\alpha_b) \text{.....(2)}$$

Similar to equation (1), the concern is the element $sin(2\alpha_b)$where if$\alpha_b = 0$then $Q_{ls} = 0$. Complete information on equation (2) can be seen at SPM (1984).

c. Longshore sediment transport formula of Hanson, H., and Kraus, N.C. (1989)

This longshore sediment transport equation from Hanson and Krauss is used at the widely used shoreline change model, i.e. GENESIS. The form of the equation is as follows.

$$Q_{ls} = \left(H^2 C_g\right)_b \left(a_1 sin2\,\alpha_b + a_2 cos\alpha_b \frac{\partial H}{\partial x}\right) \text{.....(3)}$$

In the case of$\frac{\partial H}{\partial x} = 0$or is very small, then equation (3) becomes,

$$Q_{ls} = \left(\left(H^2 C_g\right)_b a_1\right) sin2\alpha_b \text{.....(4)}$$

In this equation (4) $\alpha_b = 0$, then$Q_{ls} = 0$. Complete information on equation (3), can be seen atHanson, H., and Kraus, N.C. (1989).

From the three longshore sediment transport equations, it can be stated that at the stable coastline, the tangent of the coastline is parallel or equal to the tangent of the crestlinethat forms the coastline. In an open area where the coast is formed by incoming wave, the tangent of the coastline is parallel with the crestline of the incoming wave, whereas at the shadow zone, stable coastline is parallel with the crestline diffracted wave.

2.2. Review on the form of stable coastline.

It has been known that in the nature there is geometrical form of the stable coastline in static equilibrium condition, and there are plenty of researches that have been done on

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the form of that stable coastline. There are several terminologies for the form of the stable coastline, Silverster, R. (1960) called it zeta bays, half-heart bay Silvester, R., Tsuchiya, Y., ad Shibano, Y. (1980), crenulate shaped bays Silverster R, Hsu,J.R.C. (1993), Hsu, J.R.C., and Silverster R., Member et.al (1989). The form of the stable coastline, Silverster R, Hsu, J.R.C. (1993), Hsu, J.R.C., and Silverster R., Member et.al (1989) studying stable coastline between two headlandsare as follows.

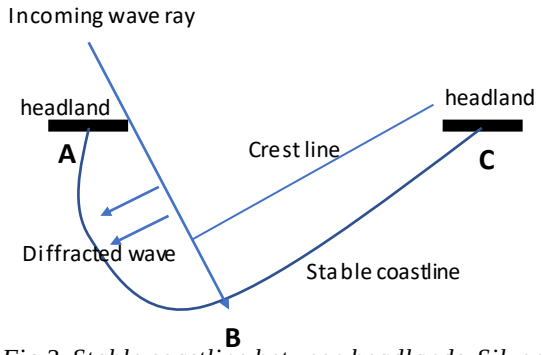

Fig.3. Stable coastline between headlands, Silverster R, Hsu,J.R.C. (1993)

Stable coastline consists of two parts (Fig3.), i.e. coastline directly facing the incoming wave ($\overline{BC}$) line) and coastline facing the diffracted wave, $\overline{AB}$ line. At the segment of the coastline facing the incoming wave, the tangent of the stable coastline is equal to the tangent of the crestline of the incoming wave, whereas at the shadow zone facing the diffracted wave, the tangent of the coastline is parallel with the tangent of the crestline of the diffracted wave.

From the review of the longshore sediment transport equation and the geometry of stable coastline, it can be concluded that stable coastline has a tangent that is parallel with the crestline forming it. For the coastline directly facing the incoming wave, the tangent stable coastline is equal to the tangent of the crestline of the incoming wave, whereas the coastline formed by the diffracted wave will have a tangent that is equal to the tangent of diffracted wave crestline. This condition will be used as boundary condition at the formulation of stable coastline equation.

III. SOME RESULTS OF PREVIOUS STUDIES

There are plenty of previous researches in the formulation of salient at the offshore backwater. This section will present some results of previous studies that will be used in the model development. The results of the research are in the form of qualitative relation $\frac{L_s}{X}$with the salient and do not mention about wave angle.

3.1. Ahrens and Cox (1990)

Ahrens and Cox (1990) used the beach response index classification scheme of Pope and Dean (1986) to develop a predictive relationship for beach response based on ratio of the breakwater segment length to breakwater distance from original shoreline. The relationship defining a beach respose index I_s is :

$I_s = e^{\left(1.72-\frac{L_s}{X}\right)}$ .....(5)

Table 1, shows the relationship between I_s and salient formation.

Table 1. The value of $\frac{L_s}{X}$and salient formation, Ahren dan Cox (1990)

I_s	$\frac{L_s}{X}$	Salient formation
1	4,2	Permanent tombolo
2	2,5	Periodic tombolo
3	1,52	Well-developed salient
4	0,81	Subdued salient
5	0,27	No sinuosity

3.2. Leo C. Van Rijn (2013)

The result of a research by Leo C. Van Rijn (2013), Table 2.,related to this research is the relation between the value of $\frac{L_s}{X}$and the formation of salient, i.e.:

Table 2. The value of$\frac{L_s}{X}$and salient formation, Leo C. Van Rijn (2013)

$\frac{L_s}{X}$	Salient formation
> 3	Permanent tombolo
$2 < \frac{L_s}{X} < 3$	Permanent or periodic tombolo
$1 < \frac{L_s}{X} < 2$	Well developed salient
$0.5 < \frac{L_s}{X} < 1$	Weak to well developed salient
$0.2 < \frac{L_s}{X} < 0.5$	Incipent to weak salient
$\frac{L_s}{X} < 0.2$	No effect

3.3. Others

Inman and Frautschy (1966)

$\frac{L_s}{X} \leq 0.17 - 0.33$: no accretion

Nir (1982)

$\frac{L_s}{X} < 0.5$: no depositional condition

SPM (1984)

$\frac{L_s}{X} < 1$: tombolo formation prevented

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$\frac{L_s}{X} > 2$: tombolo formation certain

There is a conformity between the criteria from Ahren and Cox (1990) and the criteria of Leo C. Van Rijn (2013), whereas the criteria from Inman and Proudcy (1966), Nir (1982) and SPM (1984) also have a conformity with both.

IV. FORMULATION OF SALIENT EQUATION

4.1. Basic Equation and Boundary Conditions

Ordinate salient equation $y(x)$ is approached with polynomials of degree ten

$y(x) = \sum_{i=0}^{10} c_i x^i$ .....(6)

where the horizontal x axis is coincided with the original coastline (Fig.4). The number of polynomial terms is an effort to obtain a unique solution, where the more the number of polynomial terms, the more will be the boundary conditions that are used so that they will increase the solution uniqueness.

There are two boundary conditions, i.e. the two ends of the salient, where in this section an assumption is done that coastline coordinate is fixed. Whereas at the interior points, the boundary condition of the stable coastline is done, i.e. coastline tangent or salient which is similar to the tangent of the wave forming it.

The wave forming salient is diffracted wave, whereas the direction of diffracted wave is defined as in Fig. 4. For a diffracted wave with direction $\overline{AB}$ towards a point B at the original coastline with x_B abscissa then the tangent of the crestline of the wave is

$\beta_B = atan\left(\frac{x_B}{X}\right)$ .....(7)

For a diffracted wave with direction $\overline{CD}$ towards a point Dat the original coastline with x_D abscissa then the tangent of the crestline of the wave is

$\beta_D = -atan\left(\frac{L_S - x_D}{X}\right)$.....(8)

For $x_B = L_s - x_D$ produces $\beta_D = -\beta_B$. This characteristic produces a symmetrical characteristic at the salient with maximum point of salient at $x_{max} = \frac{L_s}{2}$ where $\beta = 0$.

Thus, the salient characteristic formed by diffracted is symmetrical. In this method there is an assumption that in the salient growth, the tangent of a point is still the same, from the beginning of the formation until the final condition.

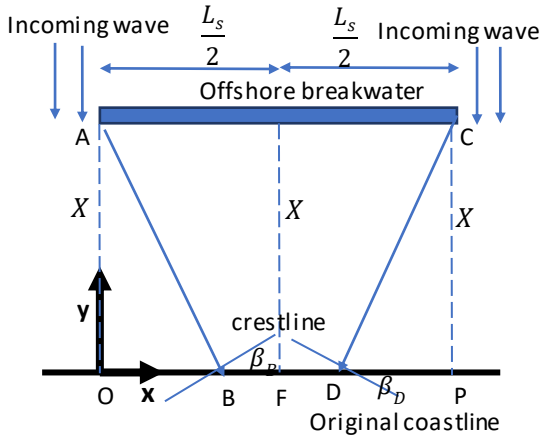

Fig. 4. Axis system and salient symmetry characteristics

Table 3. Boundary condition points

point	x	Boundary condition
1	0	$y = 0$
2	$0.025L_s$	$\frac{dy}{dx} = tan\beta_2$
3	$0.05L_s$	$\frac{dy}{dx} = tan\beta_3$
4	$0.10L_s$	$\frac{dy}{dx} = tan\beta_4$
5	$0.35L_s$	$\frac{dy}{dx} = tan\beta_5$
6	$0.50L_s$	$\frac{dy}{dx} = 0$
7	$0.65L_s$	$\frac{dy}{dx} = tan\beta_7$
8	$0.90L_s$	$\frac{dy}{dx} = tan\beta_8$
9	$0.95L_s$	$\frac{dy}{dx} = tan\beta_9$
10	$0.975L_s$	$\frac{dy}{dx} = tan\beta_{10}$
11	L_s	$y = 0$

To obtain the values of polynomial coefficients c_0, c_1, c_2, c_3, c_4, c_5 ,c_6,c_7 ,c_8, c_9 and c_{10}, boundary conditions are done at the points as presented in Table 3. The abscissa values of the boundary tangent condition points is the result of an experimentation to obtain a salient condition that in accordance with the Vanrijn and Ahren&Cox criteria.

At the salient equation and its boundary condition there is no wave height impact or diffraction coefficient since crestline tangent is not determined by wave height or diffraction coefficient. Whereas salient tangent is determined by crestline tangent.

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4.2. Relationof Breakwater distance$X$ and Breakwater length L_s $\left(\frac{L_S}{X}\right)$with Salient height Y_S

As has been stated that there is a relation between salient height $Y_S$with the value $\frac{L_S}{X}$or in other words there is an impact of $X$and$L_s$on the formation of salient. The relation can be explained as follows

Fig.5 shows a diffracted wave towards a point P at the original coastline at different breakwater Xposition. The farther away the position of breakwater, the smaller the crestline tangent, and the smaller the tangent crestline, the smaller also the coastline tangent and the smaller the coastline tangent the smaller the size of salient Y_S.

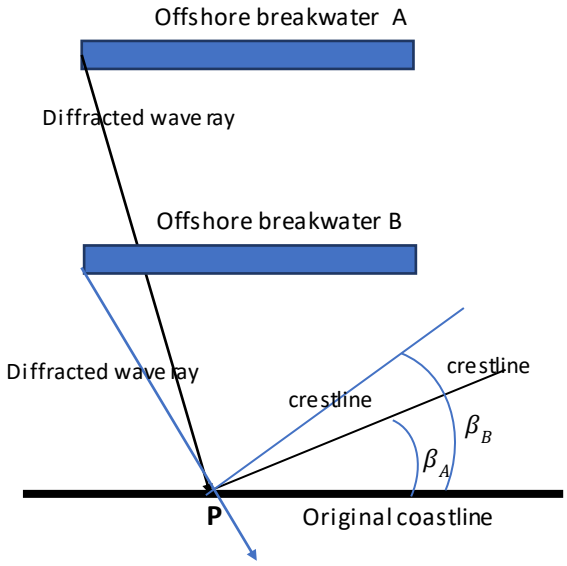

Fig.5: The comparison of tangent crestline of diffracted wave at different breakwater position.

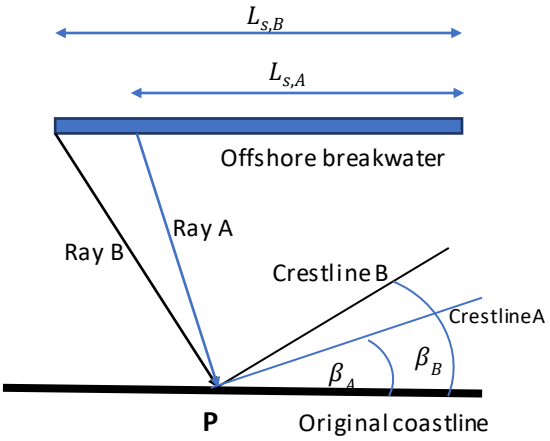

Fig.6 The comparison of tangent crestline from diffracted wave, with different breakwater length.

Fig.6 shows that for different breakwater length, crestline diffracted wave towards the same point P have different tangent against original coastline, where the shorter the length of breakwater, the smaller the tangent of the crestline.

V. THE RESULT OF THE EQUATION

Fig 7. presents the result of a model for breakwater length of $L_s = 60$ m with the position of$X = 30$ mfrom the original coastline where $\frac{L_S}{X} = 2.0$. Salient that is formed has a measurement of $Y_s = 12.37$ m. Both Ahren and Van Rijn stated that this salient is a well-developed style.

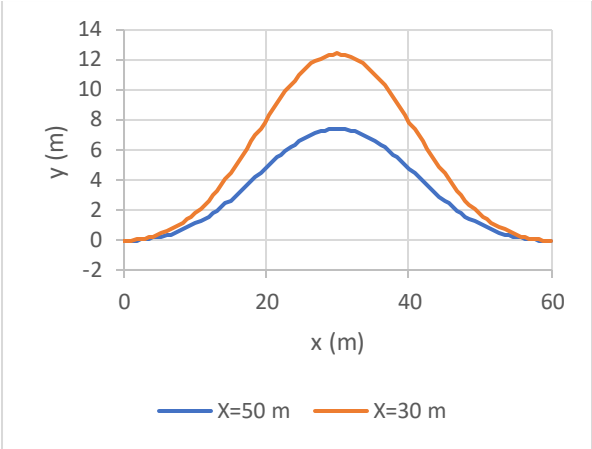

Fig.7. Salient at$L_s = 60\ m,\ X = 50\ m$ $\frac{L_S}{X} = 1.2$, and$X = 30\ m$ $\left(\frac{L_S}{X} = 2.0\right)$

Table 4 presents the result of calculation for a number of $\frac{L_S}{X}$ values with fixed L_s. It shows that the result of the model is in accordance with the result of Ahren as well as Van Rijn's research, where perfect tombolo is formed at $\frac{L_S}{X} = 3$. On the other hand, Table 5 presents the result of the calculation with changing breakwater length L_s,whereas the breakwater distance $X$is fixed at 30 m, which also provides a result that is in accordance with the result of the research by Ahren and Van Rijn. Thus, it can be concluded that the model that is developed provides a very good result.

The comparison between the result of the calculation in Table 4 with the result of the calculation in Table 5 shows that at the same value of $\frac{L_S}{X}$, different $Y_S$value was obtained , i.e. $Y_S$is bigger at bigger L_S, as an example for $\frac{L_S}{X} = 1.5$, in Table 4., $(L_s = 60\ m, X = 40\ m)$, $Y_s = 9.28\ m$, meanwhile in Table 5. $(L_s = 45\ m, X = 30\ m)$, $Y_S = 6.95\ m$.

Table 4. The result of the calculation of salient Y_s, for$L_s$constant of 60 m.

$\frac{L_s}{X}$	X (m)	L_s (m)	Y_s (m)
0,25	240	60	1,55

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0,5	120	60	3,09
0,75	80	60	4,64
1	60	60	6,19
1,25	48	60	7,73
1,5	40	60	9,28
1,75	34,29	60	10,83
2	30	60	12,37
2,25	26,67	60	13,92
2,5	24	60	15,47
2,75	21,82	60	17,01
3	20	60	18,56
3,25	18.46	60	18.46

Table 5. The result of the calculation of salient Y_s, for X constant at 30 m.

$\frac{L_s}{X}$	X (m)	L_s (m)	Y_s (m)
0,25	30	7,5	0,19
0,5	30	15	0,77
0,75	30	22,5	1,74
1	30	30	3,09
1,25	30	37,5	4,76
1,5	30	45	6,95
1,75	30	52,5	9,46
2	30	60	12,37
2,25	30	67,5	15,69
2,5	30	75	19,04
2,75	30	82,5	22,95
3	30	90	27,78
3,25	30	97,5	30

VI. CONCLUSION

There is a conformity between the result of the model with the result of the previous research which is the result of field observation as well as the result of physical model in the laboratory. Thus it can be concluded that the method that was developed is capable of modeling the formation of salient and tombolo well.

However, the obstacles in this method is the determination of interior abscissa of the boundary condition points was done like an experiment, where with different interior abscissa of the boundary condition points will result in different result. Therefore, further development needed is formulating equation for determining the boundary condition interior points or looking for additional equilibrium equation so that the result of the model is no longer dependent on the location of the interior boundary condition points.

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Examination on Increasing Stability of Multistoried Building: A Theoretical Review

Romesh Malviya[1], Sagar Jamle[2], Kundan Meshram[3]

[1]M. Tech. Scholar, Department of Civil Engineering, Oriental University, Indore (M. P.), India
Email: malviya.romesh@gmail.com
[2]Assistant Professor, Department of Civil Engineering, Oriental University, Indore (M. P.), India
Email: sj.sagarjamle@gmail.com
[2]Associate Professor, Department of Civil Engineering, Oriental University, Indore (M. P.), India
Email: kundan.transpo@gmail.com

Abstract *— The behavior of building depends upon its structural components and add on applied to it for high strength stability. Grade of concrete is the key components and plays a vital role in this regard. The current study summarizes the performance of different grades of concrete as on the stability factor in high rise buildings. The tall tower or high rise building is subjected to lateral loads like wind and seismic loads. Various researchers analyzed their work and evaluated something new in their work done but none of them describes the importance of the concrete grade and its importance on the increasing stability of entire building by adding stability components, using different materials and by replacing raw concrete components. The current review summarizes the same.*

Keywords *— **Beam, Column, Concrete grade, Stability, Tall structures.***

I. INTRODUCTION

High rise mega structures or skyscrapers are changing the pictures of skyline which accommodates the major population under one roof. They are proving highly suitable for increasing population where land availability is major issue, hence contributing in maintaining the environment. But higher they go more chances of failure in stability occurs as they are subjected to lateral forces namely wind force and seismic force. For any tall structure stability is the most major factor to be kept in mind while designing and analyzing.

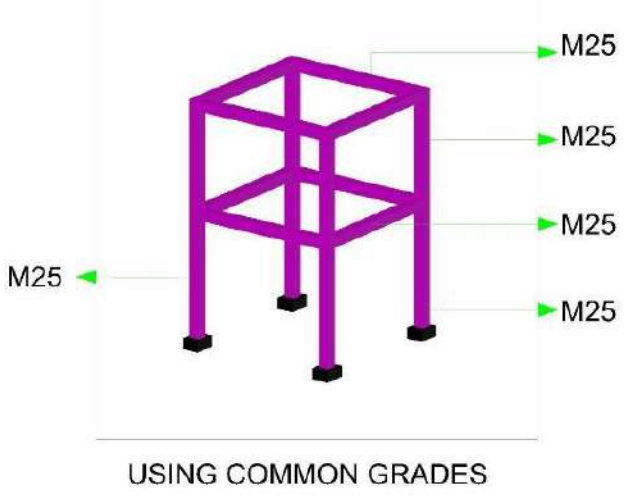

Fig. 1: Bare frame having same grade of concrete

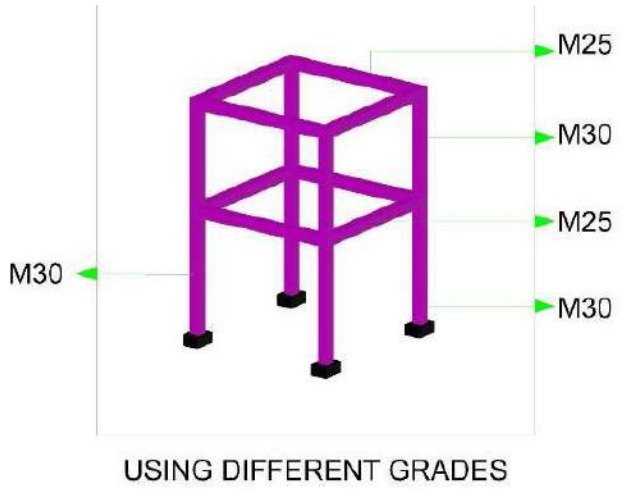

Fig. 2: Bare frame having different grades of concrete

II. LITERATURE REVIEW

The work deals with casting of geo-polymer concrete, geo-polymer being obtained from industrial waste such as fly ash. It used different grades of concrete namely M30, M40, M-50 and M60 and experimented on varying quantity of alkaline solution on mechanical property of geo-polymer concrete. An alkaline solution is mixture of Na2SiO3and NaOH solution in two different ratios as 2, 2.50 and 3, 3.50. The samplings of 150x150x150 mm cubes and 100x200 mm cylinders heat-treated at 60°C in an oven. Outcomes of experiment showed workability in the range of 85-145. Which depend on the ratio by mass

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of Na2SiO3 and NaOH. The workability increases with rise in ratio of alkaline solution while its strength is enhanced by reducing water to binding ratio. The results of compressive and split tensile strength lie between 20.64 – 60 N/mm2 and 3 – 4.9 N/mm respectively, (Shankar H. Sanni, R. B. Khadiranaikar).

The effort summarizes test performed on different multi tower high rise buildings on shaking table. Instead of assuming rigid floor for analysis, flexible transfer floor method is used. The dynamic behavior is equated with theoretical method. The dynamic behavior of structure is also taken into account, (Wensheng LU, Xilin LU).

This paper made use of fly ash to improve the durability of concrete. For this experimental studies three grades 33, 43, 53 of ordinary Portland cement are used. A comparative study is conducted with different grades of OPC, partially replaced by fly ash by per cent 10, 20, 30 and 40. The study parameters are shrinkage of concrete compressive strength and durability. The results showed improvement in properties of concrete up to certain per cent replacement of fly ash in all three grades of OPC, (T. P. Agrawal C. Marthong).

The work of the authors highlights the overuse of fine aggregates obtained from rivers which is a reason of overexploitation and ecological imbalance. To reduce the pressure on environment, an alternative to fine aggregates are discussed in this paper. Fine aggregates are being partially replaced by compatible materials like glass powder, crushed rock dust, and sintered fly ash but "spent fire brick"(SFB)obtained as a waste material from chimney lining and "glass powder" are chosen as best alternative to partially replace fine aggregates, (Tiwari Darshita, Patel Anoop).

Author carried out a study on self-compacting concrete on higher temperatures. To study the behavior of SCC on structures exposed to high temperatures, beams of dissimilar grades of SCC were tested under flexural loading. Temperature of SCC beams was maintained at 900 degree Celsius followed by cooling either by air or water. The result showed the loss in strength of SCC beams of higher grades as compared to lower ones. Due to type of heating and cooling conditions, there was also decline in compressive, flexural and tensile strength of specimens, (N. Anand, G. Prince).

The author explains the various methods to enhance the function of shear wall against lateral loading. The maximum portion of lateral load of lower segment of building is taken by shear wall while the upper segment is supported by frames suited for soft storey. Shear wall is a part of structural unit which is mainly design to take lateral loads and can be made of reinforced concrete, timber and unreinforced masonry, (Purushottam Lal Tamrakar, Vikky Kumhar, Priyanka Soni).

