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Research Papers

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**A CASE OF STUDY ABOUT THE REDUCTION OF WASTE IN CAPIXABA  
FACTORY OF POPCORN, CACOAL – STATE OF RONDÔNIA (Brazil)**

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**Abstract**

*It Born in the imagination of a venturer in Rolim de Moura the idea of a small company, the Factory of Popcorn Capixaba, which starts its activities with enthusiasm and grapple, but with little capital and without experience in the industry. The need to establish themselves in the market, conquer space makes to seek ways to increase profits, an alternative would be to increase sales, but without the capacity of immediate investment and its machinery working in limit. The output was to increase the profit of what has already been produced and even without the theoretical knowledge required or the possibility of hiring expert advice as happens in large companies, the way to achieve this end was the fight against waste during the various stages of production, seeking solutions adapted to the realities and conditions of the Company. It was used to search the type case study, together with the productive process, observation, data collection and analysis that in interaction with the theory showed the evolution of the process. The conclusion of this research showed the importance of looking for continuous improvement, the reduction of various types of waste was reflected in the reduction of costs and consequently the increase in profits.*

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**KEYWORDS:**

continuous Improvement. Reduction of waste. Production Process.

**1. INTRODUCTION**

In today's business world in general, but mainly industries need to continually review its processes, seeking to achieve the effectiveness by applying production administration in the planning, organization, direction and control of the production process, eliminate waste, reduce costs, increase their competitiveness in increasingly globalised market and Consequently increase their profits.

According to MOREIRA (2004), within the production system certain elements are common both in Industry and in the provision of services, are the inputs that are replaced by the conversion process suffering influences and restrictions of the control system thus producing products and/or services to be offered to consumers. It is understood that the Administration of production, as well as its support functions, are essential to the survival of organizations in this world of hipercompetitivity

Where it would be easier to identify failures, in a small or a large Company? If the small company produces less and less employees, because the failures sometimes take time to be noticed and corrected? Where are the bottlenecks that slow down the growth of the company?

The main objective of this work is to study the process of productive Industry and Trade in Food Products Capixaba Ltda. - Popcorn Capixaba, a company located in the City of Rolim de Moura/RO, tracking the phases of the process, detecting possible failures that are causing waste.

As specific objectives create the principle a database on the steps of the production process, tabulate and analyze them, creating tools to calculate the injury caused by waste, and show how some simple solutions taken by the board of directors of the company have already shown results. The study will be able to generate useful alternatives to your management, for the development of further actions aimed at the improvement and optimization of production processes, increasing efficiency in production and reducing costs.

As understanding of Lakatos (apud LIMA, 1999), the methodology must meet the questions: how? With that? Where? AND how much?

The purpose of the methodology is to highlight "the ways and means to reach the end of the research" (LIMA, 1999, p. 48). However, LIMA (1999) warns that there should be differentiation between what is method, procedure and techniques. Thus, the method used in the present study is the deductive, as part of comprehensive findings for the individuals, of form Descending. This means to say that, from the general lessons about the administration of the production, seeking solutions to the case of the company POPCORN CAPIXABA.

The procedure adopted is the case study, where it will be analyzed the information of the company.

AND, finally, the techniques to be employed in the present work are studies bibliographic research in documentation, observation and the collection and tabulation of data obtained through the records of the Company.

## **2 THEORETICAL FRAMEWORK**

### **2.1 Definitions of Waste**

What is waste? It is not a notion as clear as some think. BALLARIN (1985, p. 12) Defines: "Waste is spent useless goods or part of them, that are not used, a waste and burn that directly or indirectly imply loss of that result from damage to the collective and the individual."

For Brinson (1996, p. 80). ), losses and waste are constituted by the activities that do not add value and which result in expenditures of time, money, resources without profit, and add unnecessary costs to the products. Activities that do not add value are those that can be eliminated without any deterioration in the performance of the company (cost, function, quality and value-added). In this same line, Nakagawa (1993, p. 19) assigns as waste all forms of costs that do not add any value to the product, from the perspective of the consumer.

