

# Graphic waste management in PIM/AM

Pedro Medeiros Neto<sup>1</sup>, Fabiana Rocha Pinto<sup>2</sup>

<sup>1</sup>Environmental Engineering; Fametro University Center, Brazil

<sup>2</sup>Forest Engineering; Fametro University Center, Brazil

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**Abstract**— This study aims to show the application of the management of graphic waste production providing suitability for the final disposal of solid waste from a company located in the Industrial Complex of Manaus/AM, segmentation of the printing industry showing the need to adopt procedures that bring environmental, economic and social benefits. The companies started to worry about actions that have the purpose of adapting, being ecologically correct and improving their image in the market as a company that is concerned with socio-environmental issues and sustainable development. The objective is to show the application of correct disposal management of solid waste produced by this company. However, the generation of solid waste is potentially harmful to the environment, the activity of industries can be performed in an environmentally friendly way, through this study, environmental aspects have been properly identified, evaluated and controlled. This shows that the company is committed, according to the National Policy for Solid Waste, playing an exemplary role regarding the proper disposal. Social and environmental responsibility practices, based on the company's economic performance, show the performance of responsibility practices, in the items that were considered in the analysis regarding the concern with the environment and the awareness about the waste generated by it, in its production process in the labour field. In this way, the company that demonstrates practices of responsibility and commitment to society and the environment.

**Keywords**— Discard, Graphic Industry, Paperboard, Solid Waste.

## I. INTRODUCTION

This study aims to show the application of graphical waste production management providing suitability for the final disposal of waste, analyzing the need to adopt procedures that bring environmental, economic and social benefits, thus bringing a high quality image projection, including socio-environmental awareness and sensitivity.

One of the main milestones of technological evolution occurred during the period of the Industrial Revolution. In order to meet the progress of this period, there was a search for new materials and consequently the demand for natural resources and manufactured products has risen causing damage to nature and an increase in the amount of waste generated [1].

Initially environmental impacts were not considered relevant to society and industry, because the production of waste was small and environmental assimilation was considered in a grand way. This concern became known after finding that one of the biggest polluters and

generators of waste, in industries. From this concern, questions began to arise as to what could be done to alleviate this problem.

Industrial and technological development together with the population growth that has been made possible by this transition of the productive model, has triggered a number of impacts, whether social, cultural, economic or environmental. The latter deserves special attention because of its great interference in today's society [2].

In view of this, companies have started to worry about actions that have the purpose of adapting themselves, be ecologically correct and improve your image in the market as a company that is concerned with social and environmental issues and sustainable development. Environmental impact is a consequence of human action, so it is important that society is educated to behave responsibly, causing less aggressive impacts on the environment [3].



Companies need to be seriously and ethically committed through management, so that industries can be required to have responsibility for the process of moving its production to its final destination for capturing value or proper disposal.

The problem of overproduction of solid waste contributes to its inadequate disposal in places not suitable for disposal, mainly when there is no adherence by industrial managers of reuse programmes and compliance with standards that establish guidelines for appropriate waste disposal [4].

In order to satisfy the demands of its clients and show its concern for socio-environmental issues, companies have shown a growing concern to highlight practices that make them recognized as socially and environmentally responsible [5].

To identify problems in the management of solid waste from industry the proposal of measures for its control prior knowledge of the characteristics and causes of waste generated is required.

## II. METHODOLOGY

Therefore, the bibliographic and quantitative research has the objective of locating and consulting sources and information relevant to the subject, collecting useful data to support, complement and respond to a problem.

Quantitative research seeks to bring reality and aims to inform results according to indicators and other techniques, thus having a faster and more easily applicable result [6].

This study comprises a descriptive and exploratory bibliographic research together with data collected from a particular graphic segmentation company developed because of managing environmental, economic and social aspects in the management of the company with regard to the final disposal of solid waste left over from the company's production process.

The data collected is linked to a company that is located in the Industrial Complex of Manaus producer of paperboard packaging, with micro corrugated, special and technical literature manuals, the company now operates with a workforce of 120 founded in 2003 and located the southern part of Manaus. The company is certified with an Integrated Management System (IMS) by RINA BRASIL in ISO 14001-2015 and 9001:2015.

The details was obtained from the company's SGI sector which is responsible for collecting details related to waste from the company.

## III. RESULT AND DISCUSSION

In the business area, sustainability is operationalized on a regular basis, from this it presents the three sustainable dimensions that are environmental, economic and social. In the environmental sphere, resources must be used in a way that does not harm future generations by reducing the impacts of production processes. From an economic point of view, it is necessary to take care of the profitability of the company and not to compromise its economic development. In the social sphere, the major objective is the evolution of a more just world, relating all stakeholders in the organization [7].