This paper recaps about the stability of high rise buildings subjected to seismic and wind load acting at the base or up to certain height.it also talks about the structural stiffness discontinuity which causes failure of member at junction and ultimate collapse in structure. Lateral supports are provided using bracing system or shear system to analyze stability of shear walls, cores and columns and coupled components. Many structures failed in stability due to wind load which gets solved using P-Delta analysis. All the stability analysis is done using ETAB/SAP 2000 software including P-Delta, (Mohd. Zeeshan, Mohd Sadiq, Masoom Mazhar, Ahsan Khan).

III. CONCLUSION

After reviewing and analyzing previous research papers it is concluded that:

1) Stiffness and Stability is analyzed by raw components used.
2) Different materials should be used for improving the analysis results.
3) No software analyses are done before on different grades. Different software should be used to determine the analytical results.
4) Design of the structure depends on the size, its materials and method used. Hence it should keep in mind while designing the structure.
5) Cost effectiveness of the structure depends on the sizes and material of the components used; therefore the approach should be effective.

As per the above conclusion by reviewing the researches of different studies, the technical approach should be there in the field of Civil Engineering, by software approach on multistorey building and the first analytical work will be provided and will soon be seen in the analytical research papers. A conclusion section must be included and should 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 as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

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Ecosophy and the relationship between man and nature in contemporaneity

Kellison Lima Cavalcante[1], Rafael Santana Alves[2]

[1]Master in Environmental Technology, Institute of Technology of Pernambuco (ITEP/Brazil). Researcher at the Federal Institute of Education, Science and Technology of the Sertão Pernambucano (IFSertão-PE/Brazil) E-mail: kellison.cavalcante@ifsertao-pe.edu.br. Petrolina – Pernambuco (Brazil)
[2]Master in Education, Culture and Semiarid Territories, State University of Bahia (UNEB/Brazil). Teacher at the Municipal Secretariat of Educatio of Juazeiro – Bahia (Brazil). E-mail: fael2270@yahoo.com.br. Juazeiro – Bahia (Brazil)

Abstract *— Among its functions, Philosophy allows us to understand reality and, in view of today's environmental issues, Ecosophy consists of the study of the relationship between nature and human beings, proposing discussions between the environment, man and social relations in modern times. This work aims to reflect on the relationship of man with the environment through the principles of Ecosophy. The Ecosophy proposed by Guattari (2009) addresses our understanding, as part of the environment in which we live, and how we learn and act on the environmental issue, based on the three ecologies: that of the environment, that of social relations and that of human (mental) subjectivity. Thus, it is possible to understand that Ecosophy is more than a reflection on ecology, nature and man-nature relationship, it is a search forconcrete actions, taking into account man's interaction with the environment. In this way, Ecosophy stimulates a broad environmental awareness, making it possible to extract from the field of learning and knowledge the potential to become capable of understanding what our planet needs and reviewing our actions.*
Keywords *— **Philosophy, Ecology, Society.***

I. INTRODUCTION

In the evolutionary process of the human species, man disputed food and space with animals, as a way of survival and demarcation of territories. However, over time, the development of skills related to man's rationality was marked, such as the creation and use of tools to obtain food and dominate space. In the early days of existence, man removed from nature only the essentials for his livelihood without aggressively interfering with the ecosystem.

However, at a certain time in history, man begins to dominate nature and the way of managing natural resources has been modified with each generation. Thus, agriculture and livestock are the result of the development of human skills and ways of managing natural resources, as part of the process of domination of nature. As a result, a process of change in the relationship between man and nature, triggering an unequal relationship and significant change in the environment in which we operate. In view of the above, Carvalho and Souza (2012) point out that the countryside, one of the oldest human settlements, has undergone an enormous transformation and its economic activities function more and more at the pace of factories.

The sedentarization of man in the countryside and the transformations of the environment provoke the search and dissemination of knowledge necessary for the understanding of the relationship between man and nature in modern society. Thus, the discussion proposed in this work provides for the construction of new socio-environmental and ecological knowledge, and, above all, of the human condition in modern times. The focus of discussion between society and nature in the perspective of co-evolution will mitigate innovations and knowledge for social and environmental relations, such as the recognition of the relationship between man and nature for the management and design of sustainable development, in its environmental principles and social.

In this way, Ecosophy consists of more than just a Philosophy of Ecology, but a way of thinking about the destruction of nature and human relations in contemporary society. Thus, Philosophy, through the awareness of the deterioration of the environment and social relations, inserts man in the conception of the reality he experiences, looking for answers and solutions to the problems he identifies. It proposes to analyze humanity in an integrative way of the environment in which it lives through the practical articulation of man's daily life.

Ecosophy consists of awakening the human condition in the environment, emphasizing the formation of a new human being, based on the three ecologies. In this way, ecosystem thinking enables reflection and understanding of the development of new social and analytical practices

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in the search for the creation of new subjectivities, making man as a being capable of interacting with the environment. This reflection supports the deepening of the ethical norms and social premises of human action in the environment.

Ecosophy is configured as a social need, creating an awareness that everyone must care for and preserve the environment for future generations, forming active individuals. The Ecosophy makes the man participant in the discussion and debate of environmental issues and their solutions. In this perspective, this work aims to reflect on the relationship between man and the environment through the principles of Félix Guattari's Ecosophy, mainly in the contribution of philosophical thought.

II. DISCUSSIONS FROM ECOSOPHY

According to Guattari (2009), we live on the planet under the acceleration of technical-scientific mutations and unsustainable development, which distance us from our personal, social and environmental relationships. In view of the new patterns and ways of life for man, we have intensified an environmental crisis derived from the interest in production and the indiscriminate use of natural resources.

According to Guattari (2009), the intense transformations in nature engender the phenomena of environmental imbalances and that simultaneously influence the ways of life of the countryman, who evolve towards a progressive deterioration. In this way, the capacity to develop rational and critical thinking about the problem in its entirety and as a whole makes it possible to remedy the future implications of human existence and the environment, establishing processes of territorial development. Thus, Guattari (2009) developed the theory of Ecosophy, from the Deep Ecology of Arne Naess, which consists of the articulation between the three ecological records (that of human subjectivity, that of social relations and that of the environment) to clarify the problem environmental.

In this way, Ecosophy consists of more than just a Philosophy of Ecology, but a way of thinking about the destruction of nature and man's relations in contemporary society. Thus, through the awareness of the deterioration of the environment and social relations, it inserts man in the conception of the reality he experiences, looking for answers and solutions to the problems he identifies. It proposes to analyze man in an integrative way of the environment in which he lives through the practical articulation of his daily life.

According to Avila-Pires (1983) from a mere link in natural ecosystems, as a great predator, man began to influence decisively the environment and acquired the power to alter natural processes, including those that regulate his own evolution. In this perspective, Maffesoli (2010) highlights that, with the scope of the discussions of the environmental problem due to a philosophical attitude, man starts to live in a moment of transition from a predator of nature to what he wants to live in harmony. Thus, man seeks solutions for the relationship with the environment, ceasing to be the center for a broader look in all directions. For Maffesoli (2017), Ecosophy consists of a paradigm shift, where man is aware that he is an inseparable part of the environment.

THE MENTAL ECOSOPHY

Mental Ecosophy implies reviewing the very ideological structure of being through its subjectivity. For this, Mental Ecosophy allows us to reflect initially on the opposition between the subject and the society that increasingly demands hierarchical obligation and the domination of being. In this way, it is possible to think critically about the unconscious of the mentality of the current man in the formation of his subjectivity through the eruption of historical values, the machinic contribution to the values of society and environmental aspects that are related together to form human subjectivity.

According to Guattari (2009), human subjectivity is widespread in the questioning of the empire of a world consumer market stimulated by Integrated World Capitalism and the productive set of the machinery revolution of the postmodern world. The problem, according to Guattari (2006), is that the development of human subjectivity is influenced in a direct and impacting way in a machinic way, pointing out as a cause of the individual's social segregation, a true *chaosmosis* of the everyday of being. In this way, ecosystem thinking finds segregations and hierarchies, making it classificatory in subjective positions and classes.

The problem of individualization of man, caused by segregations and hierarchies, lies in the principle of coexistence in groups and collectives. For this, Guattari (2009) highlights that:

"Within developed countries we find this same principle of social tension and 'stimulation' by despair, with the establishment of chronic regions of unemployment and the marginalization of an increasing share of young people, elderly people and 'wage workers', devalued, etc." (GUATTARI, 2009, p. 12).

These contemporary social aggravations are the result of the lack of a meaning of the individuality of man, corrupted by the forces of the Integrated World Capitalist power and by the lack of knowledge. Thus, according to

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Guattari (2009) Mental Ecosophy has the capacity to critically analyze the introjection of repressive power by the oppressed.

In this sense, Guattari (2009) seeks to investigate a resingularization of the individual through the mental Ecosophy that according to the philosopher:

"The mental ecosophy, in turn, will be led to reinvent the subject's relationship with the body, with the ghost, with the time that passes, with the 'mysteries' of life and death. It will be led to look for antidotes for media and telematics uniformity, fashion conformism, manipulation of opinion by advertising, polls, etc." (GUATTARI, 2009, p. 16).

The postmodern mutations, the computer and machine revolutions transformed the way of living and being of humanity, bringing limits to the individual development of subjectivity. Thus, mental Ecosophy results in the individual's subjectivation process, his *psyché*, not as a pathological being, but the individual mental relationship of each individual with the collective problems. That in ecosystem thinking seeks to relate the problem in general of being, social and nature.

"Whether in individual or collective life, the impact of a mental ecology does not imply the importation of concepts and practices from a specialized 'psi' domain. Facing the logic of ambivalent desire, wherever it may be - in culture, in daily life, at work, in sport, etc. - to reconsider the purpose of work and human activities according to criteria different from those of income and profit: such imperatives of mental ecology call for an appropriate mobilization of all individuals and social segments." (GUATTARI, 2009, pp. 40-41).

The mental Ecosophy seeks to explain in a rational and logical way the intimate space of each individual, from the knowledge of his own unconscious, his existence and his opinions, that is, his inner world, which is related to the externalities of the social world, the outside world. The articulation of Mental Ecosophy contributes to the singularity in the formation of each individual, even though they are influenced by contemporary mutations, enabling the construction and reframing of the relationship with beliefs, social and environmental values. It demonstrates the need to consider man in his internal world, based on his experience, emotions and senses, full of ruptures in the relationship with his being and with the social.

Thus, Mental Ecosophy proposes to raise awareness and knowledge of the individuality of man in his individual, family, professional and social daily life. For Guattari (2009) Mental Ecosophy aims at the singular production of man's existence. Thus, human subjectivity prepares man against social events and facts that disturb man's relationship with himself, with society and with the environment.

THE SOCIAL ECOSOPHY

The changes in the contemporary world reveal the process of deconstructing the identity of being and its life in society. Thus, the subjectivity of each individual shows us more and more the destruction of life in common in society and the transience and deterritoriality of living in groups. Thus, Guattari's thought (2009) corroborates the understanding that the world of capitalist production is valued, where the main problem is the diverging power of man's actions in contemporary society.

In this sense, to understand all the communicational systems that generate these divergences in society, Guattari (2009) regrouped four main semiotic regimes that govern Integrated World Capitalism, namely:

"a) economic semiotics (monetary, financial, accounting, decision-making instruments ...); b) legal semiotics (title of property, different laws and regulations ...); c) technical-scientific semiotics (plans, diagrams, programs, studies, research ...); d) the subjectivity semiotics, some of which coincide with those just listed, but many others should be added, such as those relating to architecture, urbanism, collective equipment, etc." (GUATTARI, 2009, p. 31).

For the understanding of these regimes, Social Ecosophy consists of the philosophical attitude of *socius'* relations with all semiotic elements and instruments that make up the trajectory of contemporary mutations. Thus, according to Guattari (2009), the question will literally be to reconstruct the set of modalities of being in a group, resignifying the relations of man's subjectivity with his own exteriority.

Thus, the relationship of these elements of Integrated World Capitalism results, according to Guattari (2009), in the material, formal, final and efficient causes of the destruction of man in society. Linked to this whole semiotic system, man's subjectivity has a direct effect on the mutations and adversities of the world in society. Thus, the Social Ecosophy aims to recover human relations in their essence in group and collective.

According to Guattari (2009) Social Ecosophy does not only result in general recommendations, but the development of effective experimentation practices at both the micro-social levels and at larger institutional scales. It consists in the permanent construction of the human essence in the discovery of the truths of the world and its own existence, but also in the proposal to result in effects and attitudes in society.

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"The social philosophy will therefore consist of developing specific practices that tend to modify and reinvent ways of being within the couple, family, urban context, work etc. It would certainly be inconceivable to intend to return to previous formulas, corresponding to periods in which, at the same time, the demographic density was weaker and the density of social relations stronger than today." (GUATTARI, 2009, pp. 15-16).

The philosophical attitude, through Social Ecosophy, allows thinking about social relations in the perspective of the heterogeneity of man caused by the advances and setbacks of the contemporary world. For Guattari (2015), differences in heterogenesis cannot be destroyed, but hetero-food. This proposal must be the power to reconnect man's subjectivity with the meaning of living in society, understanding the near and distant others. Thus, Guattari (2015) emphasized that one cannot look only at one side or the other, but at all sides, for a greater totality.

THE ENVIRONMENTAL ECOSOPHY

The constant changes in the contemporary world, causing the multiple and multiform forms of man's subjectivation and the heterogeneous weaknesses of social relations, make rational and logical thinking about environmental issues and problems on a planetary scale essential. Based on these mutations, the philosophical attitude aims to connect the elements of constitution of the being and the development of specific practices that communicate technological, scientific and cultural advances for the preservation of nature.

With the metamorphoses of *psyché* and *socius* in contemporary times, nature took on a machinic form, as a product of Integrated World Capitalism for the advancement and evolution of humanity. Thus, for Guattari (2009) the principle of Environmental Ecosophy is that everything is possible, both the worst and the best. Irrationally, both the worst catastrophes are possible, such as the case of Chernobyl portrayed by the philosopher, and the events of appropriation of mountain slopes, which in rainy periods are at risk of collapse. As flexible evolutions of man are also possible, which uses knowledge and wisdom to improve the world in which he lives, such as the use of what nature offers us in renewable sources and without the destruction of our natural habitat, with the energy coming from the light and solar heat, the movement of the tides and the strength of the winds.

In this sense, Guattari (2009) develops the sense of eco-logic in appropriating the logic of the intensities of humanity's evolutionary processes in environmental problems. Thus, eco-logic, as a philosophical, rational and critical attitude of contemporary situations, consists of the search for knowledge and action on the movements and processes of evolution, which result in the degradation of the Planet.

Thus, for Guattari (2009) the Environmental Ecosophy aims to articulate new ecological practices. These new ecological practices must make the subjective singularities of humanity progressive and active, moving to collective thinking, in the well-being of the group. Thus, heterogeneity has the capacity to organize and articulate the functioning of the global system.

For this, Guattari (2009) states that:

"In each partial existential focus, ecological praxis will endeavor to detect the potential vectors of subjectivation and singularization. In general, it is something that is placed in the "normal" order of things - a contradictory repetition, an intensive fact that calls for other intensities in order to compose other existential configurations. Such dissenting vectors are relatively devoid of their functions of denotation and meaning, to operate as disembodied existential materials." (GUATTARI, 2009, p. 28).

However, the eco-logic disseminated by Environmental Ecosophy has no way of obtaining answers and truths for the opposite, as in a dialectical discussion. In this philosophical attitude, the common objectives for the preservation and conservation of the environment will belong to everyone, in a collective movement of global interest in the face of problems that emerge from the individualist stance of being and social competition that marginalizes being in a group.

In this context, Guattari (2009) that there will be moments of resingularization where individual and collective subjectivities will manifest. Where, precisely, the Environmental Ecosophy will awaken the philosophical character of the use of reason, seeking to settle choices in the production and assimilation of safer perspectives for the environment. What is evident is the articulating proposal of the subjectivity of the individual being and the valorization of social relations in the construction of a natural environment without anthropic intervention.

III. AN ECOSOPHIC JOINT IN CONTEMPORANEITY

For Habermas (2012) Philosophy strives from the beginning to explain the world as a whole, as a unit in the diversity of phenomena. In search of this totality, Châtelet (1994) points out that the philosophical search progresses towards rationality. In this sense, for Hessen (1987) Philosophy is developed through the orientation towards the totality of objects and the rational character of this orientation. Faced with this development of the use of

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rationality to explain totality, Avila-Pires (1983) points out that man occupies a unique position in the world, as an intelligent being who built a technological civilization, a prerogative of his cultural evolution.

Thus, taking the evolution of man, Ecosophy develops from the philosophical attitude of the totality of contemporary problems, through the use of rationality. Not only as a Philosophy of Ecology, but as an active stance on the human condition on the environment and social relations, on the unity of the relation of thought. According to Avila-Pires (1983) from a mere link in natural ecosystems, as a great predator, man began to influence decisively the environment and acquired the power to alter natural processes, including those that regulate his own evolution.

All cultural, technological and scientific evolution places man in a position of modifying agent, capable of inferring with solutions to the imbalanced environmental problem. For Avila-Pires (1983), man is an integral part of the biosphere and is the only organism capable of understanding it.

And ssa relationship of man and society with nature is the current economic and political organization of contemporary, interfering with the entire production process of meanings of being in the world. Thus, Boff (2004) highlights the importance of a new paradigm for the planetary community, capable of emerging a new form of dialogue with all beings and their relationships.

For Boff (2004) this new paradigm seeks to discern the fundamental issue of the current crisis, which consists of the crisis of hegemonic civilization. In this way, the concern of Boff's deep ecology (2004) turns to the dominant paradigm of our society of the most determining models of relationships. Thus, we seek a sense of dialogue and discernment of the fundamental issues for the survival and preservation of nature, in the sense of living predominantly.

According to Dodsworth-Magnavita (2012), Ecosophy has the capacity to synthesize the concern of Contemporary Philosophy with environmental issues. Thus, Dodsworth-Magnavita (2012) states that:

"Initially, we can think that Ecosophy is a term whose emergence comes to supply the lack of an expression capable of synthesizing the relatively recent philosophical concern with ecological issues. However, it is more than an ecological philosophy (or an 'eco-philosophy'). At Ecosophy, we are not 'friends of the wisdom of the environment'. Like the ancient Hindu gymnasticists, wisdom is sought in the body, in the senses, in a physiological relationship with nature, thus not requiring great erudition, but attention to the environment. And it prioritizes, above all, an existence focused on what is necessary, fighting superfluous." (DODSWORTH-MAGNAVITA, 2012, p. 16).

The concept of Ecosophy expresses the ways in which subjects interact with each other and with the environment, based on the knowledge of sustainable environmental practices in the process of including the subject in the environment and as part of nature, for environmental preservation and awareness. Thus, Ecosophy seeks to bring together a harmonious relationship between the environment and man, leaving the characteristic of being dominant of man to be able to act in the resolution of environmental degradation.

Boff (2004) states that the human being's mission is not the domination of nature, but the care of it, as he is a responsible part of the entire Plante community. Thus, according to Dodsworth-Magnavita (2012), Ecosophy consists of an activist and political stance that aims to act in the world, more than simply thinking about it. As Gallo (2008) emphasizes the importance of effective actions in the post-industrial society and in the post-modern culture in constant mutation. This action comes from thinking about nature, in the aspect of seeking to understand the relationship between man and his habitat.

According to Gonçalves (2008), the ecosystem approach brings man closer to himself, to the other and to nature. The focus is on the need to understand and learn about the environmental problem, about the actions that caused it and its implications or projections over time. Thus, the eco-friendly attitude highlights the importance of man in the totality of his social and individual relationships, which synthesize his relationship with the environment in which he lives.

Gonçalves (2008) highlights that Ecosofia promotes a dilemma in the relationship of subjectivity with the exterior and the social. Thus, it puts into question the action of man in the environment, his way of being individual and social as part of the same natural ecosystem. In this way, Ecosophy consists of the philosophical attitude between the balance of the contemporary way of life and the relationship with the environment, as an inseparable part that we are.

For Guattari (2009), Ecosophy and the link of ecological records are not only used to encompass all heterogeneous ecological approaches in the same totalizing ideology, but to show us the opposite, an ethical-political perspective of diversity. Thus, Ecosophy seeks to highlight the heterogeneity of humanity based on the differences and distinct instances of man's subjectivity. Thus, Hur (2015) corroborates for the understanding that to think the

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subjectivity related to its exteriority, added to the concern of the political and environmental management of the planet, the three ecological registers must be worked in an articulated way.

Environmental problems are the result of the evolution of society, in its economic, political, social and cultural aspects, which synthesize the subjectivity of the human condition. Thus, the observation of the fundamentals, based on the Deep Ecology of Naess, collaborates for the rational and logical development of ecological balance and human subjectivity. This subjectivity means our perception of the world we live in and of ourselves, our way of thinking and acting to preserve and care for the environment.

In this perspective, Maffesoli (2010) highlights that, with the scope of the discussions of the environmental problem due to a philosophical attitude, man starts to live in a moment of transition from a predator of nature to what he wants to live in harmony and take an attitude ecosystem. Thus, according to the ecosystem thinking, man seeks solutions for the relationship with the environment, ceasing to be the center for a broader look in all directions. Also according to Maffesoli (2010), Ecosophy consists of a paradigm shift, where man is aware that he is an inseparable part of the environment.

Maffesoli (2010) defines Ecosophy as a way of understanding the metamorphosis in progress, which makes it progress from progressive to progressive. In this way, Ecosophy contributes to the minimization of degrading results of man himself, society and nature and the understanding of the fundamentals of man's feelings and his subjectivity, group experience, territories, culture and the environment.

"Instead of complaining, and aware of the vitalism of the environment, it is time to produce a new Discourse on Method, which is a retrospective clarification. That is, who knows how to go back from the derivative to the essential. Understand the first in the light of the second. Thus it will be possible, in its etymological sense and in its total sense, to understand the metamorphosis in progress. It is making us move from a progressivism (which was potent, competitive, but which became something sick) to a progressivism that reinvests in archaisms: people, territory, nature, feelings, impulses ... that we believe we have overcome." (MAFFESOLI, 2017, p . 1).

For Maffesoli (2017), modern progressivism has difficulty accepting natural progressivism. In this sense, Ecosophy awakens the capacity for a practical articulation between identifying metamorphosis and mutations and acting in search of a new method of solutions and answers. For this, understanding and knowledge become essential for an eco-philosophical thought that contemplates the totality between the three records.

Maffesoli (2017) points out that the common denominator between nature and the social becomes manipulable, maneuverable. In this way, the ability of Ecosophy becomes evident in the power of man to control and possess. For this, all ecosystem thinking is evidenced, according to Maffesoli (2017), in the modern collective unconscious. In view of this, man becomes concerned with the devastation of the world and its relations.

According to Devall and Sessions (2004), the love of wisdom relates ethics, norms, rules and practice, making Ecosophy a shift from science to ecological wisdom, as an ethical-political attitude. According to Hernández (1998), Ecosophy consists of a new name for political philosophy, as a cry in the face of heterogeneity and contemporary chaos. Thus, what we need in the contemporary world is the expansion of ecological thinking towards the thinking of Ecosophy. The human condition becomes an integrated being in the environment, a complete, holistic being, which combines biological, mental, social and spiritual aspects.