Bornia (1995) states that the waste does not only add value to the products as also are unnecessary to work effectively, and occasionally even reduce the value of these products. Fall into this category the production of defective items, the unnecessary maneuvering, quality inspection, idle capacity, etc. , i.e. could cover the costs and expenses used in an inefficient manner.

Waste, in the opinion of Robles Junior (1996, 1906) is the loss that the society is submitted, due to the use of scarce resources. These resources range from material, labor and energy lost, until the loss of hours of training and learning that the company and the society are lost due to an accident at work, for example.

Crosby (apud GITMAN, 1997) estimates that the waste in industrial enterprises on average corresponds to 20% of sales, while the service providers get to reach 40% of operating expenses.

For more careful definition, never be comprehensive enough: there are forms of waste that are not evident. If you can impose a community culture of not throw trash on the floor, spend less money with the cleaning staff, the economy thus achieved is the natural consequence of a waste avoided.

## 2.2 Classification

Strictly speaking, the concept of waste would be inextricably linked to its uselessness and pernicious action of prejudice. No one could call to waste any act which, although with such appearance, was shown to be useful or necessary, and in this order of ideas, admit that there are true and false waste.

Ballarin (1985) classifies and defines the types of waste as follows: Unavoidable, compensation, protection, avoidable, and recoverable.

**Waste inevitable:** arising from phenomena of nature on which man has no control: earthquakes, storms, typhoons, frost etc.

**Waste of compensation:** those who, although they do appear relatively large to some people, are necessary to avoid waste even more. The rigor, lose up to the character of waste.

Companies spend fortunes on advertising to impose itself on the market. It may be thought that, if there was a concentration of efforts on a single brand, as occurs in the countries of economy centrally planned, avoid would waste, reducing to a minimum the propaganda. It just so happens, though, that where there is this trend, there is, as demonstrated by the studies conducted by many economists, that this concentration, or better said, monopoly, resulting in a huge low productivity. It is, therefore, "a waste hidden" above the waste visible, with the advertising expenditures required by the fight between competitors.

Similar Reasoning applies to other products in countries in which the production is concentrated in state-owned companies, possessing monopoly, which lead to low productivity and consequent increase of costs. It is advisable to carefully discern the true waste of compensation, not to take counterproductive measures.

**Waste of protection:** found especially in nature. Are waste needed to guarantee the reproduction and the conservation of the species.

**Avoidable Waste:** it is these that should concentrate their attention. But to avoid them you must know them well, analyze their origins and their causes, because the waste takes several forms.

A) lack of adequate infrastructure.

- Decrease the intrinsic quality of the agricultural product, because it has not been collected and transported in a convenient manner, the time and the hour.

- IRREPARABLE loss when the food deteriorates due to the lack of industrialization or not to have been made at the appropriate time.

- Injury suffered when food evil-stored are consumed and infected by insects, rodents etc. , and can achieve high percentage of harvest.

- Raw material not fully seized, as it would be, for example, the abandonment of orange peel after you remove the juice, or other similar cases where there is no concern in obtaining a byproduct.

(B) lack of organization and planning.

- Buying poorly made, in terms of quality and price, in embalo sales and benefits, an irrepressible tendency to spend more than what is available.

- Spending more, done by the buyer, that it is not the job of comparing prices at the various points of distribution and sale.

The product that interests you might be offered on more favorable terms.

- Financial costs exaggerated in a company, by bad management of stocks of raw materials and finished products. Where we ended up paying interest in duplicates of goods which have not been sold or raw materials that were not used.

- As SANDRONI (2001), non-application in various sectors of methods and appropriate techniques, leading to a decline in production and, hence, the *profit-loss*<sup>1</sup>.

- When in a production line that works with food, and that it must go through several stages with execution times different lack of planning can cause accumulation and even loss of the product, because it deteriorates when left more time without the proper treatment.

- Leave the fire lit, gas or wood, without anything cooking, while if gives attention to other tasks.

(C) Lack of discretion and understanding.

- Failure to perform with due promptness certain tasks, forcing many people to take on a queue, impairing the presence of these in service, thus affecting the production.

-Conversation in service that, although tasty, takes time, and it is with that that salesman has come too late for the meeting with the buyer and, in minutes, miss a request that goes to a competitor.