The legislation applied to companies is necessary given a commitment, with the rejects obtained by means of their production making it of great importance to know its specificities and possibilities of adequacy since there are specific means of treatment for each type of waste in which this study surveys the waste originated in the printing industry.

Development is the result of an extensive process of economic growth with increasing average productivity, productive diversification and employment, these processes cause intensification of industrialization where environmental issues are changed and there is a need for environmental issues to modernization the habits and customs of society [8]

The printing industry is very diverse performing graphic services as well as providing services for a specific field. The waste generated in graphics depends on the technology used, because the processes and inputs will also vary. The main raw materials used in the printing industry are various types of paper.

The problem of managing waste in the right way to obtain the correct disposal requires a large investment and that companies establish policies so that this process is aimed at helping, supporting and contributing to environmental issues, since most of the companies are only aiming at profitability and few want to join this programmer. However, management policies and measures are essential. Managers have several possibilities to adopt measures that can contribute significantly to promote industrial activities and maintain sustainability and minimize the effects of production processes.

The industry under study is active in the printing of packaging on paperboard and technical guide of technological products, more directly in the process of industrialization of customized products.

For the investigation of the waste generated in the printing company, showed the management of the waste



from the production process of the company under study. Based on the types of waste, a sectorisation of the company has taken place.

Table 1. Waste generated by the company.

WASTE	GENERATING AREA	FINAL DISPOSAL	FINAL DESTINATION METHOD	FREQ. SHIPPING
White Paper	Production	In bulk	100% reused	Daily
Mixed Paper (coloured)	Production	In bulk	100% reused	Daily
Mixed Paper (coloured)	Production	In bulk	100% reused	Daily
Cardboard	Production	In bulk	100% reused	Daily
Cardboard tubes	Production	In bulk	100% reused	As needed.

Source: SGI,2020

The PNRS covers all the fundamental principles of the subject, seeking together coordination between production and conscious consumption, where each member of the production chain and government agencies have specific functions in the proper management and control of solid waste [9].

Various types of print jobs occur in production to meet market demand depending on the type of printing and finishing in the paper use process, differences were observed in the type of waste generated. Thus, having a destination for the waste center that meets the demand for waste that is generated by production, according to the data in table 1, shows that 100% of the final waste is reused after all, this procedure guarantees the improvement of the company's performance, taking care to minimize social and environmental impacts.

The conditioning takes place with collectors that are located in the waste center, which is on the side of the company, and for the disposal of the waste there is a specific collector and the removal of these scraps takes place on a daily basis depending on the quantity of material in the production waste.

With industrial growth, companies have gradually increased their production. As result, large quantities of the most diverse natural resources are removed from nature, as well as generating more waste, since they refer to the remains of raw materials and other products that are part of the production process [10].

Table 2. Survey of waste generated by the printing industry in the first half of 2020.

PRODUCT	JAN	FEB	MAR	APR	MAY	JUN
Mixed	39,67	53,50	66,97	103,68	64,69	42,73
Cardboard	0,76	5,07	12,48	12,91	1,69	1,01
Listing	3,48	11,02	13,16	14,22	0,00	7,29
Plastic	0,43	0,76	0,97	1,95	0,47	0,69
Total/ kg	44,34	70,35	93,58	132,76	65,16	51,72

Source: SGI,2020

The waste collected in the company is usually performed, through a third party company which carries out the withdrawal by means of its own transport with the help of officials of those companies of the temporary storage site, for the transport vehicle and then to the final destination, where the material is recycled.

Through the work of weighing the waste from the production sector and by means of the survey of proofs of waste disposal, data on the average quantity generated was determined form of packaging and responsibility for the final destination of the waste, as described in table 2.

It is noted that the economic development of the printing industries has been widely developed and are accompanied by changes to the environment, the economy and society. As direct result of these processes, there has been an increase in waste production.

The printing industries, with their daily segmentation, generate products from the production of printed materials. There are several printing segments there is a variety of papers shapes and sizes and despite attempts to reduce the



volume generated, in this type of production, there will always be waste at the end of production.

In this company was invested mainly in the correct disposal in the production process because these materials have a different destination according to their specifications. The company has a selective collection system thus storing its waste generated in an appropriate manner until the companies responsible for their destination to carry out the collection when requested.

The waste paper is stored in the waste center until a significant amount is completed for collection, being collected at most one to three times a day. The company that collects this waste every fortnight carries out the quantitative survey received and weighed so that together with the company it makes a balance of waste generated and each month the outsourced company issues a certificate of destination to prove the destination of the waste generated in the printing industry.

Each year, the industry undergoes an audit to ascertain the disposition of the final product of its waste controlled by the SGI (Integrated Management System).