D and according to Gallo (2003), mankind develops so your consciousness in time there comes a time where you do not just feel the world creating values (myths) about the world. The desire arises to discover the laws that govern our world, to want to understand the world in a rational way and to seek solutions to the problems resulting from our actions. In this sense, it is possible to highlight that philosophy is opposed to myth, since philosophical consciousness is not limited to feeling the world. Thus, Ecosophy aims to interpret in a rational way the questions and problems of our environment, and then to question reality.

In this perspective, ecosystem thinking enables the relationship between human beings and the reality that produces and crosses them, in their multiple dimensions. Thus, through the understanding of the three ecologies, it is essential for us, as human beings and an inseparable part of the environment, to seek the reconciliation of this relation of possibility on our Planet to minimize the risks of environmental problems and human interventions in nature.

IV. FINAL CONSIDERATIONS

According to the philosophical thought of Félix Guattari, we live in a Mecanosphere in constant technical-scientific and cultural changes that dominate our way of living on the Planet. Then came the need to understand the complexity of postmodern life governed by advances in globalization. Thus, when environmental problems began

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to become a priority in contemporary political and social circles, the Ecosophy proposed by Guattari sought to concatenate in a logical and rational way what Philosophy could do for the world and the devastation of the environment, as an issue urgent.

Faced with the environmental crisis in the postmodern and machinic world of integrated capitalism, Guattari based himself on the ecological and political activism of Arne Naess's Deep Ecology in the search for a Philosophy capable of acting to minimize the impact of human evolution on the environment. Above all, it is possible to observe his post-Marxist inspiration as a criticism of the anthropocentric paradigm of nature as a product for capitalism and for the deculturalized and deterritorialized man.

For this, Guattari's Ecosophy proposed the observation, through a planetary and totalizing dimension, of contemporary issues, causing a real political, social and cultural revolution. Thus, Ecosophy consists of the dimension of human relations and human subjectivity (*psyché*), social relations and culture (*socius*) and the environment (nature), through the three ecologies: mental, social and environmental. Thus, an ecosystemic dimension of ecosystem records is sought through a philosophical attitude.

Ecosophy is expressed as a philosophical attitude through critical reflection in a way of coexistence and reframing between man, society and nature. From this thought, the "natural" and the "cultural" emerge as inseparable entities, bringing human subjectivity, social multiplicity, support for human rights and environmental diversity as necessary issues. Thus, it is possible to establish how everything is interconnected, from depression, suicide, racism, homophobia, machismo, violence and degradation of the environment. All the elements are united in a philosophical action to settle the antinomies between man and nature.

Man does not recognize himself as an inseparable part of nature and makes it a product of its evolution, causing great environmental damage and transforming life in our natural habitat in a disordered way. Thus, Environmental Ecosophy brings together the heterogeneity of human changes in search of remedying environmental crises. How can we use technological advances, through mental and social reconciliation, to minimize the impacts of global warming. The engagement of humanity is awakened in an articulation for the resolution and mitigation of environmental problems.

Ecosophy is expressed as a philosophical attitude through critical reflection in a way of coexistence and reframing between man, society and nature. From this thought, the "natural" and the "cultural" emerge as inseparable entities, bringing human subjectivity, social multiplicity, support for human rights and environmental diversity as necessary issues. Thus, it is possible to establish how everything is interconnected, from depression, suicide, racism, homophobia, machismo, violence and degradation of the environment. All the elements are united in a philosophical action to settle the antinomies between man and nature.

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The Religious Parties of Popular Catholicism of the Immigrants of the city of Santa Teresa

Sonia Maria Wenzel[1], Marcus Vinicius Sandoval Paixão[2], Polyana Pulcheira Paixão[3]

[1] Professora DSc, IFES Campus Santa Teresa, soniavenzel@bol.com.br;
[2] Professor PhD, IFES Campus Santa Teresa, mvspaixao@gmail.com,
[3]Médica Veterinária MSc, polyanapp@gmail.com

Abstract— *This research was carried out with the objective of analyzing the effect of religious festivals of the popular catholicism of Santa Teresa in the religious development of the municipality, located in the highland region of Espírito Santo, strongly marked by European immigration in the 19th century. The field research was complemented on grounds tion of the literature review on the relationship between sacred and profane, the religious culture of St. Teresa. The search It presents a conceptual discussion of religion, culture and the presence of the sacred and profane, highlights ing the religious element of immigrants as a constitutive factor of that society. Three cycles of religious feasts of the Catholic communities of Santa Teresa were analyzed, namely: the Feast of Kings, the June Saints, St. Anthony and St. John, and the Feast of Our Lady Aparecida. The presence of the sacred and the profane represented in the religious festivals, from the beginning of the colonization of Santa Teresa until the present day, constituted as a factor of cultural and religious identity of the community. It was possible to observe this relationship in the religious festivals of the city, the sacralization of temporality as a way of entering the eternal, the Kairós, that is, the time of grace, in which the miracles, the healings that manifest the action of the divine happen. through the saints. Although unconsciously, without the presuppositions of the sociology of religion, these simple people were affirming with their religious manifestations that they overlapped the spiritual and the temporal, walking with the saint's andor on their shoulders on the day of festivity, through the Catholic faith and Its practice manifests itself in religious festivals throughout the liturgical and devotional cycle, constituting Italianity in Brazil, based on family, land, the value of work and Catholic religiosity.*

Keywords— Sacred. Devotion. Catholicism.

As Festas Religiosas do Catolicismo Popular dos Imigrantes do Município de Santa Teresa

Resumo— *Esta pesquisa foi realizada com o objetivo de analisar o efeito das festas religiosas do catolicismo popular de Santa Teresa no desenvolvimento religioso do município, localizada na região serrana do Espírito Santo, fortemente marcada pela imigração europeia no século XIX. A pesquisa de campo foi complementada na fundamentação da revisão bibliográfica acerca da relação entre sagrado e profano, na cultura religiosa de Santa Teresa. A pesquisa apresenta uma discussão conceitual acerca da religião, cultura e a presença do sagrado e profano, evidenciando o elemento religioso dos imigrantes como fator constitutivo daquelasociedade. Foi analisadatrês ciclos de festas religiosas dascomunidades católicas de Santa Teresa, a saber: a Festa de Reis, os santos juninos, Santo Antônio e São João, e a festa de Nossa Senhora Aparecida. A presença do sagrado e do profano representado nas festas religiosas, desde os primórdios da colonização de Santa Teresa até os dias atuais, constituiu-se como fator de identidade cultural e religiosa da comunidade. Foi possível observar essa relação nas festas religiosas do referido município, a sacralização da temporalidade como forma de se adentrar ao eterno, ao Kairós, ou seja, ao tempo da graça, no qual acontece os milagres, as curas, que manifestam a ação do divino por meio dos santos. Ainda que inconscientemente, sem os pressupostos da sociologia da Religião, aquelas pessoas simples estavam afirmando com suas manifestações religiosas que sobrepunham o espiritual ao temporal, ao caminharem com o andor do santo sobre os ombros no dia da*

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festividade, por meio da fé católica e de sua prática manifesta nas festas religiosas ao longo do ciclo litúrgico e devocional, constituindo a italianidade no Brasil, baseado na família, na terra, no valor do trabalho e na religiosidade católica.

Palavras-chave*— *Sagrado. Devoção. Catolicismo.

I. INTRODUCTION

The religion is one of the factors that make up the anthropological dimension of the human being. In contact with the Catholic community of Santa Teresa, one can see a very strong, ingrained religiosity since the beginning of its colonization, especially in four of its most popular festivals: Feast of the Three Kings (01/06) Saint Antônio (06/13), Saint John the Baptist (06/24) and Our Lady Aparecida (10/12). It will be on these four parties that the present research will stop as an object of analysis of the relations between the sacred and the profane, as proposed by the studies of Mircea Eliade (ELIADE, 2001).

Within a settlement context, in a strongly agrarian society in which religious festivals are linked to the earth, making a link between the sacred and the profane, in time and space. Faced with the complexity of the arrival of the first immigrants and the immediate search for a process of fixation in the geographical spaces, social, political and economic movements are developing, but also, mainly, the development of religious practice, as a factor of unity, and the feasts in tribute to the patron saints to overcome the unknown. To this end, we sought to base this research on a literature review by authors of Anthropology, for analysis of man as a cultural and religious being.

The process of occupation of Brazil, characterized with the arrival of European immigrants. In Espírito Santo, it was established in the Timbuy nucleus, Santa Teresa Municipality/ES, where there was a lack of planning and consequently the distribution of land plots along the watercourse, with all the difficulty in reaching the promised land.

Religiosity and socialization between communities, in considering the historical trajectory of the phenomenon and religious practices, shows the need for affirmation before each other, their identity in the transmission, references of the religious phenomenon in a symbolism and religious practice, predominant to their rural world of origin of these immigrants who symbolically all the rites are linked to the land of their ancestors left to their descendants, to understand what would be the understanding of religion, faith and belief among immigrants, where these actors came together to seek and meet God. , at the moment of dialogue with the phenomenon of religious practices forming a link between the profane and the sacred of each following and diversities in this religious field in space and time.

The search to analyze the role of religion in the process of expansion and freedom, including the dynamics necessary to assure variety and opportunity to the actors, as well as the environment, so that each one can fully exercise their religious belief and faith and understand the development of religion as a science.

The union between immigrants and religious festivals produces important spaces for discussion that make it possible to highlight the phenomena that occur in religious development in the construction of communities among themselves and to preserve favorable conditions through the union and religious festivals in order among themselves. interferes with their descendants and family structure so that the actors formed a contemporary society. Based on various theories that one reads, listens to, speaks, religion presents and cultivates in various ways in the formation of society.

The great contribution is made in the transcripts of religiosity and knowledge in their religious festivals and may be a preponderant factor in the formation of society in the religious universe, aiming at a higher quality of life in belief, faith in a social relevance the possibility of revealing the religious phenomenon. influence on the social relations of the subjects' life contributing to the understanding on the religiosity issue, being able to observe the elements that compose the religion phenomenon and the influence from the religious context, of those who believe and believe in a Superior Being, God.

Through an approach where it can be affirmed that the spiritual spiritual dimension proves to be a universal phenomenon, present in the different times and cultures of human civilizations, to study the religious phenomenon, is to understand, understand this social phenomenon in the religious festivals of great importance to identify the manifestations relations between social groups.

Religion, faith and belief among immigrants is a factor to be studied, where the actors gathered to seek the encounter with God, and the moment of dialogue, political and economic and social forming the link of the profane to the Sacred, hoping for comfort between a religious festival left to their descendants as well as social and religious values.

This research was carried out with the objective of analyzing the effect of religious festivals of the popular

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catholicism of Santa Teresa in the religious development of the municipality.

II. RESEARCH METHODOLOGY

The research was divided into three stages. In the first, the theoretical assumptions such as the concept of culture, religion and the relationship between sacred and profane were addressed. In the second, some data will be presented from the municipality of Santa Teresa, as well as aspects of the Espírito Santo religiosity. Finally, the third will seek to analyze the religiosity that gave unity to the municipality from the popular religious festivals of the patron saints, contributing to the reflection on the importance of the role of religion in the formation of cultural identity, as noted by Pereira in affirming that it served to "reinforce and preserve the ethnic identity of the immigrant group, with religion being the diacritical feature of this identity" (PEREIRA, 2005), that is, it is the differential feature of this community that was formed in the municipality of Santa Teresa at the same time it seeks to preserve the memory of this city, whose popular religiosity in which sacred and profane mingle is so remarkable and constitutive.

Detecting the first Catholic churches of the municipality that emerged from their religious trajectories, we describe the paradigms in religious festivals.

It was necessary to understand the phenomena and the development of religious festivals in the daily lives of immigrants, and the movements of religious institutions, and the discovery of religious phenomena and movements, and the influence of knowledge on religious festivals. The research of religious festivals is of a descriptive and qualitative nature, it is necessary to thoroughly conduct the bibliographical analysis, documentary history and religious texts, on the theme proposed in this research, and the understanding and interpretation of data collected through questionnaires and interviews. open in the understanding of religious festivals, built through the immigrants and their descendants involved, in the municipality of Santa Teresa ES, Brazil.

From the analysis of the data obtained from the questionnaires, interpretative interviews were described and translated in a natural way. The research took a representative sample approach of data collection, gathering interpretive techniques which we tried to describe, translate in order to check the meaningful data of the questionnaires guaranteeing the results with precision to this research that will give the discussion of the results.

We adopted in this field research the contact procedures with the study phenomenon, with the pre-established methodological procedures.

The interviews were direct with groups of immigrant descendants, with reports from the informants to know the behavior of the religious festivals surrounding the problem to be studied, by analyzing the collected data. It was descriptive and exploratory, with field research based on qualitative and quantitative questionnaires to the actors included in this research.

It concludes with an analysis of the historical process and the structuring of immigrants and, as it happened to the religious phenomenon and the religious festivals in the municipality of Santa Teresa, main focus, according to the characteristic of exploratory research.

III. THE HOLY FESTIVALS OF SANTA TERESA

Since the foundation of Santa Teresa, popular religiosity has been a hallmark in the history of that community. This traditional lay religiosity of which Besen speaks (BESEN, 2012b), will manifest itself over time in the Capixaba municipality of Santa Teresa through religious festivals, in which sacred and profane mingle as a manifestation of faith and the culture manifested by the immigrants throughout these years in Brazil. Regarding this religious culture derived from a popular Catholicism, Souza expresses:

> Popular Catholicism lacks its own status in the practice of the Church, yet exists in close interaction with it. It does not dispute it, but may eventually acquire a distinctly anticlerical bias. They do not oppose the attributes of the clergy, but create their own attributes, and are organized and practiced by lay people who seek, to a greater or lesser extent, to maintain their autonomy as believers while claiming to be children of the Church.
>
> The ecclesiastical rites did not remain immune, on the other hand, to the influences of popular Catholicism. On the contrary, the Church has traditionally adapted to them and incorporated them, to a greater or lesser extent, into their rites, just as popular Catholicism adapted diverse elements from ecclesiastical ritual (SOUSA, 2013).

As noted in Souza's statement, popular Catholicism that emerges as a manifestation of faith of a particular social group creates a religiosity with its own tributes that merge elements of official, clerical Catholicism, with the elements of popular culture to a greater or lesser extent, performing a symbiosis, as can be observed in the four parties chosen as the object of

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research of this work, because what seems apparently local, has a universal dimension, inserted in the religious consciousness of social groups, as pointed out by Souza:

> Popular Catholicism is a cultural as well as a religious expression, and changes its form and position from the transformations that have taken place in the broader cultural context of which it is a part. It is dynamic and historically constituted, not necessarily averse to modernity, as some of its most conservative scholars want to believe. On the other hand, some of its most archaic manifestations radically suffer the impact of modernity, and even disappear under this impact, which does not prevent bridges and adaptation mechanisms from being created.
>
> Popular Catholicism was structured, after all, from its vocation for syncretism and the absorption of exogenous elements, which are molded to their beliefs and rituals. With this, what appears to be local — a ritual performed in a specific region — is in fact universal in all its range of contacts and influences: in its ability to assimilate what came from afar and what came from other times (SOUSA, 2013).

This cultural syncretism present in popular religiosity is especially noticeable in the feasts of the patron saints, in which the practice of orthodox faith of official clerical Catholicism mingles with the syncretic manifestations of popular piety, as can be observed, for example, in the Folias. of Kings and Congadas, on the occasion of the liturgical festival of the Magi, on January 6 of each year.

IV. THE PARTY OF KINGS AND THE FOLIAS

The Feast of the Magi has its origins in the Christmas liturgy of the Church that celebrates the Epiphany of Jesus Christ when it manifested itself to the wise men of the East, who are traditionally referred to as holy kings, according to the narrative of the biblical text, celebrated on January 6th. in the liturgical time of Christmas, as Jurkevics explains:

> The Folia de Reis, Reisado or Feast of the Holy Kings is a popular auto that seeks to remember the journey of the Magi, Gaspar, Melchior and Baltasar, from the moment they receive the notice of the Savior's birth, when they take gold, incense and myrrh until they find it in the lapel. So being part of the Christmas cycle, the procession of revelers parades singing, both in the countryside and in the cities. This festival, as well as many others, was brought by the Portuguese at the beginning of colonization, whose roots lie in the Invincible Sun Festival, initially celebrated by the Egyptians and later incorporated by the Romans. This celebration, in its first version, took place on January 6 and the Roman on December 25, according to the Gregorian calendar (JURKEVICS, 2005).

The liturgist Augé (AUGÉ, 2007), states that the origin of the feast of the Epiphany, that is, the manifestation of the deity of Jesus Christ to the Magi from the East, which popular religiosity called the Feast of the Magi had its origin in the region of Egypt, in the third century, according to ancient testimonies and settled in Rome, around the fifth century, as he wrote:

> The origins of Epiphany evoke us in Egypt. The earliest but indirect testimony would be from Clement Alexandrian in the early third century. A nod, though not yet an explicit testimony, is given to us by St. Athanasius's first paschal letter in the year 329. Only Cassian, in the year 420, bears an explicitly proven, dated testimony. In Egypt the epiphany celebrated both the baptism of Christ and his birth.
>
> There is much evidence to think that the Roman feast of Jesus' birth on December 25 was influenced by some pagan celebration. In fact, in Alexandria, the pagans, on the night of January 5-6, celebrated the Christmas Day of the god Eon (god of time and eternity) and on that solemn ceremonial day sought and preserved the water of the Nile. In the second half of the fifth century, Rome adopted the feast of the Epiphany. According to the homilies of St. Leo the Great, who dedicates eight sermons to this festive event, the theme of this celebration in Rome is the visit of the Magi, interpreted as a manifestation of the deity of Christ (AUGÉ, 2007).

From the beginning of the liturgical celebration of the Solemnity of the Epiphany, it was associated with the Magi, and it was this emphasis that popular piety gave the liturgical feast of the Epiphany of Jesus. Thus, the feast represented the triumph of Catholicism over paganism, the victory of the light of Christ that illuminated the Magi by

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the star of Bethlehem over the darkness of paganism, as Sanchis pointed out:

> What is first and effectively celebrated in worship is the primordial Sacred in its finished historical expression: the mystery of the historically dated Christ, once constituted as dominating history, definitely emerged from its intricacies and uniquely susceptible to being beaten, made present and reactivated by the rite (SANCHIS, 1988).

The festival, therefore, with its rites revives the Christian mystery by impregnating the faithful in a symbolic-religious world, loaded with folklore, in which the presence of the sacred, in prayers and processions, joins the profane element, represented by the fun, as spells out Pergo:

> Popular festivals are traditions that constitute the resistance of the peoples in defense of their culture and customs. Studies such as those by Antonio de Paiva Moura address the theme of folk festivals in Brazil. According to this author, for the characterization of the Brazilian popular festivals, its structural components must be presented, that is, the religious activities, such as the mass, the procession, the blessing, the novena and the prayer are given by priests or by persons authorized by the Church; those of profane religious character seek to honor the sacred figures, always in a festive and joyful manner, in which there is mast raising, ballets such as “Congados”, “Folia de Reis”, “Império do Divino”, “Reinado do Rosário”, “Pastorinhas”, being given by lay people with the approval of the priest. The profane popular parties have a sense of fun, aiming to entertain visitors for longer parties such as auctions, dances, food, stalls, among others. It should be noted that the “Folia de Reis” has a profane-religious character and is part of the Christmas cycle, held from December 24 to January 6, with celebrations for the birth of Jesus through festivities (PERGO, 2018).

During the Christmas season, the faithful of Saint John of Petropolis, a community belonging to Saint Teresa celebrates the Feast of Kings with Mass, prayers, processions, holidays and congadas, as a way of honoring Jesus Christ, the Virgin Mary and the Kings in Celebrations of the birth of Jesus. These celebrations reflect that manifestation of the Sacred.

Regarding the importance of the flag, in a revelry of kings, this is expressed Question:

> The Flag, called the "Doctrine", is made of shiny cloth. It is affixed with a print of the wise men. It is the sacred element of the Company and is treated as such: it is respectfully kissed by the residents of the houses visited, it is passed with great faith on the beds of the residence and can never be placed in a less dignified place. This respect continues throughout the year, even after the time of Kings: in the house where she is kept, there are periodic prayers before her. In the cultural universe of our people, the flag is the representation of the three kings; therefore, the Masters explain, she must always go ahead with the representatives of the shepherds who followed the Magi (PERGO, 2018).

Respect and veneration of the flag, made sacred by the revelers and blessed by the priest before the celebrations, illustrates this process of sacralization as a hierophanic manifestation. In this way, the faithful have their energies renewed to begin another year of toil under the protection of the divine while having fun with the family as they parade in the preparation of the typical dress, the rehearsal of the songs by the revelers.

The procession goes through the streets of the community, reciting a third, stopping at the altars made by some residents, in which they say a few litanies, the clowns recite a few verses and bow the flag, the revelers beg the almsman and They say goodbye, departing the streets again, praying and singing to the next mounted altar. After the end of the Church comes a great feast with food and drink for all, uniting the religious element with the profane.

V. JUNE PARTIES IN SANTO ANTONIO AND SAINT JOHN THE BAPTIST

Another occasion in which the sacred and the profane intertwine in a special way are the feasts of the June cycle saints: St. Anthony (June 13), St. John the Baptist (June 24) and St. Peter (June 29). The first two are present more intensely in the life of the communities of Santa Teresa, hence the omission of St. Peter. Concerning the origin of devotion to the June Saints, Trigueiro expresses himself:

> In June, there are the most traditional festivals of popular Catholicism throughout

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> Brazil, especially in the northeastern region. These are the celebrations of the June cycle, in honor of the three saints: Santo Antonio, celebrated on the 13th; St. John the Baptist, on the 24th; and St. Peter on the 29th. St. John's night is undoubtedly the most celebrated.
>
> The celebration of these feasts has its origin in the pagan tradition of the peoples of Europe, Asia and Africa, who celebrated the fertility and harvest protector deities as summer approached in the Northern Hemisphere and were transported to the Catholic calendar.
>
> It is not just a coincidence the hagiographic date of the June festivities. Old agrarian rituals in the Old World on the occasion of the summer solstice (June 22-23) marked the beginning of the grain harvest. Man's relationship with the earth was very strong and the fertility rites of the plantation were also associated with human fertility. Planting and reaping was more than an unholy act. Benjamin states: "The Catholic Church has placed the feast of St. John near the change of season (midsummer) seeking to absorb the pagan agrarian cults. For the hierarchy of the church the feast of St. John is an anticipation of the announcement of Advent, considering the role of John the Baptist as a forerunner of Christ "(TRIGUEIRO, 1995).

As can be seen from Trigueiro's studies, also in the June cycle we find the overlap of Christianity over ancient pagan practices, in a system of acculturation and resignification of rites and dates, purifying, resinifying and giving it a doctrinal orthodoxy from Christian trinitarian monotheism. that in popular religiosity elements of paganism are still preserved as the permanence of ancient agrarian rituals, such as the presence of the bonfire of St. John, for example, dances, among others, as a way of worshiping the precursor of the Sun of Justice, St. John the Baptist .

> The practices of ancient hierophanies in honor of the summer sun by the peoples of Europe are incorporated into the various religious systems of today. They have passed through the times and come in different forms, but conserving their archaic manifestations represented in our folklore. The rituals of celebration of the ancient peoples of Europe showed their love for the harvests that took place in the late winter and early summer periods, which we call here "the month of St. John", were true struggles between the forces of the good against evil (TRIGUEIRO, 1995).