(D) lack of care (carelessness):

- Energy consumption beyond what is required, when you leave the light unnecessarily lit.

- Leave an electric motor running for a long time without the Use between one step and another in production.

- The misuse and/or imprudent of vehicle delivery company, unnecessary acceleration engine, followed by a sudden stop, spending unnecessarily more fuel and more tires.

- Not to observe that a machine malfunctioned during the packaging and have to redo the same service again with injury-time and packaging.

- Failure to punctuality, causing waste of time for people who are waiting.

**Recoverable Waste:** we in this category the industrial utilization of waste and sewage. The recycling itself. That today is very important factor for the quantities involved, as well as the number of people who survive this activity.

## 2.3 Waste and industry

**Productivity:** became word order in the industry today. Even if, of course, many factors and methods, inspired in the technique and in experience, should combine to ensure their optimization, it is about all the result of a constant struggle to reduce the waste to a minimum, in all the phases and steps of industrial operations. It is the Lean Mentality, a philosophy of manufacturing that second Liker (*apud* CHIOCHETTA and CASAGRANDE, 2007, p . 2). "It shortens the time between the request of the customer and the delivery, through the elimination of waste."

**Raw materials:** (they include also the semi-finished products used by certain industries). Point of departure for the industrialization is often also the point of departure of the waste, as:

- The specifications laid down are not correct and clear.

- Because of the lack of planning for the use of materials, acquires- if quantity exceeding the needs: a stock "idle" entails financial burden with the capital unnecessarily stopped, i.e. waste;

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<sup>1</sup> Profit-loss: profit that the business owner or Administrator has left to obtain that in the specific case of this study caused by waste.

- Tolerate a supplier, which produces certain material under order and invoice 5% more (quantitatively) of which he was asked to do, and if the buyer of industrial firm judge to be prudent buy a little more than the technical division has requested, frequently happens that these two tolerances if turned on and in the end, the quantity purchased will overcome in much the needs;

- The raw material or the components received may not meet specifications established: if wrongly used, will affect the quality of the final product, causing rejection on the part of the buyer and the consequent waste, including damaging the good name of the manufacturer; if they are returned, the freight to return will be wasted (in addition to the value of the raw material unusable; therefore, in order to save that freight, it - as its nature - is often destroyed where it would have been employed, this account by the supplier, which may represent a huge industry waste).

For these and other reasons, without a strict quality control of the raw material as soon as we arrived , would be considerable waste.

With the raw material and/or the components purchased, technicians and workers will start production that will require, however, at least two basic conditions:

- Efficiency of labor; you should act under supervision of a careful and continuous, which is not always the case; even at large factories supposedly well-targeted, not surprising see supervisors accommodated: do not act with the attention and with the sense of justice recommended, resulting in the calculation of hours actually worked, but less productive than it would be reasonable to expect, in addition to creating an environment of insecurity for some and struggles deaf to avoid that someone is "crucified" in the event of failures.

- Coordination between the various sectors: the time required to complete certain parts is different than spent by other operations, failures in planning will lead to impairments and conflicts that generate waste. Machinery and equipment - both the product flow in manufacturing, as the internal transport, may give rise to waste when the provision of machinery and utensils do not meet the criteria of rationality.

When the director or the owner of a factory does not account with an independent assessor to advise you on the choice of machines, often leaves lead or by their ideas (and he may lack of expertise) or by a fast-talking mule some seller skillful and cunning; thus ends up acquiring equipment likely to be of good quality, but that they are not all needed: there will be a waste, while in another sector will be missing a tool that would have greater service roads.

One of the most common causes of waste in the factories is the lack of a proper and timely maintenance. In small companies, which do not involve a workshop of their own repairs and therefore depend on external assistance, the waste of time and productivity can be quite large. It is clear that a machine badly maintained will require increased expenditure to put it in order when, perhaps already a little late, if thinking in fix it: another waste.

But there is a source of waste whose scope does not always deserves due attention: it is the rust. According to Charles Vögtlin (*apud* BALLARIN, 1985, p. 87) "the corrosion due to it cause losses, i.e waste, representing up to 1.5% to 3% of the Gross National Product of industrialised countries!" As will represent us in development?

