MATERIALS MANAGEMENT: A REVERSE LOGISTICS CASE OF AGROTOXICS EMPTY CONTAINERS IN A SUGAR AND ALCOHOL COMPANY

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Abstract
With the advances in today's chemical pesticides, global agriculture has become extremely productive, which, from another point of view, brought many environmental problems, especially in relation to damage caused by pesticides and the improper disposal of their packages. Brazil, on the other hand, holds the world record in the collection and recycling of empty pesticides containers, which could only be configured within a process of compromise among all stakeholders: from the manufacturers of pesticides to the farmer (or rural enterprise). The objective of this study was to analyze the

measures taken from storage, to transportation, and to collection posts of empty pesticides containers, by a large Brazilian sugar and ethanol company. The methodology has adopted of an exploratory nature within a qualitative approach, through a semi-structured interview with the logistics and material manager of the company investigated. It was found that the company follows a strict process of handling empty containers of pesticides, following the standards and laws of the country, aiming to achieve the ISO14000 certification, for the social compromise to the community in which it operates.

Keywords: Materials Management, Reverse Logistics, Packages, Pesticides, Recycling

Introduction

Nowadays, many sugar and ethanol companies are distinguishing themselves in Agribusiness with strong economic and productive growth, especially in Brazil. Associated with this, the factor of "interference in the environment" has been grown as big as the actual growth of these companies (Neves & Conejero, 2007; Bragato et al., 2008).

This has occurred because there has been a neglect of Agribusiness companies in relation to the environment, mainly, regarding to the use of pesticides and disposal of its packages. Thus, the Brazilian government began to monitor these companies, as well as encourage sustainable growth, that does not harm the environment, and because of this, the agribusiness enterprises began to have a better environmental responsibility (Segato et al., 2007; Bragato et al., 2008; Martinez et al., 2013).

These government demands began to influence in the form of the handling of pesticides, in the production stage, starting from cultivation to the destination that have empty containers of pesticides. This has involved directly in production processes and has become a constant element in large agribusiness companies (Soares & Port, 2009; Faria and Pereira, 2012).

Based on this scenario, it was made the question: will the companies of this sector properly follow the form of handling, storage and disposal of empty pesticides containers? Understanding the importance of environmental conservation for agriculture, especially from the point of view of agribusiness companies, the aim of this article is to analyze the measures taken from storage, to transportation, and to collection posts of empty pesticides packages by a large Brazilian sugar and ethanol company.

Thus, the article will be divided into 6 sections. The first section (1) starts with a brief discussion of the trailblazing theme "agribusiness and pesticides packages". Then, the second section (2) discusses the environmental aspects of sugarcane. Therefore, the third section (3) will

discuss the issue of the green marketing. The section four (4) exposes the methodological procedures of the work. In the fifth section (5) it will present the case study. Finally, the sixth section (6) presents the final conclusions of the study. It is noteworthy that the literature review (sections 1, 2, and 3) give the basis for the analysis in the case study.

Literature Review

The Pioneering of the Theme: Agribusiness and Pesticides

In the period after World War II, there was the well-known green revolution, in which systems with low productivity were changed, for the use of improved seeds, soil amendments, use of machinery and agricultural tractors, with pesticides and industrial fertilizers gaining a higher performance in agricultural productivity (EMBRAPA, 2009).

Today, the agricultural productivity has as a challenge; the food production for a growing population, with a commitment to the use of technologies and procedures which ensure respect for the human health, for the environment and also for agriculture sustainability. Therefore, after the pesticides are used, their empty containers should be returned correctly, where they will have one of two destinations: recycling or incineration. This is because, if thrown in the fields and rivers, these packages can cause damage to the environment, and the human--animal health (INPEV, 2006).

In Brazil, the market for pesticides is valued at USD 2.5 billion in Brazil, according to the National Union of the Industry of Agricultural Defense Products (Sindag), where the sales leaders are herbicides, with 52% of sales, and insecticides, with 27.5%. But still, the country is the third place in the world pesticide market, alongside Japan and behind the United States and the European Community (Fairbanks, 2008).

Account of this exposure to contamination of the environment, the government saw the need to take measures to control the destination of these empty containers of pesticides, through laws to control the manner in handling washing, storage, and reverse logistics of these packages, with entities like INPEV (National Institute for Processing Empty Containers), and ANDEF (National Association of Plant Protection), that seek to disseminate in every link of the chain what are their main responsibilities regarding the return of pesticides empty containers.

The final destination of the packages is a complex process where they requires the effective participation of all those involved in their manufacture, commercialization, use, licensing, inspection and monitoring activities related to the handling, transportation, storage and processing of such packages. Since each stakeholder in this process plays a key role in their step, from the user until, passing through the manufacturer, and also regarding the receiving entities and inspection process (ANDEF, 2008).

Despite the complexity of the process of return empty containers, Brazil differs from other countries because of the good work performed by each agent of the agricultural production system. With this, Brazil is today, the world record holder in collection and recycling of pesticides empty containers , with 77% of empty containers of the market, were removed from the countryside in 2008, and 96% of primary containers are removed from the environment (packages who came in contact with the product). In addition, 95% of these packages are recycled, creating various items such as a conduit, construction blocks, covers for new packages, packages for lubricants, among other things, and only 5%of these were incinerated (Petrini et al, 2008).