Throughout the centuries, the Church has been able to purify certain pagan practices, seeking to eradicate them, and in other cases, when they were too entrenched, sought to mean them, as happened in the celebrations of St. John, whose ancient elements remained to this day. , incorporated into the manifestations of popular piety, including these elements, such as bonfires, for example, was used by the Jesuits in the process of catechizing the Indians in the 16th century, especially with the festivities of the June cycle (CHIANCA, 2007).

The celebrations are always preceded by a preparation over the nine days, called novena, in which masses are celebrated, receive outside priests to celebrate and make prayers and litanies to worship the patron, in addition to the social aspect of the party, ie the profane, such as typical food stalls, flags, children's games, folk dances, mast lifting, among other elements that in addition to the fraternization aspect raises financial funds for the Church. Here one sees a clericalization of the party, once exclusively lay and almost without mass, in the early days.

> The June festivals were also brought by the Portuguese and their original name in the European Catholic countries was the “joanina” festival, in honor of St. John, with the parties in honor of St. Anthony and St. Peter being later included, in Portuguese America, in the context of the June festivals they cover medieval traditions from other regions of Europe. June festivals are the cycle of Catholic festivals that have the slightest connection with the Church; These are popular parties, organized and carried out basically by the faithful (SOUZA, 2014).

However, before celebrating St. John, on June 24, the community celebrates one of the most popular saints in the history of the Church, St. Anthony of Padua or Lisbon. Vainfas (2003) makes an interesting analysis of St. Anthony that reveals his intense biography as a thaumaturge with more than 50 stupendous miracles performed in the life of the most diverse, as narrated the old hagiographies; On the other hand, it was called the "hammer of the heretics" because of its strong defense of Christian orthodoxy against the Cathars and the Islamic infidels. However, the saint's popularity in Portugal and Brazil came as the saint invoked to find lost things and to

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arrange marriage. Thus the orthodox thaumaturge became the "matchmaker saint."

> At the beginning of the Modern Age, the domestic and affective face of Saint Anthony would be concentrated, within the scope of popular Catholicism, in his virtue of being a "matchmaker", a holy marriage promoter. "Marry Me Saint Anthony, Marry Me!" Is what appears in various prayers. But such virtue of friar Antonio, later saint, hardly appears in his hagiography or in the accounts of his thaumaturgical powers. Yes, stand out - and this virtue is of extraordinary longevity - its immense power to recover "lost things." Things and people. Perhaps this gives rise to the "matchmaking" virtue attributed to Saint Anthony, for between the lost and the desired the border is always very thin. In any case, Saint Bonaventure, also a Franciscan, had pointed out Saint Anthony, still in the Middle Ages, as he reminds perditas and Antonio Vieira calls him ria deparador, a word that is in disuse today. that finds the lost (VAINFAS, 2003).

A striking feature of the devotion to St. Anthony in the Catholic communities of Santa Teresa / ES is strong male devotion, as seen in the devotions of men during the festivities, as in the procession. The procession is one of the outward aspects of popular devotion. Souza (2013) points out that a procession can be both a festive celebration and a penitential act, in any case, it is a public demonstration of faith, since the processions take place in the streets around the chapel or church, and in some occasions, through various city streets.

> The procession symbolizes the belonging of the faithful to the Church, but it is done outside the temple, on the streets and not inside, which demonstrates the ambiguity inherent in the ritual: at the same time ecclesiastical and profane ceremony, controlled by the Church and absorbing elements profane. At the same time, the procession affirms the authority of faith over the profane space, incorporates it into the authority of the Church, and makes the Christian identity of those who participate in it affirmed before themselves and before those who remain unaware of the faith (SOUZA, 2013).

In this statement by Souza are those elements presented by Mircea Eliade about the relationship between the sacred and the profane that blend together as they roam the streets of the locality which is an unholy space with a religious image adorned with flowers on its shoulders while singing and singing. The rosary says that it demonstrates the primacy of faith, the sacred, the supernatural over the profane, the temporal.

One element that can be seen in the procession of St. Anthony is a pedagogical transmission of faith to future generations, as observed in the child dressed as St. Anthony, who eventually reflects the faith of those responsible who are likely to keep some promise to the saint. It is a common custom to dress the children of St. Anthony, the so-called "Toninhos" who accompany the procession as a way of thanking the saint for some grace achieved, usually a cure or payment of promise and ex-vows:

> And when healing is done, the believer often thanks him for making ex-vows, although these are not limited to the rendering of healings, but may include financial, loving, and other problems. What matters is that the ex-vows are intended to make the miracle public or to make a public demonstration of the success of a promise, that is, a covenant between the believer and his divine protector. The term ex-vote, after all, represents the abbreviation of the Latin expression ex-suspicious vote, ie the vote taken, and it is thus, effectively, that it can be defined (SOUZA, 2013).

The promise is one of the elements of popular piety that manifests itself in many ways, from offerings and donations to the Church to public manifestations of faith in the saint, which demonstrate faith in miracles. For this reason, Souza considers that these elements, such as "the feast, the promise and a series of rites, aim to win the saint's favor, causing him to intercede for the believer in his daily affairs and dramas. Let the saint protect him, take care of him and save him. " In addition to the religious aspects, there are the social aspects of cultural manifestation as noted by the presence of the fanfare soon after the andor, emphasizing the festive character, as Souza expressed: "The festive, profane character of the processions did not come with Christianity, but made within it, common to the parties organized by the Church or by its faithful "(SOUZA, 2013).

VI. THE PARTY OF OUR LADY APARECIDA

Another feast very celebrated in the communities of Santa Teresa by Catholics is the Feast in honor of Our Lady Aparecida, Queen and Patron of Brazil. It is a

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devotion from Brazil itself, in the face of the finding of the small image of Paulista terracotta of the Immaculate Conception, by fishermen, by the 1717, which in the following centuries soon spread, mainly in southeastern Brazil, impregnating, including religiosity. of newly arrived immigrants, as attested by the chapels, such as the community of Correia, illustrated by photo 09 below, in honor of Our Lady of Aparecida in Santa Teresa.

Besen (2012a) states that the Church in these lands owes to the laity, that is, to the simple and faithful people, the foundation and, later, conservation of shrines, oratories, chapels and other places of pilgrimage. This is exactly the case of the largest Marian shrine in the world, the National Shrine of Our Lady Aparecida, in Aparecida / SP, a great religious center of devotion, a true *hieropolis*.

> The feast of the Immaculate Conception was made official in Portugal in 1640, being patron saint of Brazil in the colony and the Empire. In the Republic, assumed the title of Our Lady Aparecida.
>
> The image of Nossa Senhora Aparecida was found by three fishermen from the Paraíba do Sul river, in the Guaratinguetá region, São Paulo, around 1717. The fishermen Domingos Martins Garcia, João Alves and Filipe Pedroso had been fishing for a long time, without that they could get some fish. It was when John brought into his net the part corresponding to the body of the image and then, casting the net a little farther, brought the head of the Lady into it. From then on, the fishery became plentiful and, fearing that the amount of fish brought to the boats would cause a wreck, the three friends return home, bringing the image and telling everyone the wonder they had experienced. The worship of the Lady soon took shape. The image, which represents Our Lady of Conception, was soon given the name of Aparecida, because it appeared from the middle of the waters in the hands of fishermen. Initially installed in a chapel in the fishing village, around 1745 had its first official church, around which would be born the village and the sanctuary of Aparecida (BESEN, 2012a).

From the devotion to the Immaculate Conception brought by the Portuguese, began the worship of Our Lady Aparecida in Brazil, which soon spread to other regions of Brazil, reaching Santa Teresa, where some chapels were built throughout the twentieth century. in honor of the Virgin Mary under the title of Our Lady Aparecida. One of these chapels is still under construction.

Despite the simplicity of the place, the people always meet in October, on the occasion of the novena or triduum in honor of Our Lady Aparecida to say their prayers, litanies and attend masses that prepare the great day of the Solemnity of the patron saint of Brazil, the 12th. October, when the procession and the festive mass take place. It is interesting to mention that in all festivities there is a preparation before the festive day, be it a trezena (13 days), a novena (9 days) or a tríduo (3 days).

It is interesting to see in these religious manifestations - the patron feasts - this game of sacred and profane that the classical authors of the sociology of religion referred to. We can see that division of the world into two domains, one sacred and one profane, good and evil. This dichotomy of which Durkheim speaks, for example, in the quotation already presented in the first chapter and resumed here for the purpose of grounding this perception even today when analyzing the religious manifestations of the municipality of Santa Teresa.

> All known religious beliefs, whether simple or complex, have the same common character: they assume a classification of things, real or ideal, which men conceive in two classes into two opposite genres, generally designated by two distinct terms than the words. sacred and profane translate quite well. The division of the world into two domains that comprise, one, all that is sacred, another, all that is profane, such is the distinguishing feature of religious thought: beliefs, myths, gnomes, legends, are representations or systems of representations that express the nature of sacred things, the virtues and powers attributed to them, their history, their mutual and profane relations (DURKHEIM, 1996).

As can be seen, the Catholic faith manifested in the feasts of the patron saints becomes an element of social unity and continuity between the past and the present, keeping alive the traditions received from immigrant ancestors and transmitting to new generations, as can be observed by the presence of children in these festivities, the values that constituted Santa Teresa.

After the sacral moment of prayer, of the liturgy of the Mass, there was an unholy prolongation through Quermesses, folkloric performances, gatherings in barracks, in which there was all social and economic interest. It is undeniable that in these manifestations of

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faith, the sacred and the profane intertwine, giving meaning to the life of these faithful of Saint Teresa.

These elements since the beginning of colonization constituted a factor of cultural identity. For through the Catholic faith and its practice manifested in religious festivals throughout the liturgical and devotional cycle, Italianity in Brazil was founded, based on family, land, the value of work and Catholic religiosity. Thus, these immigrants from various parts of Italy were forging during the colonization process marked by many tensions, having faith and language as common elements, a sense of belonging that remains to this day in their devotional and religious practices. in local customs, although over time they have adopted Brazilian traditions and customs, including devotional practice, such as the devotion to Our Lady Aparecida, typically from Brazil. However, the elements of Catholic faith inherited from the first immigrants are still present in these religious manifestations, maintaining a cultural unity among Catholics, despite the particularities of each community.

VII. CONCLUSION

It was possible to observe this relationship between the sacred and the profane in the religious festivities of the aforementioned city, the sacralization of temporality as a way of entering the eternal, the Kairós, that is, the time of grace, in which miracles, healings, that manifest the action of the divine through the saints.

The importance of demarcating the sacred as territoriality to emphasize that that place or place is sacred. This has been present since the founding of the city and continues today with the construction or renovation of temples, and the importance of publicly manifesting faith through processions. Thus, even unconsciously, without the presuppositions of the sociology of Religion, these simple people were asserting with their religious manifestations that they overlapped the spiritual to the temporal, the sacred to the profane as they walked with the saint's shoulder upon the feast day.

It is a trait that demonstrates the universality of the Catholic faith that manages to keep within it diverse cultural elements while professing a single faith, acculting them, adapting them, reframing them, so as to give a feeling to the faithful world, without great damage to doctrinal orthodoxy, mainly through popular piety. It can be seen in these researched manifestations, the strength that popular Catholicism has to maintain this bond, as well as the appropriation of these popular manifestations by the hierarchy of the Church, that is, by the Institutional Church for the maintenance of the Catholic faith among the local population.

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Review Analysis on Determine the Best Location of Porch in Multistory Building with and without Seismic Loading

Abrar Ahamad[1], Ankit Pal[2], Mayank Choudhary[3]

[1]M. Tech Scholar, Civil Engineering Department, oriental university, indore, India
E mail abrar.bunty24@gmail.com
[2]Assistant Professor, Civil Engineering Department, oriental university, indore, India
E mail ankit.5792@gmail.com
[3]Assistant Professor, Civil Engineering Department, oriental university, indore, India
E mail mayankchoudhary845@gmail.com

Abstract**—** *This paper briefs about determination of best location of porch with the help of analytical method by using staad-pro software. It also describes the effects of seismic and non seismic behavior of multistory buildings. The main purpose of the paper is to analyze the effect of seismic waves on skyscrapers and multistory buildings. The analysis is also for non seismic area locations. The software which is used for the analysis is staad-pro.*

Keywords**— Staad-pro, porch location, seismic loading, seismic analysis.**

I. INTRODUCTION

The world is full of multistory buildings and skyscrapers so it is really important to make it safer for people and also to reduce its overall cost therefore seismic analysis is really important and compulsory in today's world. The new invention and ideas are increasing vastly so that we can easily live our life without being afraid of hazards and earthquake is one of them. Seismic loading is the major factor in any type of multistory buildings and skyscrapers.

Fig.1 Multistory Building

It widely affects the structural approach of multistory buildings. When earthquake occurs seismic waves started to begin into earth crust which mainly affect the civil structures like buildings, bungalows, houses, skyscrapers, dams, highways and Bridges.

Fig.2 Multistory Building

II. MULTISTORY BUILDINGS

This paper is about different-different analytical approaches for multistory building by considering seismic and non seismic behavior on multistory buildings and also

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to find out best location porch by using analysis. The software which is used for this analysis is staad-pro.by using this method and analysis we can easily find out the best location of porch. it is really important analysis for multistory buildings because many of the multistory building are constructed in seismic zones and many without seismic zones so this analysis is important for both. And it also can reduced the cost of construction by knowing that it results

Fig.3 Building Plan

Figure shows the plan of building with the porch which is provided middle of the bulding

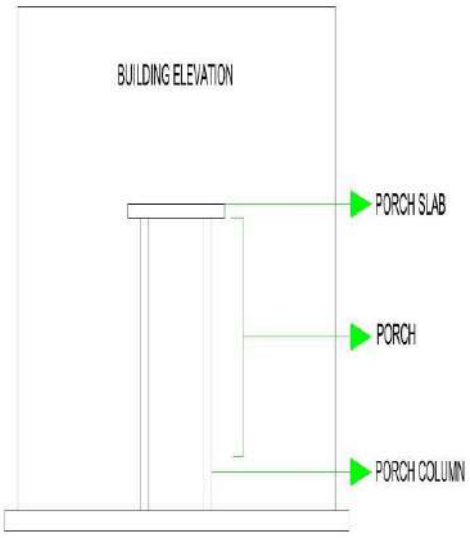

Fig.4 Building Elevation

Figure shows the elevation of building with the porch which is provided middle of the bulding

III. LITERATURE REVIEW

T. Öztürk, Z. Öztür This paper summarizes the analysis of load carrying systems and its effects on multi-storey RCC buildings during seismic loads. It is so important to determine all possible earthquake loadings and behavior of reinforced concrete Because of it helps to design the structure system and also to resist seismic effects. seismic load effects is also an important factor in all type of normal buildings including skyscrapers.

Wensheng LU, Xilin LU The paper briefs about the tests of some scaled high-rise multi-tower structure models on the trembling table. By considering the effect of flexible transfer floor in a new analytic model is shown. The test result considers the theoretical dynamic behavior comparison. The combination floors between towers at top levels, and the stiffness of foundation role to structural dynamic behavior is also described in this paper. Many suggestions and theoretical guidelines are also accomplished.

P. P. Chandurkar, Dr. P. S. Pajgade The paper state that In the design of building structural walls, shear walls plays an important role as major earthquake resisting members during seismic loadings. These walls provide a great potential for lateral load and offer resistance efficient bracing system. The properties of these seismic shear walls is very important factor in the buildings therefore, it is very significant to calculate the seismic response of the walls suitably. In this paper determination of shear wall location in multi-storey building is observed. It has been considered with the help of 4 different models.

N R Shwetha , Naveen, Pampanna Moolimani, S Naveenkumar, Mahesh Sajjan, C H Veeresh This paperincludes design and estimation with the analysis of multi storey building under seismic load, Dead load and live load. The design of beams, columns and footings is carried out under seismic loads. The software has been adopted is E Tabs because of its new features of data sharing and analysis and design. Completion of the analysis, design and estimation of a multi-storey building is the main aim of the paper. kani's method is being used to verify the results obtained through E tabs software. The fitness of structure is calculated by using the analysis result. E tab software is used for analysis.

Pushkar Rathod, Rahul Chandrashekar The paper states that the Seismic analysis plays an important role in any type of structure. it is very important to consider seismic analysis in high earthquake prone areas. During an earthquake the high lateral movement of earth's crust the structure can be designed with the help of seismic analysis. By using ETABS any type of basic or a highly advanced

structure can be evaluated which maybe under static or dynamic conditions. ETABS is a main tool for analysis and designs, which can design simple 2D frames to modern skyscrapers therefore it is the one of the best software for building structures.

Viktor castlenrist, Stefan svensson This paper summarizes the methodology which is based on idealized calculation models and idealized finite element models, especially focused on the dynamical properties, natural frequencies and accelerations of the building. In recent years it has been seen that in society, there has been vast changes like related to economics, urbanization, and architectural changes has become the greater interest for the construction of high-rise buildings. Up to that time Construction of skyscrapers has been limited in Sweden. The challenges are faced during designing and construction of high-rise buildings.

IV. CONCLUSION

This paper summarizes that it is really important to use analytical methods before construction of multistory buildings in seismic and non seismic areas. By reviewing all the Papers we can easily understand the importance of analytical methods. We can easily calculate the effect of seismic loading by using the software's like staad pro and E-tabs before construction of multistory buildings. Calculation and modeling is the main purpose of the conclusion

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Impacts of sea level rise on an area of significant tidal variation

Vera Raquel Mesquita Costa[1], Janaina Santos Bezerra[2], Maria do Socorro Saraiva Pinheiro[3], Gizele Barbosa Ferreira[4], Luiz Carlos Araujo dos Santos[5], Kathery de Sousa Silva[6], Érima Jôyssielly Mendonça Castro[7], Juliana Lopes Almeida[8], Gilvanele Silva Oliveira da Silva[9], Jhessica Martins Ribeiro[10], Allyson Luis Ramos da Silva[11], Adriano Oliveira de Macedo[12], Ingrid Santos Gonçalves[13], Denilson da Silva Bezerra[14]

[1]Laboratório de Geotecnologias, UniversidadeCeuma, São Luís - MA
Email: veraraquelmc@gmail.com
[2]Departamento de Matemática, Universidade Federal do Maranhão (UFMA), São Luís-MA
Email: janaina.lsantos@hotmail.com.com
[3]Departamento de Oceanografia e Limnologia (DEOLI), Universidade Federal do Maranhão (UFMA), São Luís-MA
Email: spinheiro@elointernet.com.br
[4]Laboratório de Geoprocessamento, UniversidadeEstadual do Maranhão (UEMA), São Luís-MA
Email: gizele.03@gmail.com
[5]Laboratório de Geoprocessamento, UniversidadeEstadual do Maranhão (UEMA), São Luís-MA
Email: luizcarlos.uema@gmail.com
[6]Laboratório de Geotecnologias, UniversidadeCeuma, São Luís - MA
Email: katherysousa@gmail.com
[7]Laboratório de Microbiologia, UniversidadeCeuma, São Luís - MA
Email: erima.castro@hotmail.com
[8]Laboratório de Geotecnologias, UniversidadeCeuma, São Luís - MA
Email: julianaalmeida.engenharia@outlook.com
[9]Laboratório de Geotecnologias, UniversidadeCeuma, São Luís - MA
Email: gilvanele@hotmail.com
[10]Laboratório de Geotecnologias, UniversidadeCeuma, São Luís - MA
Email: jhessik_180@hotmail.com
[11]Laboratório de Geotecnologias, UniversidadeCeuma, São Luís - MA
Email: allyson.80@hotmail.com
[12]Laboratório de Geotecnologias, UniversidadeCeuma, São Luís - MA
Email: adriano_matt@hotmail.com
[13]Laboratório de Geotecnologias, UniversidadeCeuma, São Luís - MA
Email: ingreds_goncalves@hotmail.com
[2]Departamento de Oceanografia e Limnologia (DEOLI), Universidade Federal do Maranhão (UFMA), São Luís-MA
Email: denilson_ca@yahoo.com.br

Abstract*—Brazil is the second country in the total mangrove area with 13,000 km2 and also holds the largest continuous area of mangrove forest in the world that is located in the coast of the legal Amazon area with approximately 7,591.09 km2. The model developed in this paper is computer model to simulate the mangrove pattern of response to sea-level rise (SLR). During the modeling experiment it was possible to observe that the mangrove migrated to areas under little influence of anthropogenic uses and that present propitious conditions for the colonization of the SLR elevation were the ones located further from the anthropogenic uses. In the Brazilian coastal zone, modeling experiments can be used to aid decision-making and the formation of mitigation measures to climate change, through management tools of the soil division, already in use by existing legislation, such as: the cities master plan, coastal zoning and economic ecological zoning.*

***Keywords*—Environmental Modeling, Climate Changes, Rising sea Level.**

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I. INTRODUTION

Brazil is the second country in the total mangrove areawith 13,000 km^2 (Spalding; Kainumaand; Collins, 2010) and also holds the largest continuous area of mangrove forest in the world that is located in the coast of the legal Amazon area with approximately 7,591.09 km^2(Wilson et al., 2013). Therefore, understand the resistance pattern of the mangrove ecosystem to the potential impacts of climate change for conservation/preservation and/or mitigation is a big challenge. Howerver, few studies have been directed to understand and simulate the response patterns of the mangroves to climate change in Brazilian territory.

II. MATERIAL AND METHODS

The Maranhão Island, in the northeast of Brazil was selected as a case study for the exercise of modeling proposed here as it presents mixed characteristics and geographical specificities of different degrees of susceptibility of the mangrove to sea-level rise such as: presence of a vast area of mangrove forest, large amplitude of tides (up to 6 m) and for being heavily influenced by urbanization which causes numerous impacts to the mangrove.