Quality Control - despite the progress achieved in many fields of industry, there are still sectors where quality control is not exercised and some only when the product is finished. In either case, the waste due to defects cleared at the time of dispatch or in the customer's home is regrettable. For this reason, today, has become widespread in large industries, such as fundamental concept, the quality control throughout the manufacturing process, leading to rejection, even before completing the manufacture of certain products, which will reduce waste and avoid unpleasant consequences. There are products that, when defective, can be repaired; although there are waste of time and effort in that operation,

In the textile industry, the lack of a quality control possibly nobody will suffer from it; in the case of foods and pharmaceutical products, any defect is unacceptable.

### 3 SEARCH RESULTS

#### 3.1 COMPANY HISTORY

The company surveyed, characterized by perseverance and learning from our own mistakes, improve its performance and solutions sometimes simple can reduce their costs, especially with the subject matter of this Article which is the reduction of waste.

The Factory of Popcorn began its activities in April 1996, and produced only a popcorn sweet 50g sold in bales with 50 units, and only in 2005 began to produce the popcorn 15g, also with 50 units in the bale and the crisps pururuca 40g with 20 units on the bale. In

2007 Launched on the market the popcorn 85g bales with 30 units, a differentiated product with superior quality and directed to supermarkets and grocery stores

The company's customers are distributors of sweets and wholesalers, located in Rolim de Moura and neighboring towns: Alta Floresta, Cacoal, Espigão D'Oeste, Ji-Parana and Pimenta Bueno. Its main product or "flagship" is the popcorn of 50g, and that by a cost-cutting strategy went for 45g and all the control and balance sheets of the plant are based on the production of the same and always considering how unit the "bale" and not sachets 45g.

How many micro-enterprises in Brazil that begin their activities in "backyard" and after the first experiments and conquest of the first customers separates the company from residence and seeks to improve the system of control. Take notes more stringent of inputs and outputs of inventories of raw materials and inventory of products ready, this is what happened to the Factory of Popcorn Capixaba, also known as over the 13 years of activities in Rolim de Moura.

The control done in company was rustic, done in spiral book which contained separately the input and output signals of each type of raw material and inputs, inventory control of product ready, current account and box, launch of overheads and production, accounts payable and accounts receivable. At the end of each month was done the balance of inventories of raw materials and finished products, and summing up everything that was spent over the fixed costs and maintenance, and finally the labor spends arrived- if the cost of the product and the profit obtained in the exercise. In spite of the rustic and empirical this control was satisfactory , as figures 1 to 5 in the Annexs.

#### 3.2 THE STEPS OF THE PRODUCTION PROCESS AND THE DETECTION OF FAILURES

The raw materials used in the process are: hominy corn, sugar and packaging for the unit cover and bale, cooking gas and electricity are the sources of energy that make the process work.

The hominy corn was produced by the company itself for a good time, but today is bought already benefited, which avoids the inconvenience and concern in buying and storing large quantities of maize (*in natura*) of the region and the need to leave a large amount of working capital tied. There was a need for a dedicated employee for handling the raw material in this first step, without mentioning the need for space, suitable machines and higher power consumption. This decision is part of the model of waste of compensation, as Ballarin, where in spite of opinion be if paying more expensive product, is saving labor, maintenance of machines, burning of raw material.

This hominy is replaced by a machine called barrel, where literally "blows" the popcorn. This machine acts as a large pressure cooker, where the hominy is heated to create a pressure of approximately 150 pounds. The cover of the machine is released by a trigger, the internal pressure throws the entire contents at once, at a distance of up to 15 meters.

In this first step if there is not a strict monitoring and a good worker training that operates the "barrel" can happen several types of waste, the example:

- Loss of hominy, both by delay as in anticipation, this would leave the corn burned or raw respectively, and yet the disorder of the contamination of the product ready, stored in the rail guns.

- The control record of gas, if you're not in the correct position can cause two different types of waste. If the flame is too high increases gas consumption and the risk of burning the hominy, if very low lost much time and fail popcorn burst to the toasters and increases the consumption of electrical energy.
- The routine maintenance on the equipment, which many times is no longer held by "hurry", and ends up causing "breaks" where you will lose much more in expenses with refitting and decrease in production.