The main products are separated for disposal an analysis is carried out for the separation of this material regarding waste generation, aiming at pointing out and suggesting possible alternatives to improve the company's environmental performance.

However, the generation of solid waste is potentially harmful to the environment, the activity of the printing industries can be performed in an environmentally correct way as we see through this study in relation to the aspects duly identified, evaluated and controlled. This shows that the company is committed, according to the National Policy on Solid Waste, playing an exemplary role in the proper disposal.

The PNRS aims to reduce the negative impacts caused by the generation of waste being a joint action of powers between the government, companies and also consumers to establish a reverse supply chain to assist in the return of waste [11].

The company provides environmental education projects, through a partnership with the Environmental Court of the State of Amazonas develops the work on the importance of solid waste generated by the company, that is, through socio-environmental action and sustainable economic development a comprehensive measure of actions that bring benefits to the company and society.

Through these social and environmental measures the company, also works together with the community in

relation to the planting of seedlings annual thus contributing to the preservation of the environment.

Therefore, the company is seeking values that correspond to the improvement of our environment, doing so through their work ensuring attributes that correspond to awareness, awareness and preservation.

#### IV. CONCLUSION

Through this it is possible to observe that companies are interested in seeking improvements in the management of waste generated in view of the fact that impacts can be mitigated through social and environmental awareness. However, the company aims to generate as little environmental impact as possible, because through the measures adopted, it can be seen that the company is linked to some measures, for its control.

However, socio-environmental responsibility practices, the economic performance of the company shows the performance of responsibility practices, the items that were considered in the analysis regarding the concern with the environment and the awareness about the waste generated by it, in its production process in the labour sphere. This way, the company that demonstrates practices of responsibility and commitment to society and the environment.

Economic development with the environment therefore provides an improvement in the company and for society as a whole. The solid waste produced is a reality in terms of a problem of extreme relevance, and the amount of waste generated, and by means of measures it is shown that this company is in favors of collaborating in this reflection of improvement in the aspect of generating less environmental impact social responsibility, because environment and society are part of the same context.

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#### REFERENCES

- [1] LIU, J., M. SONG, R. HORTON, and Y. Hu. **Revisiting the potential of melt pond fraction as a predictor for the**



- seasonal Arctic sea ice extent minimum. *Environ. Res. Lett.*, **10**, no. 5, 2015.
- [2] SANTOS, M. R. **Environmental Performance Assessment in the Valorisation of Solid Waste from Industrial Processes**. Rev. Adm. UFSM, Santa Maria, v. 7, Edição Especial, 2014.
- [3] SÁNCHEZ, L. E. **Environmental impact assessment**. 2 ed. São Paulo: Oficina de Textos, 2015.
- [4] INOUE, C. Y.A., et al. "Sustainable consumption and production patterns: solid waste and governance challenge from local to global/Padroes sustentáveis de produção e consumo: resíduos sólidos e os desafios de governança do global ao local." *Meridiano* 47, vol. 17, 2016.
- [5] FIGUEIREDO, R.; ARAÚJO, E. A. **Financial performance of companies listed in the Corporate Sustainability Index (ISE): a multi-criteria approach..** Relatórios de Pesquisa em Engenharia de Produção, v. 16, n. 1, p. 1-17, 2016
- [6] DE SOUZA, B. C., PINTO, G. A., PAULA, P. P., LOBO, R. J., & SOUZA, F. V. P. **Implementation of the 5S programme using the DMAIC methodology**. *DMAIC*. Brazilian Journal of Development, v. 4, n. 5, p. 21632179, 2018.
- [7] DA ROCHA, A. C. et al. **Sustainable Supply Chain Management and Innovative Performance: a multifaceted study in the Brazilian mineral sector..** RAI-Revista de Administração e Inovação, v. 12, n. 2, p. 293-316, 2015.
- [8] CANO, Wilson. **(Des) industrialisation and (Sub) development**. *Cadernos do Desenvolvimento*, v. 9, n. 15, p. 139-174, 2018
- [9] GUIMARÃES, J.; KUREK, J.; PANDOLFO, L.; ROJAS, J.W.J. **Construction waste management: a practical approach in the municipality of Passo Fundo**, 2015.
- [10] SILVA, F. CERVIERI, L. **Solid Waste Treatment: A major contribution to the environment**, Indaial/SC, 2015.
- [11] THODE F. S., MACHADO, C.J.S., Vilani, R.M., Paiva, J.L., & da Costa Marques, M.R. **Reverse Logistics and the National Solid Waste Policy: challenges for the Brazilian reality** *Electronic Journal of Management, Education and Environmental Technology (REGET)*, 19(3), 529-538. 2015