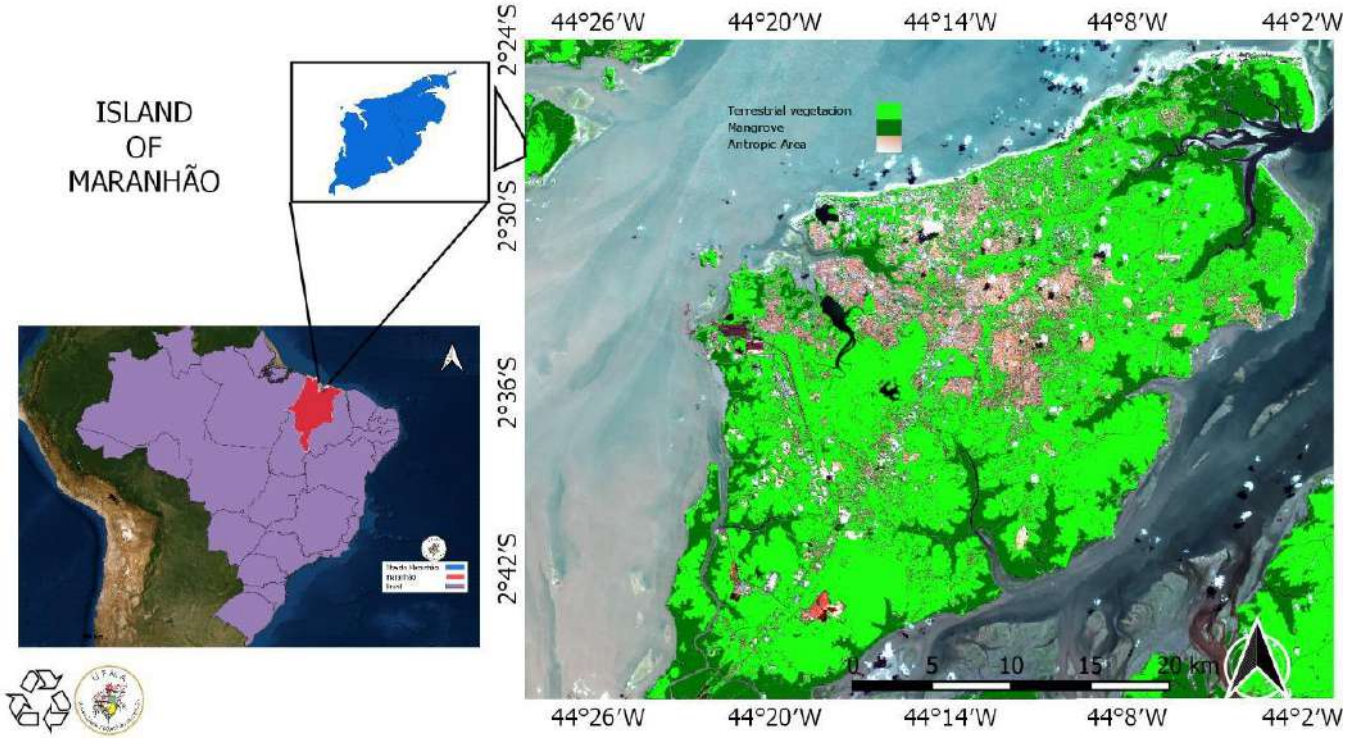

*Fig.1. Study Area: Island of Maranhão (MA), Northeast region of Brazil. Mangrove area presented in the Island of Maranhão. Source: Bezerra et al. (2014).*Modeling Experiment (BR-MANGROVE)

The model developed in this paper was prepared according to the theoretical precepts described by Bezerra et al.(2014), the mentioned author developed a computer model to simulate the mangrove pattern of response to sea-level rise (SLR), and the model is called BR-MANGROVE. The BR-MANGROVE simulated the sea-level rise for the study area in 88 (eighty eight) elevation steps of 0.011 m to 0.97 m, according to an arithmetic progression of reason 0.011 m. The mathematical distribution for the sea's elevation for the period of 2012 to 2100 corresponds to the most alarming scenario of sea global average elevation featured in AR5-IPCC, i.e. 0.97m of global average elevation in mid-2100 (IPCC, 2013).

Based on the conceptual model shows by Bezerra et al. (2014), the computational model was implemented using a toolbox for spatially explicit modeling integrated with geospatial databases called TerraME[1]: a programming environment for spatial dynamical modeling, supporting cellular automata, agent-based models, and network models running in 2 D cellular spaces. Our implementation is based on the cellular automata computational model, a logical system which has the concept of cell as the basic unit: each cell has a neighborhood of cells and a discrete

[1] For more information: http://www.terrame.org/doku.php

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state that may vary during the simulation according to its transition rules.

III. RESULTS OF THE MODELING EXPERIMENT

The initial condition of mangrove area in the island of Maranhão corresponding to the 2012 mapping was approximately 17,387 ha.In the simulation, there were changes in the area of occurrence of the mangrove with SLR variations. Given the geographical and environmental characteristics of the study area, an initial pattern of mangrove resistance to SLR variations, as for total and remaining area was observed for elevation values of 0.01 to 0.13 m, covering the period from 2013 to2024.During this interval, the mangrove area remained approximately constant, with average values of the order of 17,711 ha for the total area, and 16,916 ha of remaining area, which corresponds to 4.49% (795 ha) of increment area, favoring the expansion of mangrove with SLR.From0.14mof SLR, corresponding to the year2025, themangroverespondedwith twelvesubsequent patternsof resistance anddecline for total area and remaining area (Figure 2).

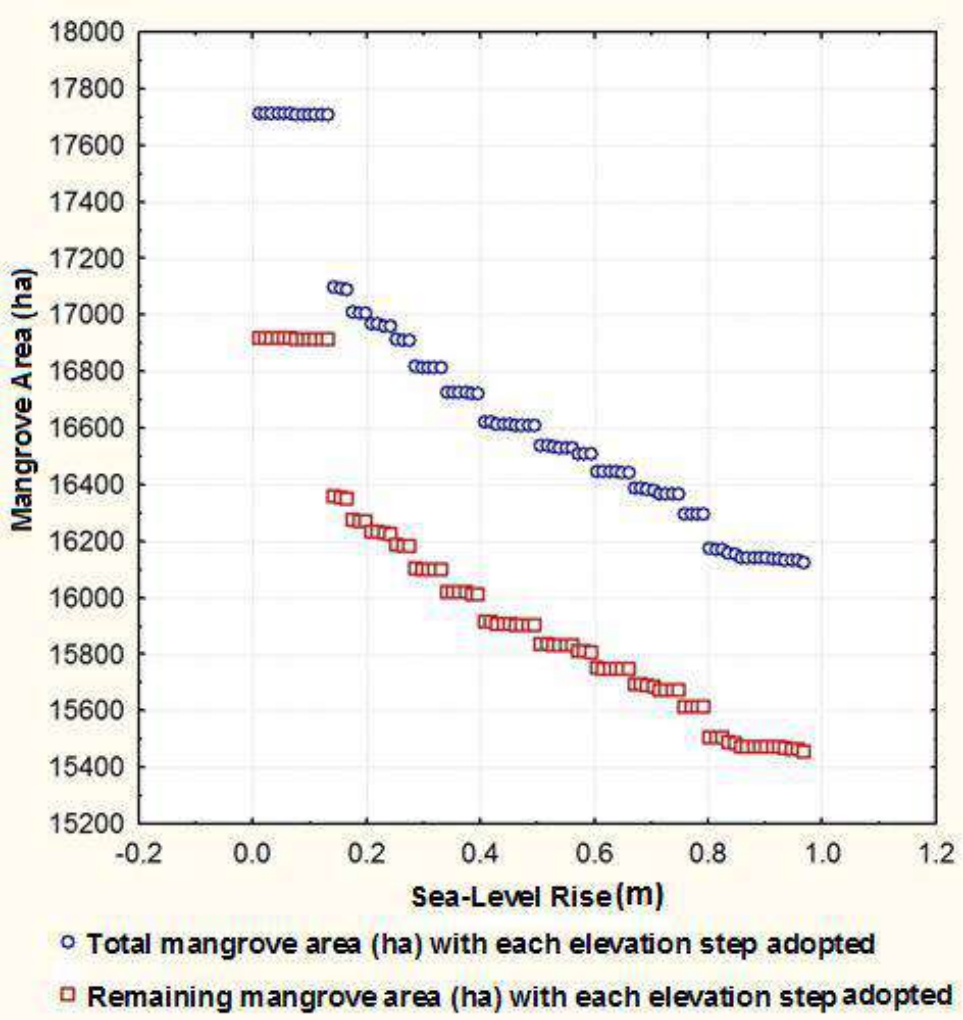

Fig.2. Simulation of the mangrove remaining area at every step of SRAL elevation adopted in this study.

After the SLR elevation interval of 0.01 to 0.13m, the simulated values of the total mangrove area suffered increased percentage losses that ranged from 3.5%, corresponding to 619 ha, for the SLR variation of 0.14 to 0.17m, to 8.84% or 1566 ha,for the SLR variation of 0.80 to 0.97m. There was a reduction of the remaining area of mangrove with a variation of 3.33%, 563 ha, for the SLRvariation of 0.14 to 0.17m, to 8.49% equivalent to 1437ha, for the SLRvariation of 0.80 to 0.97m. As for the mangrove expansion area, resulting from the migration process, a percentage value with a slight decline, varying from 4.49%, in the first resistance pattern,to 4.13% in the final resistance pattern.

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During the modeling experimentit was possible to observe thatthe mangrovemigrated toareas underlittle influenceofanthropogenicuses andthat present propitiousconditions forthe colonization of themangrove.However, inmangrove migrationareasthe topographyis low,from 0.01 to 18.60m,and thus, the migration process of new areas ofmangroveswas overlaidby the continuedsimulation ofSLRadvance, the mangrove areas less susceptible to SLR elevation werethe ones located further from the anthropogenicuses.At the end of the simulation, it was possible analyze that the south and southeast of the Island were the regions less vulnerable to the SLRelevation process adopted in this study, since they have a higher topography with altimetry values that can reach up to approximately 31m.

IV. FINAL CONSIDERATIONS

In Brazil there is a great challenge regarding the understanding of mangrove response pattern to possible sea rise scenarios, since the largest continuous area of mangrove in the world, located on the perimeter of the Brazilian Amazon, lies on the Brazilian coast, and also due to little Brazilian scientific production on anticipation and prevention of rising sea level potential impacts.In the Brazilian coastal zone, modeling experiments can be used to aid decision-making and the formation of mitigation measures to climate change, through management tools of the soil division, already in use by existing legislation, such as:the cities master plan, coastal zoning and economic ecological zoning.

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Two Dimensional Simulation of Deposited Polydisperse Particles

Ni'matur Rohmah[1], Moh. Hasan[2], Alfian Futuhul Hadi[3]

[1,2,3]Department of Mathematics, Faculty of Mathematics and Natural Sciences, Jember University, Indonesia
[1]Email: justniksma20@gmail.com, [2]Email: hasan.fmipa@unej.ac.id

Abstract**—***This research aims tostudydynamic and static conditionsaspect deposition of particles.Simulation applies Granular Dynamics model to describe contact forces simultaneously.The movement of particles forms a trajectory.The trajectory of particles resolved by Gear Predictor-Corrector method. Simulation involved a variation of thestandard deviation value of particle diversity in two dimensional simulation of polydisperse particles. The results of simulation areimages of deposition process for every time iteration until the pile of particles in static condition. Conclusion is the smaller standard deviation value, cause the greater angle of reposeof pile, and otherwise the greaterstandard deviation value, cause the smaller angle of repose of pile. So, the standard deviationsize diversity of particles is inversely proportional height and slope of forming pile structure.*

Keywords**—Deposition, Granular Dynamics, Polydisperse, Standard Deviation**

I. INTRODUCTION

Granular particles are related to daily life, such as sand, stones, grain of rice, beans, sugar, potatoes, and capsules.Granular particles behaviourare unique. They can be like a solid, liquid, and gas. It was involved with external condition [3].Particles dynamics are study of forces and motion that occur of particles. Forces of movement particles are normal force, tangential force, and gravity force.A lot of treatments from particle dynamics is deposition. Particles deposition are dropping grains into free surface, a pile is formed. The pile almost forms a triangular with irregular surface.

Particles deposition has been studied force of collision model with stick and slip phenomenon. It result of multiple transition phenomenon at behaviour particle during deposition process. Multiple transition is from statics to dynamics and dynamics to statics. The simulation use monodisperse particle for simple model [6]. Not only monodisperse particle, but also we can simulated to find out the particle dynamics with different size, it call polydisperse particles. For polydisperse particles has discussed on [1] and [4].On reference [4], It has discussed polydisperse frictional particles packing. The conditional probability distributions of particle overlaps are determined by molecular dynamics simulations. It depends on polydispersity and friction coefficient.

On the other hand, this deposition process involves many particles to be simulated. The particles which are simulated statistically are considered as data, which in this process can be observed the distribution of particles that occur. Discussion of particles within large numbers refers to analysis of particle size distribution. It is used to observe, control, and analize large quantities of industrial materials [3]. For another type of particles namely polydisperse hard sphere,On reference [1], It has discussed the comparison between particle size distribution with gauss distribution and result experiment of Transmision Electron Microcopy (TEM) method. They also did variation on standard deviations to determine of particles scattering.

Based on previous researches, in this paper discuss polydisperse particles deposition with variation on standard deviations values. The purpose of writing is to find out the dynamic and static conditions result of dropping particle by providing variations in standard deviation.

II. RESEARCH METHODS

The first step of simulation was determining collision criteria. Collisions between particles occur when the distance between the two circles is less than the sum of the radius of the two particles. Formulation of collision criteria for polydisperse particles the number of the two radius is formulated with $r_1 + r_2$ because the size of radius particles is different. So, collision criteria for circular particles with heterogeneous diameter sizes formulated by$\varphi_{ij} = d_{ij} - (r_i + r_j)$. It given criteria $\varphi_{ij} < 0$. d_{ij} is distance of center point of two particles, r_i radius of particle i-th and r_j radius of particle j-th. While the criteria of particle collision with media, for polydisperse particles φ_{zi} formulated by $\varphi_{zi} =$

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$z_i - r_i$. It given criteria $\varphi_{zi} < 0. z_i$ is the position of particle in vertical direction.

The second step is simulation with Digital Visual Fortran software and interpretation of results. The number of particles simulated $N = 900$ particles by giving three different colors namely red, yellow, and green for each of the 300 particles. Particles dropped from height $h = 3\ m$, normal and tangential velocity $v_n = v_t = 5x10^{-3}\ ms^{-1}$, it is assumed that all particles have the same mass $\mathrm{m} = 0{,}05\ kg$ althought the diameter is different, elasticity constants in the normal and tangential directions $k_n = k_t = 10^5 kgs^{-2}$, stick velocity $\varepsilon = 10^{-2} ms^{-1}$, time step $\Delta t = 10^{-5} s$, coefficients of dynamics friction $\mu_\mathrm{d} = 0{,}3$, and coefficients of statics friction $\mu_s = 0{,}6$. The value of normal damping constant γ_n has given by Equation 1

$$\gamma_{\mathrm{n-crit}} = 2\sqrt{\mathrm{m.k_n}}\,, \qquad (1)$$

given parameter values as known previously $\gamma_{\mathrm{n-crit}} \approx 140$. Because $\mathrm{k_n} = \mathrm{k_t}$, so

$$\gamma_{\mathrm{t-crit}} = 2\sqrt{\mathrm{m.k_t}} = \gamma_{\mathrm{n-crit}},$$

where $\gamma_{\mathrm{n-crit}}$ critical normal damping constant and $\gamma_{\mathrm{t-crit}}$ is critical tangential damping constant. Normal damping constant has a half value of $\gamma_{\mathrm{n-crit}}$, whereas tangential damping constant has equal with $\gamma_{\mathrm{t-crit}}$. Given $\gamma_\mathrm{n} = 0{,}5$ and $\gamma_{\mathrm{n-crit}}$ equal with coefficient of restitution value (ψ) is 0,3. Described ψ in Equation 2

$$\psi = \exp\left(\frac{-\gamma_\mathrm{n}}{\omega}\left(\pi - 2\arctan\left(\frac{\gamma_\mathrm{n}}{\omega}\right)\right)\right) \qquad (2)$$

with$\omega = (4\mathrm{mk_t} - \gamma_\mathrm{n}^2)^{\frac{1}{2}}$ [5].

The random number of diameter particles has obtained the largest of diameter particles i.e.0.121 m.Collision of two particles cause particles bounce to unexpected direction. So we can set the time collision of two particles to avoid it. For simple program, we use the largest particles for determine safest distance of particles. So, for the smaller particles are follow it. Formulated of mileage free fall particle is

$$s = \frac{1}{2}.g.t^2 + v_0.t \qquad (3)$$

where g is acceleration of gravity ($9{,}81\ m/s^2$), t is time, and v_0 is initial velocityof particles. Ifs equal the largest of diameter particles and if$t = n.\Delta t$with$\Delta t = 10^{-5}$ then based on Equation (3)obtain $n \approx 15.706$.We choose distances between first particle falling in order not to collide with the second particle must fall after 15.800-th iteration. The interpretation of the results dynamically is seen from a collection of images made by the movie with the movie maker software and the final image results in a pile in a static condition.

Random particle diameters are generated using the Linear Congruent Generator (LGC) method, which is a randomly generated random number generation method using the gauss function. Normal distribution has two parameters namely mean μ and standard deviation σ. If we give the same mean but different standard deviations, curve are centered at exactly the same position on the horizontal axis, but the curve with the larger standard deviation is lower and spreads out farther [8]. Particle velocity is defined in the *x*-axis direction, whereas in the *z*-axis direction it is made zero so that all particles are given a velocity that has a direction. Although the diameter particle is random number, but it is assumed that all particle have the same mass. The purpose of that assumption is to focus of heterogeneity particles.

Trajectory particles determinated by using the Predictor-Corrector method which is spesifically using the Gear Predictor-corrector method. As for the steps are prediction, evaluation, and correction stages [7]. Prediction stage is used to predict the initial position value of a particle, velocity, acceleration, third derivative, and fourth derivative of the particle position. Evaluation stage contains steps for calculating each force involved on all particles during the dynamic process, so that they can determine the possibility of particles colliding with each other. The Correction stage is the last step in Gear method. The acceleration of the correction is obtained from the force that has been obtained from the evaluation process divided by the mass of the particle, so that the values of position, velocity, acceleration, third derivative, and fourth derivative of the particle position are better.

The force calculation starts with calculating the possibility of particles colliding with each other. Two colliding particles have their own criteria which have been explained previously. Other particles that are within a range of these particles are called neighbors, while particles that have the possibility to collide are called partners. The core program also defines particles that are more likely to collide, called neighbor list. It is efficient the running program by not needing to do calculations on $n - 1$ other particles. In addition to calculating the probability of collisions between particles, it is also examined the possibility of collisions of particles with the medium in which the particles are dropped.

If particle qualify the collision criteria with a particle i then the particle will be save as a partner of particle i, then the normal force f_n is calculated between the two particles by first calculating the relative velocity, relative acceleration, and the unit vector in the normal direction using Equation (4)

$$f_n = -(k_n\delta_n + \gamma_n v_n), \qquad (4)$$

where δ_n is the relative displacement in the normal direction, v_n is the relative velocity in the normal

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direction, k_n is the normal elastic constant, and γ_n is the normal damping constant. Then the particle displacement and relative velocity in the tangential direction are calculated to get the friction between the two particles using Equation (5)

$$f_t = \begin{cases} -(k_t\delta_t + \gamma_t v_t), & |v_t| \le \varepsilon \text{ (static friction)} \\ -v_t\mu_d|f_n|, & |v_t| > \varepsilon \text{(dynamic friction)} \end{cases} \quad (5)$$

where f_t is tangential force, k_t is the tangential spring constant, $\delta_t = \int_{t_0} v_t(\tau)\,d\tau,$, i.e. the total tangential displacement during time $t - t_0$, v_t and $\hat{v_t}$ is the relative tangential velocity and vector shape, μ_d is the dynamic friction coefficient, γ_t is the tangential damping coefficient, and ε is speed threshold [5].

Tangential and normal force are summed to get the resultant force received by the particle. This process takes place at any time dt until all particles dropped before particle i are examined against the collision criteria for particle i using Equation (6)

$$f = mg + \sum c_i, \quad (6)$$

where f is the contact force between particles, m is the mass of the particle, g is the gravitational force of the earth ($9.81\ ms^{-2}$), and c_i is the contact force on the i-th particle [5]. If particle qualifycollision criteria with the medium, the normal and tangential forces of the particle are calculated like collision with other particles. These forces are addedwith the previous collision forces also. Another force involved on particles deposition is gravity. This force works on each particle andreduce force that leads to tangential direction. And so on until all particles have been dropped and all particles have remained or until they reach a predetermined step limit.

III. RESULT AND DISCUSSION

3.1 Dynamics and final structure of pile

These observations describe the dynamic condition of particles deposition. It was used to produce movie, consisting of a seriesconcecutive figures of the pile configuration. Based on movie, the first particles dropped will hit the medium directly. Then followed by particles that fall afterwards, it will hit particles that have fallen first so that the particles accumulate with each other.

The particles dropped earlier being covered by layers ofdrop later, and piling up. Furthermore, the particles dropped may not replace the earlier particle, but it go down through the edge of the pile directly and avalanches surface of the pile has been passed. After a long time, the pile is formed higher and parts of pile that avalanche are the edges. It is caused by the displacement of particles that fall later the pile is formed to obtain a shorter pile than the particles dropped earlier. So the force that occurs on particle cannot overthrow the pile has formed. Particle movement continues although all particles have been dropped. It caused by simultaneous movement of dropping particles, so that some of the particles are still in the neighbor list internal landslide until each particles at stable position.Result of simulation is stable pile of polydisperse particles deposition given by Fig.1

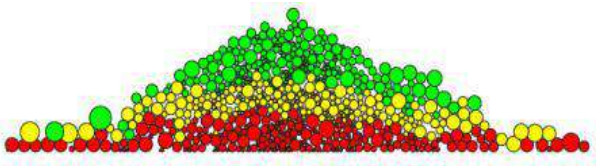

Fig. 1 Stable pile of polydisperse particles deposition

Based on Figure 1, small particles are more dominant in the middle of pile. This results also caused distribution of large-sized particles dominate the outside of pile, whereas the middle of pile is dominated by small-sized particles that push large particles into the outer side. The formed of pile is tends to be sloping, due to smaller sized particles entering between slits the larger sized particles.

The pile can be estimated as isosceles triangle. It has an almost symmetrical triangular shape with an irregular surface. So, angle of repose the pile αcalculated by Equation (7)

$$\alpha = \tan^{-1}\left(\frac{2h}{b}\right), \quad (7)$$

with *h* the height of triangle and *b* is the base of triangle. The height and base of triangle given by Equations below

$$h = 3y_c$$

$$b = \sqrt{\frac{24}{N}\sum_{i=1}^{N}(x_i - x_c)^2}$$

$$y_c = \frac{1}{N}\sum_{i=1}^{N} y_i, \text{ and } x_c = \frac{1}{N}\sum_{i=1}^{N} x_i.$$

$x_i$and y_i are the coordinates of particles centre, x_c and $y_c$are the centre of mass of the pile and the triangle [6]. So, the stable pile of polydisperse particles depositionas Figure 1 was obtained angle of repose 27,45°.

3.2Variation of standard deviation values

Variation of standard deviation is given to find out the dynamic and static conditions result of dropping particles. It presented in Table 1.

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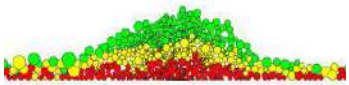
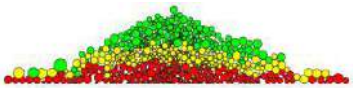
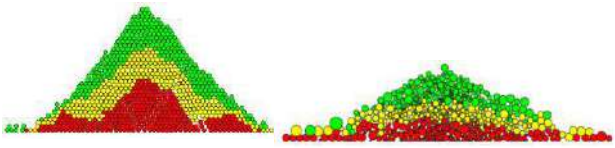
Table 1.Comparison of the results simulation with variation standard deviation values

Standar deviasi σ	Angle of Repose (°)	Image
10^{-3}	39,6	
10^{-2}	37,2	
10^{-1}	27,45	

Based on the Table 1, the smaller standard deviation value, cause the greater angle of repose of pile, and otherwise the greater standard deviation value, cause the smaller angle of repose of pile. So it can be concluded that the standard deviation values of particles diversity is inversely proportional to the angle of repose occurring on the pile.

Associate results between simulation of deposition polydisperse particle and statistical approach with variation of standard deviation values, they have the same behavior. As a proof this statement, it given explanation with Figure3, difference between the stable pile of monodisperse and polydisperse particles deposition.



(a) (b)

Fig. 3 (a) *Stable pile of monodisperse particles deposition, (b) Stable pile of polydisperse particles deposition*

The form of pile resultsdeposition monodisperse particles is higher than result of polydisperse particles. The angleof repose monodisperse particles is 52,85° and for polydisperse particle is 27,45°.