**Figure 6 - Barrel for popping popcorn in operation**

Source: photo taken by the authors. (2009)

The next step is the classification made through coarse sieve where search eliminate popcorn evil burst and also the waste of skin of maize that are always in hominy and after passing the barrel is dark and bitter, if not eliminated leaves the product with an appearance little competitive and lower quality.

A remark made by the owner of the company was precisely as to this classification, your product has won market and consumer preference, because the direct competitors were trying to "take advantage" other the popcorn burst and ended up losing in quality.



**Figure 7 - inventory of popcorn already classified.**

Source: photo taken by the author. (2009)

Then, the popcorn classified goes to the toasters where it receives the sugar syrup and is toast until crispy, giving the final product a greater durability. Although simple opinion was this step that passed by experience, because at the beginning of production the owner followed the recipe supplied by the manufacturer of the equipment from Sao Paulo. But as many factors influence the final quality of the product, such as climate, type and degree of humidity in the hominy, consistency of sugar syrup and the total time used in bottling the product, observations were made, attempts and errors until you can create a template

Suitable to the region and to what was expected of the product to the reality of the Company. The largest waste was observed at this stage, because, due to the need to adapt the "recipe" came to use 90% more sugar. This sugar literally turned dust, which in addition to increasing the cost was imbued the entire production area, forcing a routine hygiene more constant that also caused waste of time, water and cleaning materials.

After a few years of operation, the owner bothered with the costs that were increasing began looking for alternatives to Improve the performance of the machines, because even with productivity within the manufacturer's specifications, they needed to be more well-used to increase productivity without large investments, was ai that appeared two practical solutions and satisfactory.

A toaster originally torrava popcorn sufficient to produce 06 (Six) bales, it has adapted a "wedge" in front of the same which increased its tilt and thus its volumetric capacity to produce 10 (ten) bales at a time.

Another change was in the position of burner before stood under the toaster from the outside, causing the burning of sugar that stinging in "walls" of the toaster, forcing the impairments listed in for washing. It has adapted the flare launching the flame inside the same without direct contact with the popcorn and the toaster, creating a preheated air much more efficient and cost effective.

It's only then will the packaging that the company is still done manually, two people fill the teabags and a third goes through the same sealer by track. In this part of the process there seemed to be no waste unless the time and would only be resolved with a sapling automatic. During the next step it was observed that the bag was a little too big and after sealed surplus 01 cm of packaging that could be saved, then the company came into contact with the packaging manufacturer, has requested the change and had a discount of 2% (Two per cent) in the price of thousand units (milheiro) what large-scale represents a good economy.



**Figure 8 - toasters or drajadeiras during the process to assist carmelization and toasting.**  
Source: photo taken by the authors. (2009)





**Figure 9 - Sealing of track used for closing bags of red. Source: photo taken by the authors. (2009)**

The last step consists in baling and storage of the final product. The Company due to lack of planning and willingness to reach new customers even without the necessary structure for delivery already had considerable damage with the storage of large quantities, without the proper conditions and thus suffering attacks of rodents and loss of quality. This product cannot be too long stored, because "wilt" and loses its greatest asset on the competitors that is to sell popcorn always crunchy.

As was mentioned at the beginning of this work throughout the production control and reoffering rounds costs are relative to the unit BALE.



**Figure 10 - baling of popcorn, here if you use a standard to facilitate the conference of the quantity of units in the bale.**

Source: photo taken by the authors. (2009)



**Figure 11 - Storage tank with insulation on the windows and door to prevent insects and rodents.**  
Source: photo taken by the authors. (2009)

### Continuous Improvement

Even a small company with few employees and small production, when concerned to improve their results and their owners even without much instruction, but with an entrepreneurial spirit, just by applying empirically, concepts of "Just in time", seeking to increase the quality, with less time and less cost.

Martins and Laugeni comment continuous improvement:

The objectives of JIT are normally expressed as ideal: meet the demand at the exact moment with perfect quality and without waste. Even if the performance of any organization can be very far from those ideals, a fundamental belief of JIT is that it is impossible to approach them over time.