IV. CONCLUSION

The results of deposition polydisperse particle simulation are form of pile lower than monodisperseparticle deposition. The variation of standard deviation values in the program gives the fact that the physical concept of deposition of heterogeneous particles forms a pile that mathematically resembles the concept of a normal distribution curve. The standard deviation of the particle size diversity is inversely proportional to the height and slope of the formed pile structure.

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The formation of National higher education systems of Kazakhstan and Uzbekistan

Usmonov Botir

Tashkent University of Information technologies named after Muhammad al-Khwarizmi, Uzbekistan

Abstract**—** *This paper argues that during the pre-1991period the institutionalized context of the Soviet higher education governance was transformed dramatically, and has attempted to explain the outcomes for higher education from the pre-1991period and proposed the theory of "institutional dis/continuities". The theory employs elements of historical institutionalism in the explanation of higher education governance changes during the Soviet and post-Soviet periods in the countries under review, Kazakhstan, Russia, and Uzbekistan. Historical institutionalism addresses the institutional changes in historical development. The changes are explained by "critical junctures". Therefore, the pre-1991period is seen as a critical juncture in this paper. They may be caused by times of great uncertainty. The changes were dramatic in spite of the short timeframe. This critical juncture period is identifiable subject to a reference to the Soviet period.*

Keywords**— Politics & Development; Higher Education; Higher Education Management; Study of Higher Education; History of Education; International & Comparative Education; Education & Development; Education Policy; Education Politics.**

I. INTRODUCTION

This paper aims to provide an understanding of the nature, causes and consequences of the higher education (HE) governance changes in three post-Soviet countries—Kazakhstan and Uzbekistan. In doing so, the paper addresses the following research question: What are the continuities and differences of the forms of HE policy-making and HE governance in the Soviet and post-Soviet periods?

These two countries thought to be analytically suitable for examining the continuities and differences in HE governance changes since they share much of Soviet legacy in general, while their specific patterns and processes in HE development show a considerable variability that begins from period the *pre-1991*.

This paper argues that during the *pre-1991*period the institutionalized context of the Soviet HE governance was transformed dramatically. Moreover, the new mechanisms of changes would become the causes of greater diversity in the HE system in the USSR as a whole.

There are the country-specific peculiarities of the Central Asian countries under review which distinguish them from other republics of the former USSR. In particular, certain pre-1991-era anticorruption campaigns in the two Central Asian countries led to the leadership changes as "one of the first tasks for Last Soviet leadership was to change the leadership of the republics to ensure that his reformist policies were supported by the republican leadership" (Dadabaev, 2016, p. 189). These events of the "Zheltoksan" in Kazakhstan and "Cotton Affair" in Uzbekistan became the causes of greater divergences in HE governance between Kazakhstan and Uzbekistan but also from other Union-Republics. The specificities of Kazakhstan and Uzbekistan can be distinguished by comparing with the HE governance changes in each other's.

While Kazakhstan endorsed marketisation processes in education either in the *pre-1991*or in the immediate post-Soviet periods, Uzbekistan sustained the centralised Soviet model of education. It could be argued that the patterns and processes in HE governance changes in these countries reflect to a large extent, the political and economic systems that have developed since the *pre-1991*period.

The paper is structured as follows: section 2 provides the theoretical framework. The following section presents a methodological discussion: Section 4 gives a brief overview of the Soviet system of HE governance. Section 5 presents the accounts of the dramatic economic, political and social changes that were undertaken in the USSR in the *pre-1991*period. Section 5 also traces the major transformational processes in Soviet HE during the *pre-1991*period. Section 6 presents empirical accounts of changing HE governance patterns and processes in the *pre-1991*and post-Soviet Kazakhstan and Uzbekistan. Section 7 offers a concluding discussion.

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II. THEORETICAL FRAMEWORK

The theoretical framework of this paper emphasises the central importance of the "institutional dis/continuities" to help trace events. This theory of "institutional dis/continuities" is also useful in explaining the HE governance changes during the Soviet and post-Soviet periods in the countries under review. It draws on the concepts of path-dependency and critical juncture from within historical institutionalism theory.

The theory of historical institutionalism is helpful in explaining the uniqueness of the outcomes of national policies. Institutions are regarded "as the formal or informal procedures, routines, norms and conventions embedded in the organizational structure of the polity or political economy" (Hall& Taylor, 1996, p. 6).

The notion of path-dependency is the central concept of historical institutionalism. Crucially for my argument, path-dependency "rejects the traditional postulate that the same operative forces will generate the same results everywhere in favour of the view that the effect of such forces will be mediated by the contextual features of a given situation often inherited from the past" (Hall & Taylor, 1996,p. 9). To put it simply, path-dependency refers to the way in which a current set of decisions is bounded by the decisions that were made in the past. This implies, that "simple transplantation of any kind of organization, structure, curricula, etc., of course would not provide lasting and successful results" (Anweiler, 1992, p. 38). Rather, for instance, "educational reforms borrowed from the 'West' have often mutated as they clashed with socialist legacies during the implementation stage" (Silova, 2009, p. 315) resulting greater differences between post-socialist countries. Range of responses based on national differences, but the argument is that they were fundamentally shaped by the *pre-1991*creating local responses to this period of a common socio-economic and political upheaval.

If path-dependency has been used primarily to analyse the stability and persistence of institutions over time, the notion of critical juncture within the path-dependency concept has been used to analyse institutional changes. Thus, periods of continuity are interrupted by "critical junctures", that is, periods of significant change from where historical development moves onto a new trajectory, and can generate "a situation that is qualitatively different from the 'normal' historical development of the institutional setting of interest" (Capoccia&Kelemen, 2007, p. 348).

The main argument of this paper is that in the case we are examining, the *pre-1991*period though relatively brief, was the critical juncture at which the Soviet society moved onto a qualitatively different path of its historical development, and triggered dramatic socio-economic, political and educational changes. This represented a radical new trajectory when "the Soviet leadership [moved] first slowly and lately with rapidity from the organising principles of state socialism to those of western capitalist states" (Lane, 1991, p. 96). These junctures are defined as critical because in Pierson's words, "they place institutional arrangements on paths or trajectories, which are then very difficult to alter" (Pierson, 2004, p. 135).

This brings us to the question of how to define the starting point of analysis. In general, previously exogenous causal factors have been seen to be responsible for branching points or critical junctures.

However, Collier and Collier (1991, p. 266) developed a framework for analysing changes and determined critical junctures as the branching points when "new conditions disrupt or overwhelm the specific mechanisms that previously reproduced the existing path". There are two useful perspectives from which critical junctures are analysed, some drawing on the notions of "uncertainty" and "contingency" (Capoccia, 2015; Capoccia & Kelemen, 2007), and others focusing on "antecedent conditions" and "divergence" (Acemoglu & Robinson, 2012; Slater & Simmons, 2010).

In relation to the first perspective, by employing the concepts of uncertainty and contingency, Capoccia and Kelemen (2007), and Capoccia (2015) seek to conceptualise critical junctures, defining them as periods of social and political fluidity. They argue that the moments of uncertainty correspond to the adoption of political choices and decisions of key actors during critical junctures as an initial institutional setting on certain path. These choices then persist for a long period of time constraining ensuing choices (Capoccia & Kelemen, 2007). Therefore, Capoccia (2015) claims that linking is changes to the decisions of policy-makers enables the capture of the policy dynamics when certain institutional selection over others took place in this short period of political flux. Thus, critical junctures are considered as the starting point for further path-dependent processes, which means that the decisions which were made at these points have an enduring influence on the further development of events (Capoccia, 2015; Capoccia & Kelemen, 2007).

This paper employs the concepts of uncertainty and contingency in order to identify the starting point of the critical juncture. These concepts are useful in capturing and analysing the major institutional changes in this short period of political flux of the *pre-1991*period. Those changes were linked to the policy choices of key policy-makers, Gorbachev—the leader of the Communist Party of

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the USSR and his close allies, followed by huge uncertainties and the contingencies of events. This is particularly relevant in the case of the Soviet Union due to its hierarchical one party system.

In relation to the second perspective; this group of researchers of critical junctures considers the antecedent conditions and divergence as analytically more useful. They claim that the main defining characteristic of critical juncture is divergence of outcomes across cases (Acemoglu& Robinson,2012; Slater & Simmons, 2010). In particular, Slater and Simmons (2010) assert that some antecedent conditions play a causal role in the outcome of interest. Moreover, they use the term critical antecedentin order to distinguish it from other types of antecedent conditions, such as background similarities and the descriptive context. They conceptualise the critical antecedents as the causal factors or conditions that come before a critical juncture which "can sequentially combine with causal factors *during* a critical juncture to produce divergent long-term outcomes" (Slater & Simmons,2010, p. 889, *emphasis in the original*). Therefore, it is important to carefully examine whether the preceding variations made the cases diverge significantly following the critical juncture, thus putting them on differing trajectories (Slater & Simmons, 2010). This suggests that it is necessary to take into account the fact that the differences may have been in place across the cases before they diverged.

Overall, the paper argues that the concepts of antecedent conditions and divergence can explain the post-socialist diversities in education from the very outset of the collapse of the USSR. In the case of this paper, the critical antecedents are the different nationalities, religions, and cultures of the Union-Republics, and the causal factors of *pre-1991*are the emergent new political and economic factors. This study claims that a combination of these causal factors played a decisive role in bringing about the diversity of institutional trajectories in education, including HE governance, in post-socialist countries.

Thus, the *pre-1991*period is seen as both a cause of, and the starting point of, the long-term diversity in education of post-socialist countries, which consequently requires a thorough examination of the differences which emerged in the *pre-1991*period across the Union-Republics in the period before they diverged, that is, before the break-up of the USSR.

III. METHODOLOGY

This paper traces the changing processes and patterns of HE governance in the countries under review.

Process tracing is defined as a method for "unpacking causality, that aims at studying what happens between *X* and *Y* and beyond" (Trampusch&Palier, 2016, p. 2). More precisely, Byrne (2012,p. 21) asserts that "by a combination of process tracing and systematic comparison, by a historical and narrative driven approach to investigating cause, [we can] establish causal patterns". In process tracing, it is not the quantity of evidence that is the most valuable, but the link between the evidenceand the research question(s). For process tracing, context is important because the outcome of underlying mechanisms "depends on the temporal and spatial conditions or even on contingency, which is produced by uncertainty" (Trampusch & Palier, 2016, p. 11). Crucially, process tracing requires a good familiarity with the history of the outcome of interest. However, the main difference between process tracing and historical explanation is that process tracers produce an analytical explanation which requires making the relevant theoretical frameworks explicit (Bennett & Checkel, 2015; George &Bennett, 2005; Mahoney, 2015; Trampusch & Palier, 2016). In other words, this research method hasto be guided by theory in order "either to know in advances where to look for causal mechanisms or to know what causal mechanisms to test empirically" (Trampusch & Palier, 2016, p. 6). Thus, a systematicprocess analysis as process tracing is the most promising method for producing an understanding of causation, and also for assessing the capacity of theories to explain outcomes (Hall, 2003).

Thus, in this paper the processes of change are traced in a theoretically informed way. Hence, process tracing is the key method "for capturing causal mechanisms in action" (Bennett &Checkel,2015, p. 9). Checkel (2005, p. 15) argues that in this step-wise approach the researcher is forced toreflect on "the connection (or lack thereof) between theoretically expected patterns and what thedata say". Moreover, process tracing permits the researcher to bring closer theory and data meaning, creating a continuous interplay between theory and the actual things that are going on inreality (Checkel, 2005).

The main objective of this paper is to employ theory to trace the nature and consequences of the changing processes and patterns of HE governance in countries under review during the Soviet and post-Soviet periods. Data used for process tracing can be gathered from various sources. In this paper,I draw on official governmental documents, such as reports, laws, decrees as well as speeches, and memoirs of the officials. In addition, I also collected data from secondary sources, such as books, volumes, journal and newspaper articles, online publications, and conference papers can also be examined.

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IV. COMMON LEGACY: SOVIET SYSTEM OF HI

The Communist Party was involved in all aspects of Soviet life, unlike the individual Ministries, which had responsibility for the administration of specific branches of the economy. The role of the Communist Party was clearly defined for the first time in the 1936 USSR Constitution. According to Article 126, the Communist Party was the "vanguard of the working people in their struggle to strengthen and develop the socialist system and is the leading core of all organizations of the working people, both public and state" (USSR Constitution, 1936). Under the 1977 (Brezhnev) Constitution, the Communist Party's role was strengthened and it became the "leading and guiding force" of Soviet society (USSR Constitution, 1977).

From 1928, the Soviet economy was guided by five-year plans, which reflected the centralized nature of decision-making in the USSR. The first five-year plan aimed at achieving rapid industrialization of the economy. Therefore, a large number of new engineers were required. Stalin thus demanded not only an increase in the number of working class students but also the acceleration "of creating a new technical intelligentsia capable of serving our socialist industry" (Stalin, 1928).

Moreover, following Stalin's criticism of the HE system in April 1928, a number of reorganisations in HE administration were undertaken between 1929 and 1930. University schools were separated andput under the supervision of various organisations; for instance, economic schools were placed under the management of Gosplan and Commissariat of Finance, while law and medical schools werenow to be overseen by the Commissariats of Justice and Health. These organisations were authorized to recruit for new positions in accordance with their needs, which had a direct influence on thetypes of expertise that flourished. Moreover, this new administration model pushed HEIs (Higher Education Institutions) into narrow specialisations. Industries were to become financially responsible for HEIs. These changes were deemed "the most expedient way of ensuring the required speed"(Stalin, 1928) in the rapid industrialisation of the economy. Overall, the educational programs in higher technical institutions were transformed. From 1930, students were to enroll in their respective specialism and to obtain a specialist on their graduation. A model curriculum for each specialism was introduced, and in order to qualify as a specialist, the set curriculum needed to be followed. The philosophy behind this policy was that a person should perform a specific task in order to be useful to society.

As a result, HE became an indissoluble part of the overall economic complex of the Soviet Union. In discussing the underlying rationale of this stage in the reorganisation of HE administration, it bears mentioning that the industrial sector, or branch, approach to cadretraining led to a shift of emphasis towards the production of so-called prepared specialists,i.e. persons whose knowledge and skills were shaped according to a pre-established recipe, as a set of ready-made solutions permitting the application of knowledge within set parameter of industrial activity. (Eliutin, 1984, p. 22)Major changes in the political and economic agenda affected the educational area, in particular the HE system. The 20th Congress of the Communist Party in February 1956 opened a campaign for closer ties between HE and production. The study-work combination claimed to have significant effects both on education and production. This was considered to be part of a holistic transformation, where the ultimate objective of the process was the elimination of the differences between mental and physical labour (Eliutin, 1959).

Following the decision of the Communist Party's 20th Congress on closer ties between HE and production, HEIs were moved from the central cities to locations in more industrial regions. This meant that HEIs became closer to the immediate work places of those future specialists. Moreover, in accordance with the territorial administration policy, most HEIs were governed by the authorities of the individual Union-Republics and economic regions. For instance, all 25 HEIs of the Kazakh SSR were subordinated to the Republic's administration (De Witt, 1961). The stated purpose of this policy was to bring HEIs closer "to the areas of productive forces and the partial unloading of the old university centres" (Eliutin, 1967, p. 128). Khrushchov proposed to "proletarianise" non-working class origin students by requiring them to undertake a period of full-time employment. Only then werethey to be permitted entrance into HE (Khrushchov, 1958).

However, after Khrushchev's dismissal from office by the Politburo in 1964, his reforms were gradually reversed. In the HE system, the reforms focusing on the connection of HE and production, and on the expansion of HE relations with practice were subsequently abolished. As a result, HE administration became over-centralised.

The Union-Republic Ministry of HSSE (Higher Secondary Specialised Education) retained the general organisational and methodological supervision over all HEIs in the USSR through the 15Ministries of HSSE of the Union-Republics. In fact, Republican ministries became the branch offices of the Union-Republic Ministry.

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A number of HEIs in the Union-Republics were subordinated directly to the Union-Republic Ministry of HSSE in accordance with the decree of the Central Committee of the Communist Party and the Council of Ministers of the USSR (Statute of the Ministry of HSSE of theUSSR, 1968).

Overall, from 1970 onwards, the influence of the Communist Party was strengthened in every aspectof HE, including operational management of research and teaching via integrating primary party organisations as a result of the reorganization of the purpose and processes of HE. Political reliability became the main factor in the selection and placement of teaching staff.

Thus, one-party Soviet system was structured vertically with socio-economic development plansof the state, which included provisions also for the HE system. However, the outcomes of the Communist Party policies largely depended on historical legacies of the Union-Republics. For instance, the share of native women in Central Asian HEIs was insignificant which was seen as an influence of local customs of Central Asia (De Witt, 1961). On the other hand, in Uzbekistan, the overall proportion students in HEIs from the titular nationality was below the share of that nationality in thetotal population in comparison with Russian origin students which was significantly greater than that of Russians among the total population (Bilinsky, 1968). Obviously, a uniform Russian language instruction in most of Soviet HEIs hampered HE access for native nationalities, for example, "Kazakhsecondary school graduates complained that they had difficulty in getting admitted to institutions in higher learning in Kazakhstan because they were required to pass an entrance examination in Russian language and literature" (Bilinsky, 1968, p. 429). Above all, a free HE system in the SovietUnion also created improper practices in the selection process of students, such as when their parents and relatives had an influence in gaining access to HE for them. This structure mainly reflects a very rich horizontal differentiation. It would be wrong to say that the vertical differentiation simply put comprehensive universities on the top of the hierarchy. The vertical differentiation had a number of dimensions.

The most obvious was that of administrative vertical differentiation. Part of the higher education institutions were subordinated to the All-Union Ministry of Higher Education or sectoral all-union ministries. The status (and often the funding) of these institutions was higher than under the republics' ministries. In various periods there were about 25–35 HEIs under the All-Union Ministry of Higher Education (Zinov'ev and Filippov 1983). Specialized HEIs were distributed between All-union and republican sectoral ministries. Their superiority was supported by special functions related to other universities. Usually these "central" universities performed quality assurance for similar universities; they provided in-service training and concentrated doctoral programs not just for their own graduates but for those who had completed a "specialist" program at another university. Graduates of these programs were often sent back to their "alma maters" to become professors. This system was well structured: second-tier HEIs had quotas for sending their future professors for doctoral training.

Thus, it could be argued that even in the case of the uniform Soviet HE governance differences inperformance and implementation existed before the *pre-1991*period shaped by different contextswithin which these higher educational institutions operated.

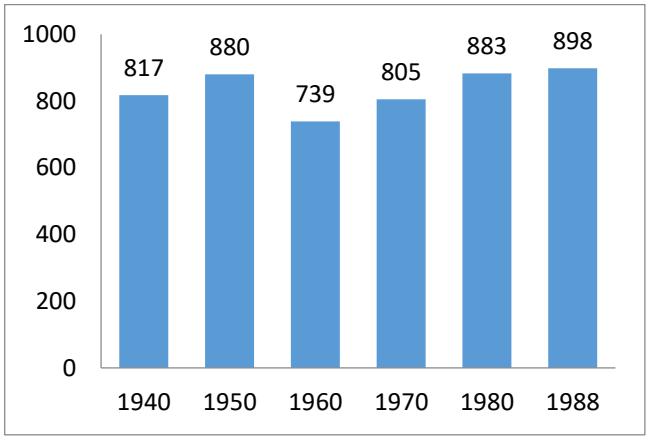

Fig.1 Number of HEIs in the USSR. Source: Statistic Yearbook, 1989. Moscow: Finansy i statistika

V. *Pre-1991*in the USSR

At the Plenum of the Central Committee of the Communist Party held in April of 1985, the Partyleader, Last Soviet leadership, initiated "significant new departures in Soviet domestic and foreign policies"(Lapidus, 1988, p. 1). This period lasted for almost 7 years, and is known as *pre-1991 or perestroyka*, which means"restructuring". However, restructuring began without a premeditated plan; Gorbachev "did not conceiveof his reform programme all at once. Certainly its enunciation only unfolded step by step, probablyin response to events and problems as they emerged" (Daniels, 1990, p. 237).

From 1985–1987, the course was presented in the materials of the April Plenum of the Central Committee in 1985 and in the 27th Congress of the Communist Party in February 1986. Initially," restructuring" meant mainly two things: *uskorenie*, acceleration of socio-economic development of the country and *glasnost*, which means openness of decision-making and access to information.

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The acceleration was understood as a means to increase the rate of economic growth, which was steadily decreasing. According to Lane (1992, p. 9), "the average increase in GNP was 8.9% for 1966–1970;6.3% for 1971–1975; 4.7% for 1976–1980; and 4.0% for 1981–1983". The mechanism of economic growth was based on three Union laws: the Law on Individual Labour Activity, passed on 19November 1986; the Law on State Enterprises, adopted in June 1987; and the Law on Co-operatives, which came into force on 1 July 1988.

Significant political reforms followed the 19th Conference of the Communist Party in June 1988,when Gorbachev proposed a new supreme authority, the Soviet of People's Deputies. This change signified a transition towards a multiparty system. Consequently, the position of the Communist Party as the leading and guiding force in society was removed from Article 6 of the USSR Constitution.

By the end of 1990, all the Union-Republics had adopted the Declaration of sovereignty. This impliedthat the status of national laws was higher than the status of laws imposed by Moscow, which inpractice meant that Union-Republics refused "to honour Soviet laws unless they were endorsed byrepublican legislatures" (Strayer, 1998, p. 151).

Overall, the *pre-1991*reforms had not yielded the intended results. Rather, "in the grandest ofironies, those very reforms seemed to deal the Soviet system a fatal blow" (Strayer, 1998, p. 86).

The educational system was not excluded from the *pre-1991*reforms. Indeed, it faced all the contradictions generated by such volatile policy-making and socio-economic conditions. In addition,"the proportion of the state budget allocated to HE declined from 1.47% in 1965 to 0.97% in 1986"(Lane, 1992, p. 299) in the USSR.

The task of restructuring higher and secondary special education was set at the 27th Congress ofthe USSR Communist Party, held on 25 February 1986. This reorganisation of HE was seen as "one ofthe imperative tasks aimed at speeding up the country's socio-economic development" (Prokhorov,1987, p. 16). The key mechanism of the main transformations of the HE system was the "Basic Directions for the Restructuring of Higher and Specialised Secondary Education in the Country". The most important direction and the main lever of HE restructuring was considered to be a close integration between HE, science and production by means of a transition to the new principles of their relationship—a direct contractual relationship (Lane, 1992; Savelyev, Zuev, & Galagan, 1990). This means that "a sort of market relationship will develop between *vuzy*[higher educational institutions],enterprises and research institutes" (Avis, 1990, p. 7). This implied that higher educational institutions had to be able "to 'sell' their research to industry, which means that in applied fields,institutes will increasingly have to find their own sources of funding or be dissolved" (Lane, 1992, p.301). However, the Soviet enterprises were themselves struggling "to cope with a new world of economicself-financing/cost accounting, [and] diverting funds to educational purposes often seems aluxury" (Balzer, 1992, p. 170). A contract form of relationship was established between the state and HEIs, which was regulated by the State Educational Order, with the aim of centralising the education of specialists. The State Order allocation of resources was to be made centrally and on priority basis (Savelyev, Zuev, & Galagan, 1990).