A comparison of consumption of raw materials in 1999, the year in which reached the major brands of monthly production and then in 2009, we will have a clear view of the size of the injury that the company had for a long time caused by the various types of waste reported during the stages of production.

**Table 1 – The consume and profit of material incomes in the beginning of productivity activities**

Incomes	March -199 – 2,713 units		April – 1999 – 3,813 units		May 1999 – 3,523 units	
	Quantity	Profits (Packaging/unit)	Quantity	Profits (Packaging/unit)	Quantity	Profits (Packaging/unit)
Maize (bags with 60kg)	102	26.5	216	17.6	176	20.0
Sugar (bags with 30kg)	104	26	141	27.0	143	24.6
Gas (tank of 13kg)	64.0	42	83	45.9	79	44.6
Red packaging (lote of 1000 units)	135	20	190.6	20.0	176.1	20.0
Labor	11.0	12.9	16	13.2	11	15.1
Cups of bags (Units)	2,713	1.00	3,813	1.00	3,523	1.00

Source: The Authors, Cacoal – State of Rondônia, Brazil (2009)

**Table 2 – The consume and profit of material incomes in 2009**

Incomes	April -199 – 2,713 units		July – 1999 – 3,813 units		October 1999 – 3,523 units	
	Quantity	Profits (Packaging/unit)	Quantity	Profits (Packaging/unit)	Quantity	Profits (Packaging/unit)
Maize (bags with 60kg)	33	30.8	41	30.5	41	31.5
Sugar (bags with 30kg)	22	50.8	25	49	26	49.3
Gas (tank of 13kg)	19	58	21	59	21	61
Red packaging (lote of 1000 units)	55	20	63	20	65	20
Labor	04	13.3	4	15.7	4	16.1
Cups of bags (Units)	1,118	1	1,256	1	1,291	1

Source: The Authors, Cacoal – State of Rondônia, Brazil (2009)

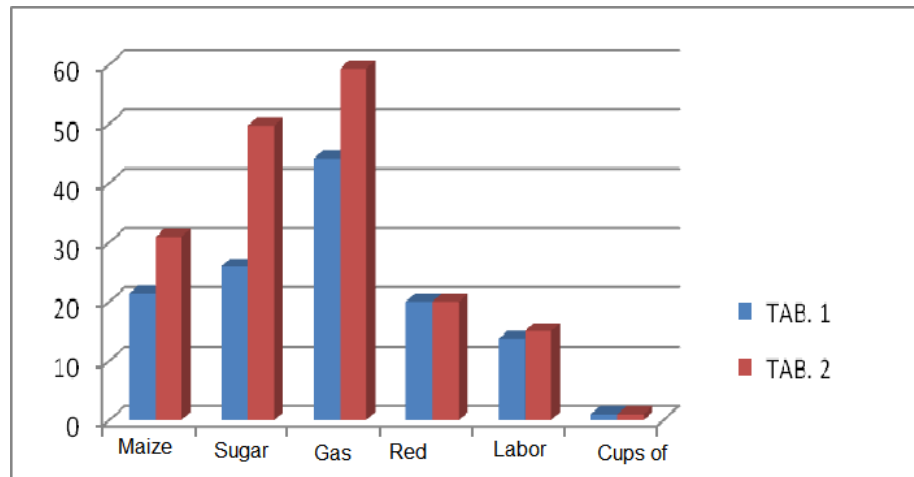
Table 1 shows the production of the company in the months of March, April and May 1999, And table 2 production in April, July and October of 2009. The Quantities of each type of material used month-to-month, and the yield of each item in number of bales.

**Table 3 – Averages of consumed and comparative averages**

Incomes	Average Table 1	Average Table 2
Maize	21.36	30.93
Sugar	25.86	49.70
Gas	44.17	59.33
Red packaging	20.00	20.00
Labor	13.73	15.03
Cups of bags	1.00	1.00

Source: The Autors , Cacoal, State of Rondônia, Brazil (2009)

After the fitting of tables 1 and 2 the averages were calculated to yield of raw materials between the three months of each table and this table 3 and graph 1 a comparison between the different times, you can see the significant difference between them, as a result of the fight against various types of waste.