The next phase of *pre-1991*led to the emergence of new political and economic factors that hadto be taken into account in order to reform higher educational institutions. The basic principles of new educational policy were formulated at the All-Union Congress of Educators, which was held inlate 1988. The main prospects for reforming the educational system became: democratisation of the system; decentralisation of administration; and the empowerment and greater independence ofeducational institutions through the establishment of state-public administration in the educational system (All-Union Congress of Educators 1990). Furthermore, the structure of the educational system underwent fundamental changes at the All-Union level in 1988. The State Committee for Public Education was created to replace three educational authorities, namely the USSR Ministry of Education, the USSR Ministry of Higher and Secondary Specialised Education, and the USSR State Committee for Vocational-Technical Education.

Given resource shortages and political reforms, the reform initiative and authority over the educational system were increasingly delegated to the Union-Republics and regions of the USSR. The HE restructuring programs of 1986–1987 and 1988 were the last centrally directed reform initiatives (Balzer, 1991). Overall, the 4th World Congress on Soviet and East European Studies held in July 1990recognised that "1990 marked the end of the time when one could write anything serious about Sovieteducation as a whole. Future efforts will need to adopt a more localist approach" (Kerr, 1990, p. 29).

The All-Union sociological survey "Higher Education: The Conception and Practice of *Pre-1991*"which was conducted in November–December 1990, showed a widespread belief among academics, officials, and researchers of higher educational institutions that the

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market was capable of solvingall the problems of HE (Higher Education. The Conception & Practice of Perestroyka, 1991). Thus, for instance, the majority of participants saw a significant source of funding from the introduction of tuition fees. Furthermore, 71% of the supporters of a HE market and 20% of its opponents advocated converting higher educational institutions "to full cost accounting and even profitability" (HigherE ducation. The Conception & Practice of Pre-1991, 1991, p. 37).

V. INSTITUTIONAL DIS/CONTINUITIES OF THE PRE-1991 IN HE GOVERNANCE IN KAZAKHSTAN AND UZBEKISTAN

The previous section demonstrated that during the *pre-1991*period the institutionalized context of the Soviet HE governance was transformed dramatically. Moreover, the new mechanisms of changes would become the causes of greater diversity in the HE system in the USSR as a whole. Thus,the main focus of this section is to examine the empirical accounts of the changing nature of governance during the *pre-1991*and post-Soviet periods in Kazakhstan and Uzbekistan.

6.1. Kazakhstan

During the early years*pre-1991*reforms, in December 1986, a massive protest of mostly young, ethnic Kazakhs, was held in Almaty. The protesterscriticised Gorbachev's decision to replace the leader of Kazakhstan's Communist Party. He was replaced by "an ethnic Russian considered an outsider in Kazakhstanin terms of both his ethnic origin and experience in Kazakhstan" (Kunaev, 1992, p. 269). The demonstration was suppressed and thousands were arrested, and many jailed.

In March 1990, Supreme Soviet elections of the Kazakh SSR were held and 94.4% of those electedwere the Communist Party members. This Supreme Soviet adopted the *Law on Education* and the *Law on HE* in 1992 and 1993, respectively. The policies of liberalisation and structural transformation of the economy, launched in Kazakhstan 1990–1991, were continued in the post-Soviet period.

In June 1992, a "Strategy for the Establishment and Development of Kazakhstan as a Sovereign State" was adopted by President NursultanNazarbayev. Under the strategy, the share of state ownership had to be reduced to 30–40%.

The HE system of Kazakhstan witnessed a number of negative developments in 1990s conditioned "by shortage or simply lack of funding" (Kusherbayev et al., 2001, p. 20). The state was able finance wages, stipends and meals, but not in full, and spending on HE decreased dramatically from 0.3% ofGDP in 1991 to 0.04% in 1992, and constituted at only 0.32% of GDP in 2000 (Kusherbayev et al., 2001).

There were 61 HEIs in the early 1990s in Kazakhstan, with more than 280,000 students(Zhumagulov, 2012). All HEIs were state owned. The number of HEIs has grown dramatically since1993, when the Law on HE permitted the establishment of non-state HEIs. The number of private HEI increased to 123 in 2001 (National Report, 2004). In contrast, the number of state HEIs decreased to 47, which included 28 universities, 13 academies and 6 institutes in 2000–2001 (Zhakenov,2002). The decline in the number of state HEIs can be explained by the optimisation process which was undertaken by the government when pedagogical and technical institutes were converted into universities. Under a government resolution from 16 June 2000, the number of state HEIs was reduced further, when 12 state HEIs were reorganised into joint-stock companies (Zhakenov, 2002).

In terms of student enrolment, the number of students increased from 313,000 in 1998 (WB,2000, p. 144) to 442,400 in 2000 (Zhakenov, 2003), and 477,387 in 2014 (MoES, 2015). While by2002, the total enrolment constituted 514,000 students in all types of HEIs with 331,000 studentsenrolled in state HEIs, and 183,000 students in private HEIs (Zhakenov, 2003).

The large number of students in state HEIs can be explained by the fact that under the new 1999Law on Education the state HEIs were allowed to enroll students on a fee basis. Furthermore, privateHEIs attested by the state became eligible to enroll students under the conditions of the State Educational Order. In 2002–2003, for instance, 169,000 students were admitted to HE; 24,500 of them were covered by the provisions of the State Educational Order, while another 144,500 werefee-paying students (Analytic Memorandum for 1999–2002, 2003). Thus, the contractual relationship between the state and HEIs, the State Educational Order, which was introduced in an acceleration phase of the *pre-1991*period, continued to exist in the post-Soviet Kazakhstan. However, inthe post-Soviet period, the students themselves became the consumers of educational services instead of state enterprises of the *pre-1991*period.

As was mentioned earlier, under the 1999 *Law on Education*, the principle of two-channel financing for state HEIs was established, one from the state budget and another from fee-paying students.

When "the republic's budgetary funds cover expenditure on the wages of professorial and teaching staff and, partially, students' stipends, while funds of the population cover expenditure on wages and communal

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expenses" (Kusherbayev et al., 2001, p. 20). In the same year, in 1999, the extra budget aryearnings of state HEIs constituted 43% of the total amount of funding (Kusherbayev etal., 2001, p. 24), and by 2010, it made up over 85% of total revenues for HEIs (European Commission,2010). The number of students who receive government grants was less than 20% (Tempus, 2010).

In the early 2000s, private HEIs constituted a majority in the HE system. By 2002, for example, intotal 171 HEIs were in existence, which included 34 state, 12 joint-stock companies, 3 international and 122 private institutions (Zhakenov, 2002). Private HEIs became an important source of incomefor the state; for example, in 1999, they "raised about T5 billion in tuition fees, or 35% of the national budget for education" (Asian Development Bank, 2004, p. 36). In other words, the economic-financial difficulties were supposed to be one of the main reasons for adjusting HE "to the conditions of amarket economy" (Asian Development Bank, 2004, p. 35) in order to reduce its financial commitments.

On the other hand, the state, by delegating most part of its mission to private HEIs, aligned withthe WB's recommendation to leave HE gradually to the "private sector to both finance and deliver"(WB, 2000, p. 38). It was considered that "further encouragement of the private sector to provide education services is an attractive policy option without any burden on the public budget" (WB,2000, p. 163).

6.2. Uzbekistan

The "Cotton Affair" referred to earlier, first came to notice during the leadership of the General Secretary Andropov (1982–1984) which extended into the *pre-1991*period. The name changed tothe "Uzbek Scandal", and high party and government officials of Uzbekistan were accused of corruptionand falsifying cotton production figures, which led to a massive dismissals and arrests of high-rankingofficials. Thus, this "renewed campaign against Uzbek culture and the growing cottonscandal created considerable tensions among the republic's elite, many of whom were implicated inthe scandal, or accused of secretly engaging in Islamic or other 'backward' activities" (Hanks, 2005,p. 63) which caused the replacement of the first party secretary in Uzbekistan in 1988. However,these policies and processes led to the growth of reactionary national consciousness since "thecampaign looked like an attempt to single out and scapegoat Uzbekistan for Moscow's mistakes inits economic policies and planning" (Dadabaev, 2016, p. 189). In addition, a strong resistance to the marketisation processes of the *pre-1991*period was noticeable within the high officials ofUzbekistan (Furtado & Chandler, 1992).

In the post-Soviet period, the economic reforms proceeded slowly and gradually (Ruziev&Rustamov, 2016) in contrast to the rapid restructuration of economy in Kazakhstan and Russia. Privatisation of small-scale enterprises in the agricultural and financial sectors were allowed whereas strategically important enterprises and HE sector remained under state control (Ruziev&Rustamov, 2016). Spending on education declined from 9% of GDP in 1990 to 7% of GDP in 1995(Weidman & Yoder, 2010). The system of HE was regulated by the Ministry of Higher and Secondary Specialised Education, which was formed in January 7, 1990. The Ministry "sets strict rules for the recognition of new developed curricula according to the state educational standards" (HE in Uzbekistan, n.d., p. 2).

Since independence, the macroeconomic stabilisation and economic growth achieved in the mid-1990s, constituting GDP growth by 1.6 and 5.2% in 1996 and 1997, respectively (Asian Development Bank, 2004). 1999, was also "characterized by macroeconomic stability with steady growth of GDP(4.4%), a small budget deficit (1.8%), controlled inflation (1.9% monthly, 22.8% annually), and a foreign trade surplus ($125.1 million)" (Asian Development Bank, 2004, p. 93). Moreover, from themid-2000s, the economy of Uzbekistan has shown and annual growth of around 8% (Ruziev&Rustamov, 2016).

Privatisation of small-scale enterprises in the agricultural and financial sectors were allowed whereas strategically important enterprises and HE sector remain under state control (Asian Development Bank, 2004). The Law on Education was adopted in 1992; however, major educational reforms were launched in the second half of the 1990s. The number of HEIs increased steadily from46 in 1990 (HE in 1990 1991) to 58 by 1995–1996 (Ruziev & Rustamov, 2016).

The system of HE is regulated by the Ministry of Higher and Secondary Specialised Education(MHSSE), which "sets strict rules for the recognition of new developed curricula according to thestate educational standards" (HE in Uzbekistan, n.d., p. 2). Student enrolment in HEIs in 2008–2009totalled "297,900 students 271,800 full-time and 26,100 enrolled in correspondence courses"(UNDP, 2009, p. 2). The state expenditure in HE represented a decline from 1% in 1990 to 0.6% in2005 in GDP terms (UNDP, 2009, p. 6).

"The National Programme for Personnel Training" (NPPT) became the law in 1997. The reformprogramme of the education system included three-stage reform plan (Majidov, Ghosh, &Ruziev,2010) with a main focus on the

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expansion of vocational education. In accordance with the NPPT HEis based "on the secondary specialised education (academic lyceum), vocational specialised education(professional college) and includes 2 levels: a Bachelor's degree level and Master's degree level"(HE in Uzbekistan, n.d., p. 2).

In 2015, there were "78 HEIs, comprising 11 comprehensive universities, 10 specialised universities,35 institutes, 2 academies, 13 regional branches of HEIs, and 7 branches of foreign universities"(Ruziev&Burkhanov, 2016, p. 15) being almost all of HEIs are state-owned with an exemption of foreign HEIs' branches. An enrolment in full-time study increased from around 180,000 to around250,000 in 1989 and 2015, respectively. Moreover, evening and part-time study programmes were abolished, and HE study is only on a full-time basis (Ruziev&Burkhanov, 2016, p. 12).

Soon after the independence, several private HEIs briefly emerged. However, in 1993, onlyTashkent Institute for International Economic Relations and Entrepreneurship (TIIERE) obtained anofficial licence, which was cancelled just a few months after (Ruziev&Rustamov, 2016).

VI. CONCLUDING DISCUSSION

This paper has attempted to explain the outcomes for HE from the *pre-1991*period, and proposed the theory of "institutional dis/continuities". The theory employs elements of historical institutionalismin the explanation of HE governance changes during the Soviet and post-Soviet periods in the countries under review, as historical institutionalism can explain the varying outcomes of national policies. From the point of view of historical institutionalism, it can be said that path-dependencies can indeed have a significant impact on subsequent reform processes. The path-dependency concept is useful in explaining the continuities in historical development, when the patterns of past decisions are reiterated in current decision-making processes.

Historical institutionalism addresses also the institutional changes in historical development. The changes are explained by "critical junctures". Therefore, the *pre-1991*period is seen as a critical juncture in this paper. They may be caused by times of great uncertainty. The changes were dramatic in spite of the short timeframe. This critical juncture period is identifiable subject to a reference to the Soviet period.

In particular, the speed and scale, as well as the character of the *pre-1991*period allows us to claim that this period represents a "critical juncture", a period of significant socio-economic and political upheaval. In other words, in this short period of time, the historical development of the Soviet Union moved onto a totally different path by destroying the foundations of the old socioeconomic and political structures.

The quick abandonment of the key institutional elements of the old system, namely, the political power of one party system—the Communist Party, and the centralised economy, created much confusion and uncertainty in the USSR as a whole. In the words of Collier and Collier (1991), these new conditions disrupted the previous reproduction mechanisms that is, prior path-dependencies, by creating the branching point—a critical juncture in historical development.

The concepts of uncertainty and contingency of the critical juncture approach are particularly relevant at this point of my analysis. In this short period of socio-political flux, the political decisions and choices of key policy-makers put in place a new initial institutional setting which were followed by huge uncertainties and contingencies of events. The systematic comparison of the Soviet and*pre-1991*periods has shown the clear differences in the institutional context. Therefore, the period of *pre-1991*is considered as a critical juncture and the starting point for further path-dependent processes.

Following Capoccia's (2015) suggestion that it is possible to see the dynamics of change by linking them to the decisions of key actors, it can be argued that the decisions of Gorbachev and his close allies were crucial in the processes of transformation in the USSR. Their significance becomes particularly apparent when one considers the hierarchical nature of the one-party system that was in place in the Soviet Union. Under such a system, the voice of the Party's leader would in fact have been a decisive factor in any decision-making process.

The *pre-1991*period had also a very strong influence on the development of Soviet HE, in part because of the inherited tight relationship with the Soviet economy. Consequently, the economic reforms of *pre-1991*dramatically changed the relationships of HE with the economy, establishing market-like relations between them. Moreover, the HEIs, in accordance with the Law on State Enterprises, became independent legal entities. The main principles of the relationship between higher educational institutions, research institutions and enterprises were changed completely. The new relations were to be based on direct contracts between them, which meant the establishment of market-like relations.

The emergence of new political and economic factors were taken into account in subsequent reforms of the HE system. The All-Union Congress of Educators formulated new directions of the HE system, which included a focus on democratization, decentralization, and increasing the

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independence of higher educational institutions. Consequently, as a result of much greater involvement of republic and local authorities, the governance of the former Soviet education system became farmore distributed and complex. Moreover, the structural changes in central administration and planning organs considerably decreased the role of the centre over HE. This was a start of greater diversity in the educational systems of Union-Republics. Under these circumstances, the centreplayed a rather formal role, while the different nationalities and ethnicities across the USSR began toestablish their own distinctive education systems. In general, all these changes created huge uncertainties and a great deal of fluidity in the education system.

Turning back to the divergence analytical concept of the critical juncture approach, it can be arguedthat the use of antecedent conditions is useful at this stage. In line with Slater and Simmons's(2010) argument, antecedent conditions in the form of different nationalities, religions and cultures of the Union-Republics, can be classified as *critical* antecedents, as they played a causal role in forms taken by the great diversification of the Soviet HE system. In other words, they created the greaterdivergence in the educational development in the Union-Republics, and regions of the USSR.

Moreover, according to Slater and Simmons (2010), these critical antecedents in combination withcausal factors of a critical juncture, in the case of this study—the *pre-1991*period, can be the starting point of long-term diversification. Therefore, the concept of divergence can explain the greater differences in education of former Union-Republics from the very outset of the collapse of the USSR.

In these two countries under review, patterns and processes in HE development have shown a considerable divergence that started from the *pre-1991*period. My analysis suggests that the causal explanation of this trend may be captured in the following developments:

The political and economic systems that have developed since the *pre-1991*period in thesecountries have significantly influenced the processes of HE governance changes. In particular, leadership changes following the events of "Cotton Affair" in Uzbekistan and "Zheltoksan" in Kazakhstan led to the strong national consciousness in these Central Asian countries. However, the outcomes varied considerably; in Uzbekistan, the government officials became resistant to the *pre-1991*reformswhereas the reforms in Kazakhstan continued in line with the general policies of *pre-1991*.

By contrast, in Kazakhstan, it was only after the collapse of the Soviet Union the establishment of private higher educational institutions was permitted, while the Uzbekistani caseon the other hand is considerably different; the HE sector remained under the state control and theprivate HE sector was/is not in existence.

Finally, some of the legislative authorities or the governmental bodies of the individual republics, which were formed during the *pre-1991*period have remained in place following the collapse of the Soviet Union. For instance, in the case of Kazakhstan, the Supreme Soviet which was elected in the *pre-1991*period adopted the first legislation on education and HE in the post-Soviet period, in1992 and 1993, respectively.

Thus, the *pre-1991*period can be seen as a significant critical juncture, and the starting point of the long-term diversity in the education systems of post-socialist countries. This implies that it is necessary to examine in great detail the differences which took place in the *pre-1991*period across the Union-Republics before they diverged, that is before the breakdown of the USSR. This implies that by identifying the *pre-1991*period as a critical juncture, a time when post-Soviet countries turned to a new path, post-socialist educational transformations became even more diverse and unpredictable.

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Contents of Fairs as an Intermediary Resource in Psychotherapy of Children's Group: Experience Report[1]

Ellen Fernanda Klinger*, Fabio Jesus Miranda, Daniela Ponciano Oliveira*, Ana Camila Neiva Wislocki, Débora da Silva Ribeiro

SEPsi, Service School of Psychology, Gurupi University, Guanabara Avenue between 9th and 10th Streets, Gurupi, Tocantins, Brazil. Tel.: +5563 3612-7717

*Corresponding Authors: klingerellen@gmail.com (Ellen Fernanda Klinger), dani.poncianocariri@gmail.com (Daniela Ponciano Oliveira)

Abstract*—Fairy tales populate the children's universe, being understood by psychology and education as an important instrument in the formation of the intellect of the human being, stimulating psychic and emotional development. The contributions of fairy tales in a situation of child group psychotherapy were investigated. Nine children, of both sexes, aged between 6 and 9 years, from the waiting list for psychological care at the UnirG School of Psychology Service participated in the study. The same was carried out on the premises of that school service. For data collection, interviews were conducted with parents and playful interviews with the child, as well as information from observation and free drawings, expressed during the therapy group. There were 12 sessions performed dynamically, using a different tale for each service. With each story, children manifested behavioral and psychic contents related to the tales that most identified themselves, reproducing their fantasies, traumas, and needs in dramatizations and drawings. Among the narrative resources used, those that most demonstrated awakening psychic contents in children were John and the Beans' Foot, Neve White and Ugly Duckling. The identifications with the stories mention the experiences brought by each child and that individual identifications with the stories are clear and direct demonstrating the relevance of the use of short stories as a valuable resource in psychological care.*

Keywords*—*Infant group therapy, Behavior, Psychoanalysis.

I. INTRODUCTION

From antiquity around the world fairy tales have been told to children for entertainment, however, such narrative features bring with them meanings that lead many children beyond fun, to contact fantasy, magic and the world of dreams, which represent reflection upon themselves, the encounter with the self.

Most kids grow up listening to fairy tales. These stories, filled with witches, princesses, and princes, give space, in adulthood, to other stories involving other heroes, who are on television, in newspapers, in various media [1].

In this sense, fiction means not only a form of fun but also a vehicle by which an imaginary model is established that serves to elaborate subjective aspects of being or its social reality, favorite stories end up being sources of inspiration and identification [2]. Through fairy tales children can make a connection of the fantasy world with the real world, thus enabling the understanding of conflicts, the elaboration of the self, the formation of their identity. How the child goes to live all this happens in a natural way, allowing her to find alone the right time to see and recognize the real world and realize that fantasy will not remain there forever [3].

According to several authors [3, 4], fairy tales are a necessary instrument for the formation of the intellect of the human being and, without a doubt, it is one of the ways that most influence psychological, intellectual and spiritual development and growth, having the function of awakening the imagination and broaden the worldview surrounding the individual.

In fairy tales, fantasies, supernatural gifts, mages characters, witches, ogres, princes, princesses, kings, ordinary people and magical objects that are part of the plots are employed. Its characteristic is the existence of good and evil in a simple way, enabling children to better understand the essence of history [5]. In these, they

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express their fears and fears, such as separation, weaning, independence, among many others, is the death of the parents, a recurring theme in the short stories and that awakens the most varied fantasies and childish emotions [6].

[3], believes that fairy tales serve in the clinic to encourage children, young people and adults to overcome overcoming their instinctive nature, strengthening the ego, so that they become increasingly aware of ethical choices in their condition and personal conduct; moreover, in the case of adults, they can help identify their complexes and their compulsions, by "more or less rapid" analogies, as well as archetypal forms, provide clues for understanding the processes that take place in the collective psyche.

With the look focused on the psychological clinic, [7] considers the fairy tale as a possibility of intervention, because this resource assists in the therapist's approach to the child, as well as in the communication between parents and children.

In this sense, group therapy mediated by short stories favors the mental balance of each participant, in which through the group relationship children bring thoughts and emotions of conflict, and may cause experienced difficulties similar to theirs, that is, his fears, anxieties and his fantasies [8, 9].

Working with children in vulnerable situations, [10] observed that at the beginning of the narratives, children were already able to express their feelings through speech and that projections and identifications were also emerging regarding the characters.

The use of fairy tales helps and facilitates the communication of psychotherapist about the psychotherapy process, as well as contributes to the strengthening of bonding, and during the therapeutic process, one can work with the issues brought by the child to form the symbolic elements used by it as means of elaborating its conflicts through narrative. Moreover, the affective bond established by the child with the narrator provides a transformative effect of fantasies [9–11]. When telling a story, it is necessary to give time for the child to think, reflect and feel how the narrated elements relate to their world so that the fairy tale acts on his psyche [3].

Even though we are aware that the tales instruct the imaginary and establish a link with the internal conflicts of the child, this understanding still remains in the field of theories and there is limited material directed to its use in child psychotherapy [9, 10].

In view of the above, this article presents research in which the contributions of fairy tales in a situation of child group psychotherapy were investigated.

II. MATERIALS AND METHODS

This study is inserted in the project Contributions of fairy tales in child group psychotherapy, already approved by the Research Ethics Committee, with CAAE 53007015.4.0000.5518. The sample of this study consisted of 9 children and their parents and or guardians from spontaneous demand from the psychology service of a school clinic. Thus, qualitative research was conducted, using the Multiple Case Study design [12].

This sample occurred for convenience, with no need for a control group because it was a qualitative analysis. The inclusion criterion of children was not to be in individual psychotherapy, being between 6 years and 9 years and 11 months, to be allowed to participate in the study. The sample size goes against that suggested by [6]. For the author, in the work with a group of children and fairy tales, the ideal number of members oscillates between five and ten participants, and a large group could create difficulties in management, dispersion in parallel conversations and agitation.

Initially, those responsible for the child were contacted and the objectives of the research were presented, being consulted about whether to participate, signing a free and informed consent form if they agreed.

After consultation with those responsible, anamnesis interviews were conducted with them, and playful interviews using free play as a resource [13] with the child, as well as the application of the Projective Test House – Tree – Person, HTP [14].

After completing the individual evaluations, the children began care in child group psychotherapy, mediated by fairy tales between April and October 2016, totaling 12 meetings. In the end, new evaluations and returns were performed for both children, finding expectations and understanding of their journey and evolution during the year.

III. RESULTS AND DISCUSSION

Below, a brief synthesis of the nine cases seen in the group (Table 1) is presented. It emphasized that, in order to protect the identity of the participants, following the ethical principles involving secrecy in research with human beings, the initials were used, for children, followed by a numeral, therefore, C1, C2 and so on.

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Table 1 - Synthesis of clinical cases composing the group

SUBJECT	INITIAL EVALUATION
C1	Female child, 6 years old and school. The reason for referral for psychological care was the complaints of the school because the girl is extremely restless, hinders the colleagues during the classes, not obey the requests of teachers and not do the proposed tasks. Suspected abuse at the age of 4 by the son of friends at the age of 12. In the evaluation, it demonstrated characteristics of introversion and inhibition; intelligence combined with a great capacity for spatial abstraction and emotional balance, tendency to be self-directed and reflective in their attitudes. It was found possible desire to remain protected, defending itself from what is external to it and regression. Indications of inner pressure in the home; feelings of inadequacy regarding sexual elements and indications of early sexuality. He reproduced the removal and return of the father during the evaluation.
C2	Male child, 8 years old and school for presenting difficulties in the school context, in which teachers report that he has extreme learning difficulties, recognizes the letters, but can not read yet; who behaves aggressively and hostilely in the classroom, both with the teacher and with colleagues, even committing physical aggression so against them. Aspects such as introversion, low level of physical energy to perform tasks, demonstrated to be under intense outside pressure and with difficulty controlling their impulses, indications of an incomplete development combined with immaturity it was also found that it feels discouraging, presenting a strong need to receive external support. He reproduced school conflicts.
C3	Female child, 7 years and school. Forwarded with the complaint of agitated and impulsive behavior that began with the separation of parents and after the reconciliation of the couple remained. Aspects involving the separation of parents stood out; impulsivity; insecurity; support and conflicts relating to maturing and independence.
C4	Female child, aged 7 years and school. Mother sought care due to her daughter presenting anguish of separation, demonstrating to be extremely attached to the progenitor, with difficulty and fear in separating herself from it. There was a lack of affection of the father figure, insecurity, retracted and some aspects, discontent, especially when it has to change the environment, has a concern about its behaviors, has shown to like gratification when it concerns her; needs support; need to be safe in the face of difficulties.
C5	Female child, 9 years and school. A complaint of memorization problem with difficulty retaining content. Very shy. Difficulties in the relationship with the grandmother who has been living in the same house since she became ill. In evaluation, he presented healthy cognitive aspects and good psychic adjustment, with a tendency to be self-directed and centered on his attitudes. Retracted behavior; much concern about yourself and personal dissatisfaction; evidence of insecurity; the need for support and reluctance to establish contact with the environment, due to extreme retracting and excessive shyness in relations with each other. He also revealed aspects of hesitation; anxiety; fear and tendency to behave more reservedly, rigidly and undecidedly.
C6	Male child, 7 years and school. He was referred by the school for low school performance, difficulty concentrating interaction in the classroom. The insecurity, retracting, immaturity and feelings of inadequacy and discontent accompanied by a certain and concern for the environment were highlighted.
C7	Male child, 7 years old and school. At 1 year and 7 months, his mother left him in the care of his father and sisters. He currently lives with one of his sisters. The family requested care to see if he was mentally healthy because he realized that he suffers from a lack of his mother. He presented elements of fear of death, feelings of inferiority and search for acceptance. Content related to insecurity also emerged; retracting, anxiety, stiffness, and immaturity.
C8	Female child, 6 years old and school. The main complaint occurs because the child was extremely emotionally shaken after the death of her father, who according to her mother, she was very close, and also because she has been presenting serious school problems, the teachers complain that she just wants to play at school time, does not respect borders and does not propose to do the activities. He has been shown to be effective with extroversion characteristics and a lot of energy to perform his actions. He presented a need for support and use of covert behavior to camouflage his conflicts; extreme anxiety and tendency to act impulsively. Traces of aggression.
	Male child, 7 years old, referred by doctor complaining of agitation, impulsive behaviors, irritability and

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C9	difficulties and performing school activities. In the initial evaluation, the activities were requested, although somewhat withdrawn from the situation. Insecurity, adjustment difficulties in the family environment, aggressiveness, impulsivity, and low self-concept emerged.

Source: Prepared by the authors

Of the nine children in this study, six came due to complaints of difficulties in school, especially regarding classroom behaviors, one of which also presented issues involving grief and its unfolding stemming from family life and Schooling. Another frequent complaint was difficulties in the family as relationships and issues involving insecurity and fear of separation of the maternal figure.

In the initial evaluations encompassing anamnesis interview, playful interview, and application of the HTP test, the prominent contents in the cases were the difficulties of separation with the maternal figure, anxiety, feelings of inadequacy, fear, insecurity, and reproduction of conflicts involving family and school relationships. It should be emphasized that some of the questions that stood out in the initial evaluation should be understood as aspects related to child development itself, in which in the age group of children in the study it is characteristic to demonstrate some insecurity and need for parental support. Moreover, it should also be considered that even if rapport was established, a new situation was still configured for the subjects, in which they were faced with an unknown (evaluator psychotherapist) and a different place from which they were accustomed to attending.

After the initial evaluations, the group meetings were initiated, in which the short stories and contents illustrated in table 2 were working. It is considered relevant to emphasize that all meetings were previously planned, however, there was no plastering in its structure, allowing adjustments when necessary, thinking about other strategies (tale 2) for the reach of the group. Similarly, [15] reports moments when it was necessary to understand the need of the group and adapt that meeting, which denotes flexibility essential to working with children.

Another aspect that there was a need for care was in the choice of classic tales, starting and adopting those suggested by [3], but also using two stories alternative to classics such as Yellow Riding Hood and Festival in Heaven. When choosing the tale, the therapist has no way of knowing which is the most significant for the child, since he makes the choice for the feelings aroused by the theme in relation to his experiences. Therefore, when the narrative becomes special, the child requests repetition until he alleviates his anguish [3].

Table 2 – Short stories and stories addressed in the group

SESSION	SUBJECT/TALE	CONTENTS INVOLVED
1	Contract Knowing the group and members	Rapport. Presentation of therapists and members of the group. Established combinations of the operation of the meetings.
2	The three little pigs*	Development (child, adolescent, and adult); Responsibilities; Independence.
3	Little Red Riding Hood*	Loss of Innocence; Child Sexual Curiosity; e Fantasies of seduction by an adult.
4	Yellow Riding Hood	Coping with fears
5	Goldilocks*	Curiosity; Search for a welcoming home/acceptance.
6	The Ugly Duckling*	Child Helplessness; Mother-Baby Bond; Anguish of Separation; Feelings of inadequacy and rejection.
7	John and the Beansan Foot*	Growth; Construction of boy identity; The faces of a father.
8	Snow White*	Identification of the girl by the mother; Importance of maternal envy; Love and hatred of her daughter for her mother.
9	Beauty and the Beast*	Acceptance; See beyond appearances.
10	Feast in Heaven	Repair; Changes and its beauty.
11	Peter Pan*	Growth
12	Closing and favorite stories in the group	Beauty and the Beast; Snow White; John and the Beansan Foot; The Ugly Duckling; Feast in Heaven; Yellow Riding Hood.

Source: own authorship. * Interpretation of Corso & Corso (2006)

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About the methodology in child group psychotherapy using the tale as a mediating resource, [6] presents a method for systematizing the sessions, in which initially the story is told, there is room for design, for the dramatic representation of history and discussion about the tale. The author clarifies that there is not a single way to work.

Similarly, the group's meetings were organized starting with storytelling, followed by the dramatization and drawings of the contents captured by the children. In the first meetings, the book used as a resource to assist the narration of the short stories, however, as mentioned by [3], the richness and contents present presented by the children will be richer only with verbal narration and without the book with Images. This aspect can be verified in these first meetings, in which participants showed anxiety in drawing soon what they saw in the books, bringing reproductions, while others did not express a desire to draw and were inhibited.

Without the book, it was observed that the children expressed their conflicts better, asking to dramatize as a way to externalize what was happening to them, as well as talk more than the tale aroused them and what they liked more or not. Thus, after reading the tale the children staged the story and drew it, demonstrating more interest in exposing their internal contents, talking about what they understood and sharing experiences. It is understood that, so they could identify themselves and see themselves in the stories, which was once very restricted.

At the end of the narration, the children were anxious to talk about the tales, which caught their attention, if they knew a variation of them and what they would like to change if they could. Then they staged and presented a certain "speed" to draw, because, as some said, "I cannot forget this", that is, I have to record on paper, bring to reality the fantasy.

In this respect, the tales resemble the transitional objects and their narcissism occurs in a potential space, in the transformation of the real world into something more bearable by fabulation from what the child plays, creates, invents and imagines, enabling to look at reality in another way [6, 16].

During the meetings, the children were more confident to outsource their anguish, share with therapists and group fantasies and conflicts. They also demonstrated a sense of proximity and belonging that the group provides and thus felt freer to express themselves in speech, staging, and drawings. According to [16], when the child feels free to think about what he likes, play and find the lost parts of his personality, from the psychoanalytic perspective will begin the search for himself.

The group with short stories besides allowing the elaboration of conflicts related to insecurities, aggressiveness, and search for acceptance, contemplated the playful aspect extremely important in the care of children [16].

It was observed in the subjects, evolution in the ability to build reports, put in place the affections and elaborate conflicts. At first, the children identified themselves with the tales and expressed their anguish through the characters, but in the course of the meetings, a movement verified in the group was that children referred not only to the characters but to themselves and how we're feeling and conflict situations. Exemplifying such a situation, there is the encounter in which C2 chose the sad expression as a figure to represent it that day and spent most of the time quiet and away, at one point approached the observer and reported a warning that received in school for bad behavior and how it was affecting him.

Among the tales that most provoked the movement of the group and demonstrated access to the psychic contents of the children has: John and the Beansan Foot The Ugly duckling; Snow White and Beauty and the Beast.

Below, brief synthesis (Table 3) of the analysis of the results of the children's evaluations in the course and after the group in an individual interview.

Table 3 - Synthesis of the evolution of clinical cases composing the group

SUBJECT	EVOLUTION
C1	The child always behaved in a retracted way upon arriving, which changed as the group happened. In certain meetings, he behaved with great agitation, but very participatory and attentive to the proposed activities. It is noteworthy that after the drawings that were requested at the end of each story, C1 always asked for an extra sheet and made several disordered risks and with great intensity. The mother reported that she had changed her behaviors at school, that she has carried out the activities proposed by teachers and does not disrespect them as before, however, she stressed that she has had frequent nightmares and woke up at night crying and even walking around the house, he also claimed, that this began to occur after the father's return to the family cycle.

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C2	In the initial meetings, he behaved well withdrawn, sometimes asked not to draw the stories, but was always loving and liked to receive hugs from therapists. There was a significant change in their participation in the group, passing until jumping, screaming, playing with the other children and even making drawings with more will and dedication, being visible their change in the dynamics of the group. In attendance with the mother, she stated that C2 no longer behaves aggressively in school and that she has not received any more complaints, but that she continues to take private lessons to improve her writing and reading, which is still a school difficulty.
C3	The relationship in the group changed and it began to express itself more and to participate more effectively in the activities proposed during the group, always wanting to lead and coordinate. The mother reported that she had improved in her aggressive behavior. However, one can still perceive the need for the presence of the father.
C4	In the group he always spoke, he expressed himself, that is, he has always been participatory in the proposed activities, maintaining a good relationship with all, despite being more related to girls, particularly one of them. I had no difficulty in fulfilling what oriented as an activity, being interested in everything that happened in the group. However, his participation was marked by many absences from the meetings, which may have interfered so that he did not have better results.
C5	There were many changes in the child's behavior, she had no more difficulties in the relationship with her grandmother, changed her behavior at school in relation to the teacher, who said she did not like it, even communicated with her after the end of classes and became well responsible and active in-home activities. In the group, even remaining quiet and quiet, it was seen as a reference by the other children, and as sessions passed, it was beginning to participate in the activities, and to be more comfortable with the other children, which at first did not occur.
C6	In a final evaluation and observation in his work in the group, it was noticed that he is a child who adapts easily to the environment, his interaction with the other children of the group was increasing, with respect for the colleague, understanding the space of the other and understanding the rules, however, in their tests, a failure in their cognitive and emotional development was found, a factor that interferes with their school performance, and referrals and orientations were made.
C7	He's a very observant, polite and intelligent child. At first, quieter, as sessions passed, he interacted more with his colleagues, began to express himself more, in forms of play, as if he was feeling in fact at ease in the group. In return, the sister reported that despite being a quiet child, her behavior has been changing, relating more to school mates, which hardly happened before.
C8	Participatory in the activities of the group with a lot of energy, in some meetings, caused disorders due to its agitation and demonstrated a lot of voracity when the time of snack came. There was a significant improvement in it, even organizing the group, placing orders, assisting therapists and being extremely attentive about the storytelling. The mother reported that the school has made frequent praise to the child, who completely changed the way she behaves in the classroom, being more participatory and cooperating with the organization, he also stressed that drawing has been one of his favorite activities at home when he gets home from school.
C9	Initially, he called attention to all the time, was the protagonist of moments of extreme agitation and indisciplines in the group, but always made very coherent placements and although he appeared scattered, understood all the stories narrated, even accompanied the narrations showing knowing details, showed extreme attention when performing the proposed activities, such as drawing, which he did with riches of detail. It is noteworthy that the mother did not attend for a return, that there was this difficulty in its cooperation with what was necessary for the process.

Source: own authorship

It was found that all children had evolution in their development and the motivations that led to the search for psychological follow-up decreased or were suppressed, although, in some, the results appeared more significantly, such as C2 in relation to C4. Moreover, they consider themselves as factors that may have contributed to the better development of the subjects to the frequency of the subjects in the sessions.

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They still remain more mildly, questions that in all subjects were scored in the initial evaluations and that is consistent with the development phase that is, such as the search for support (family or trusted person) and some insecurity.

Corroborating, this period of development, of concrete operations, is pointed out as a crucial moment since in it the most important cognitive structures arise, children demonstrate progress in their ability to distinguish between animate and inanimate and already oppose life and death, begin to approach their peers more although the family is the main bond and reference. It also presents some aggressiveness, instability, and need for support and recognition [15, 17].

Throughout the group visits, as well as in the individual reassessment with the children, it was possible to understand how significant psychotherapy was and assisted in the evolution of children with decreased initial complaints that led them to the psychological follow-up. Also, in the interviews and returns with their parents, they brought how important the care was for the improvement of children and in the interaction itself in the family context.

Thus, from the research project, we investigated the effectiveness of the use of short stories in group child psychotherapy, in which the results achieved culminated in an extension project in the School of Psychology Service.

Finally, it is emphasized that this study does not contain, questions about the applicability and efficacy of the use of short stories in other contexts, which suggests new research on this resource, since there are few empirical studies, especially in psychotherapy, with the Tales.

IV. FINAL CONSIDERATIONS

In the experience with the group brokered by short stories, it was found that the use of such a resource stimulated the imagination through stories, as well as the expression of the inner world of children.

Moreover, the use of the tale, in child psychotherapy, revealed to be a rich resource enabling children to approach their conflicts and bringing encouragement to the psychic suffering with these, which express through the tales in the group, themes such as affective, low lack self-concept and aggressiveness in the face of situations experienced in the family and school environment, as well as related to child development and the stage they are. There was a general improvement in the ability to build reports, put in place affections, the enrichment of imaginary life, the possibility of expressing and elaborating conflicts, especially linked, anxiety, insecurity, and self-acceptance.

As can be verified in the course of the sessions, even though there is no rigidity regarding the methodology for performing the groups with short stories, significant differences in group dynamics and individual repercussions of narratives with the use were observed of the books with images and without them, using only the orality and expressions of the narrator. Participants were able to better express their identifications and representations of unconscious content without the use of books. Finally, although it is a theme that has been researched in the area of psychology and education, it remains a fertile field for further studies and application.

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The concept of blessing (Barakah) in the function of consumption

Zouhair Lakhyar[1], Mouttaki Hlal[2]

[1]Professor of Economics at the Faculty of Legal, Economic and Social Sciences of Mohammedia, Morocco
[2]Professor of Mathematics at the Faculty of Legal, Economic and Social Sciences of Mohammedia, Morocco

Abstract**—** *In the holy Coran, many versets mention the notion of Barakah or blessing. This Barakah or blessing is a gift from God that gives to whom he wants from his servants. If the capital is blessed, it increases. If a child is blessed, he grows up a good child. If a human body is touched by this grace from God, it becomes healthy. If time is touched by God's blessing, it is prolonged. If the Barakah touches the heart, it becomes happy.*
What is of interest to us for the moment is the financial blessing, the increase in revenue due to the presence of Barakah?
Keywords**—** ***Barakah, blessing, financial-blessing, gift, revenue.***

I. INTRODUCTION

In the economic analysis of consumption as a function of income, other qualitative factors raised by economists influence this equation. For instance, the Keynesian concept of consumption function stems from the fundamental psychological law of consumption which states that there is a common tendency for people to spend more on consumption when income increases, but not to the same extent as the rise in income because a part of income is also saved. Furthermore, there is the social factor. For instance, the relative income hypothesis developed by James Duesenberry states that an individual's attitude to consumption and saving is dictated more by his income in relation to others than by abstract standard of living; the percentage of income consumed by an individual depends on his percentile position within the income group to whom he belongs. In addition, Giffen described " the snob effect" or the desire of some consumers to be " in style" and belong to a higher social group. In the same line of thought, Veblen and American sociologists, talked about " keeping up with the Jones". A Veblen product, which is generally a high quality, coveted product where demand rises as price rises because people feel its higher price and exclusive nature reflects greater status.

In this paper, we evoke another factor, never mentioned before to our knowledge, which the factor of Barakah.[in islam, Barakah or Baraka "blessing" is a blessing power, a kind of continuity of spiritual presence and revelation that begins with God and flows through that and those closests to God]. We will show look at this moral and religious factor, to show the effect it has on relationship between consumption and revenue.

1- The consumption function taking into account, the factor of Barakah.

If we insert this factor, denoted by β, in the consumption function, for those who comply with the percepts of islam, the disposable income becomeR_d +βR_d instead of R_d. Where β is the fraction of the blessing that is added to the disposable income. This is of course on condition that the use of this income is within the limits of what is licit or halal according to islam. Because, God does not bless prohibited transactions or haram.

If the blessing (Barakah) is injected in the revenue, the national consumption becomes

$$C_N = C_0 + \delta_2(R_d(1+\beta)$$
$$= C_0 + \delta_2\,(1+\beta)R_d$$

2- Propensity to consume:

Using the equality

$C_N = C_0 + \delta_2(R_d(1+\beta)$,

we can derive the following propensities to consume:

2-1: the mean propensity to consume.

Let us denote by MPC, the mean propensity to consume, we have:

$$MPC = \frac{C_N}{R}$$

Then,

$$MPC = \frac{C_0 + \delta_2(R_d(1+\beta),}{R}$$

Finally we have:

$$MPC = \frac{C_0}{R} + (1+\beta)\delta_2$$

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2-2: The marginal propensity to consume.

The marginal propensity toconsume denoted by mpc is equal to$\frac{\Delta C}{\Delta R}$, where ΔC is the change in consumption and ΔR is the change in income, then we have:$mpc = \frac{\partial C_N}{\partial R}$

Or equivalently:

$$mpc = \frac{\partial}{\partial R} C_0 + \delta_2 (1 + \beta) R_d$$

Finally we have:

$$mpc = \delta_2 (1 + \beta).$$

II. CONCLUSION

With a consumption function that takes into account an income that includes Baraka, that is to say a consumption function in an Islamic context, we note that the propensity to consume is stronger compared to a purely liberal context.

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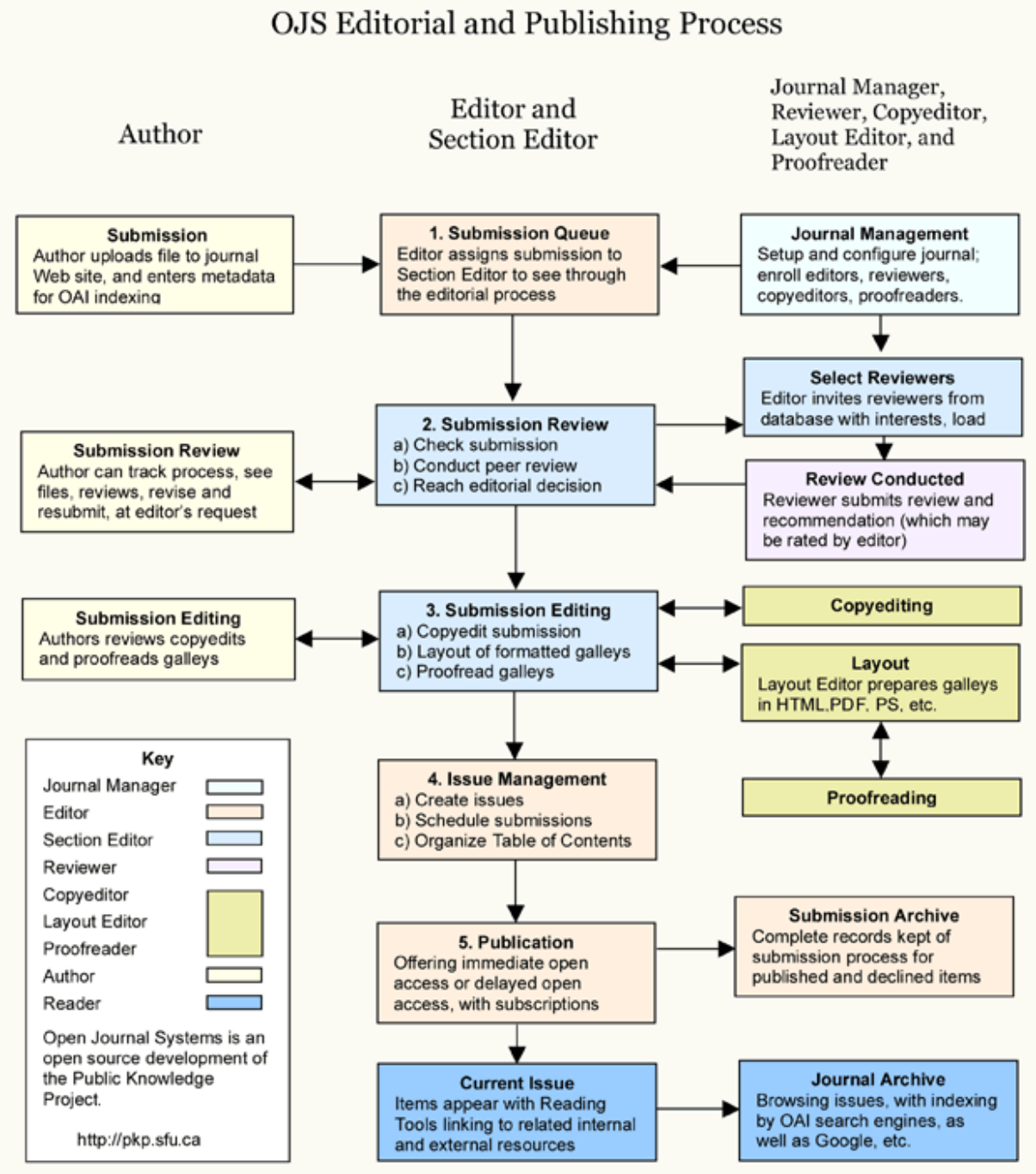

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