Graph 1 - graphical representation of table 3

Source: The Autors , Cacoal, State of Rondônia, Brazil (2009)

#### 4. FINAL CONSIDERATIONS

Developed the readings on production management and continuous improvement, topics that brought the practice resulted in a reduction of the various types of waste, it was observed that even empirically, when applying the observation, comparison and the search for improvement in the production process the results are obvious.

The objectives of the research if took, because factors causing waste were detected and corrected, some in a very original, through experiments, trial and error.

A global vision of the numbers would lead to the conclusion that the company Popcorn Capixaba not grew and until it had been reduced in the course of all these years of hard work. The number of bales produced today is lower than that produced the 10 (ten) years, but at that time the company had 03 (three) members, now only one owner, that with a table and lean produces proportionally more and with a better profitability.

As strong point of company surveyed you can highlight the entrepreneurial administration, as was reported during the work, where even without technical knowledge, seeking to improve. The vision of the need to combat the waste was very important for the survival in the market. As weakness, there was found to be a lack of courage to seek financing to invest, since the product is already proven in the marketplace. The automation will eliminate more waste of time and labor

Given these considerations, it can be concluded that the reduction of waste really is very important especially when the company is giving its first steps, because the economy of raw material was visible, the profits were maximized. Making the company more competitive

#### REFERENCES

1. BALLARIN, Osvaldo Miguel Frederico. **O desperdício... Tudo róí e corroi...**São Paulo, RR Editores, 1985.
2. BORNIA, A. C. **Mensuração das Perdas dos Processos Produtivos: Uma Abordagem Metodológica de Controle Interno.** Tese (Doutorado em Engenharia de Produção) - PPGE/UFSC: Florianópolis, 1995.
3. CHIOCHETTA, João Carlos; CASA GRANDE, Luiz Fernando. **Mapeamento do fluxo de valor:** Aplicado em uma pequena Indústria de Alimentos. Paraná, Enegep, 2007.
4. GITMAN, L. J. **Princípios da Administração Financeira.** São Paulo: Harbra,1997.
5. LIMA, T. L. DE. **Manual básico para elaboração de monografia.** Canoas: Ed. ULBRA, 1999.
6. MARTINS, Petrônio G.; LAUGENI, Fernando Piero. **Administração da produção.** São Paulo, Saraiva, 2006.

7. MOREIRA, Daniel Augusto. **Administração da produção e operações**. São Paulo, Pioneira, 2004.
8. NAKAGAWA, Masayuki. **ABC : custeio baseado em atividades**. São Paulo : Atlas,1993.
9. JÚNIOR, Antônio Robles. **Custos da qualidade: uma estratégia para a competição global**. São Paulo: Editora Atlas, 1996;
10. SANDRONI, Paulo. **Dicionário de Administração e Finanças**. São Paulo, Ed. Best Seller, 2001.
11. SLACK, Nigel; CHAMBERS, Stuart; JOHNSTON, Robert. **Administração da produção**. São Paulo, Atlas, 2007.
12. AMARAL, Jéferson Pinho do; CAMPOS, Ana Augusta da Silva. **Estudo do processo produtivo da Pollybrindes indústria e comércio Ltda**. Paraná, Enegep, 2007.
13. CHIAVENATO, Idalberto. **Introdução à teoria geral da administração: Uma visão abrangente da moderna administração das organizações**. São Paulo, Elsevier, 2003.
14. FILHO, Moacir Godinho; FERNANDES, Flavio César Faria. **Identificação e análise do foco de três abordagens para a produção enxuta**. Revista Ciência e Tecnologia, n°. 19, Universidade Metodista de Piracicaba, São Paulo, jan/jun 2002.
15. JUNKES, Maria Bernadete; SANTOS, Maria Lindomar dos. **Trabalhos acadêmicos: a facilidade em desenvolvê-los**. Rolim de Moura – RO, D'press,2007.
16. TIMOFIECSYK, Fabiana do Rocio. **Minimização de resíduos na indústria de alimentos**. Dissertação (Mestrado em Tecnologia Química, Área de Concentração em Alimentos)- UFPR, Paraná, 2000.



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