For that situation happen, a number of laws and decrees passed to be enacted as Law No. 9974 (June 6th 2000) that complemented the law No. 7802 (June 1989) and Decree No. 4074 (January 2002) which regulated the deadline for compliance of the companies in receiving, collection and disposal of empty pesticides packages and regulated the manner of handling these products (Barbosa and Pereira, 2008).

Moreover, making the control of empty containers of pesticides more rigid, there was a need to create institutions that would help the government in monitoring, advising and assisting producers and rural businesses to no longer dispose of packages incorrectly. The National Association of Plant Protection (ANDEF) has been working to assist in monitoring and also to avoid the mistakes of the past (Barbosa and Pereira, 2008).

So, in 2001 was created the National Institute for Processing Empty Containers (INPEV), to manage the proper disposal of empty plant protection products in Brazil. The institute is maintained by the chemical industries that produce pesticides, and its main activity is to transport empty containers of receiving units to its final destination where it will be disposed of in the correct manner and so that the packages could be either recycled or incinerated (INPEV, 2006).

Environmental aspects and sugarcane

Environmental aspect can be defined as the element of the activities, products and services of an organization that can interact with the environment, which is a predictor of environmental impact, i.e. any change to the environment, whether hostile, or beneficial, resulting, in whole or in part, in activities, products or services of an organization (Bigatão, 2009).

Therefore, the expansion of sugarcane has transformed the entire structural, productive and marketing environment involved, especially because it is a wide chain involving from the crop area in the countryside, passing thought industry, to the marketplace, having as the final product sugar and alcohol. This expansion has produced significant changes in organizations, especially in what is related to concerns about environmental

issues, where the greatest impacts are linked to the production process and its results. In strategic terms, the combined use of chemical formulas with biological control organisms has become a significant economic gain in the production of sugar and alcohol, which is highly advantageous for sugarcane companies (Neves & Conejero, 2007; Segato et al., 2007; Bragato et al., 2008; Martinez et al., 2013).

This occurs, according Zambolim (2003) and Segato et al. (2007), because the cultivation of sugarcane, as a monoculture, make an increase in pests and diseases, making it necessary to have a control with application of pesticides, where the impacts of these pesticides are directly in soil and, also, in the air.

Thus, the entire expansion project of sugarcane must be carefully analyzed to identify all potential impacts that may be caused in the region, in order to take the measures needed to minimize or eliminate these impacts (Carbone, Sato and Moori, 2005; Martínez et al., 2013). Thereupon, it is required an entire study of environmental aspects as well as environmental impacts, because the company must submit evaluations of the environmental aspects and impacts of their projects, so that the market and the society is aware of the process of innovation and sustainability. In addition, there is the environmental license that requires a number of standards that reinforce the compliance with the law (Gavira et al., 2007; Barbieri et al., 2010).

Green Marketing

Building on those needs for analysis of environmental impacts, the green marketing arises. The green marketing is the business behavior with environmental responsibility in conjunction with the promotion of a whole process of design, production, final destination and disposal of the products/services of the company, showing customers that the company, besides seeking to satisfy them, worries also with environmental responsibility (Dias, 2009; Ko, Hwang and Kim, 2013).

For Liu, Kasturiratne and Moizer (2012), the concept of green marketing is directly related to the evolution of marketing management philosophies. In addition, the concept cannot be adopted as a single model, because each market has its own environmental influences. These marketing management philosophies comes from the production of products related to low costs, sales techniques, quality of services as differential, customer relationship, even the concern for the environment.

Still, according to Maia and Vieira (2004) and Dias (2009), green marketing is also concerned with the whole production process and what are the consequences of this project on the environment, because if a company incorrectly discards its toxic waste it will be damaging all the environment in which it operates from the local community nearby to the environment as a

whole, and thus getting a bad image to their customers. Several studies show that the image of the environmental impact of companies is related to the purchase decision of consumers, in which, according to Churchill & Peter (2000), 93% of consumers analyze the environmental impact that a product may cause before buying them. This awareness of consumers can currently be noted in the Brazilian market.

Dias (2009) argue that the awareness of the population is related to the increase in income of the Brazilian consumers, the increasing of the level of education, the environmental protection laws, the consumer, and even the growing perception of environmental degradation in Brazil .

Ko, Hwang and Kim (2013) complements exposing that due to this awareness, in addition to the penalties imposed by the government, the punishment for destroying the environment depart also from consumers who stop consuming the products of companies that are not environmental responsible, making that ecological awareness is present not only in the consumer decisions, but at the strategic core of enterprises.

Methodology

The study was conducted in a case study format, which according to Yin (2003), is significantly suitable for investigating phenomena in loco, in which, the real context can be emerged to make their characteristics more obvious, thus enabling a deeper understanding of the subject.

In this sense, the methodology was through a semi structured interview with the materials and logistics manager of the investigated company. Accordingly, the methodology adopted an exploratory study within a qualitative approach, supported by what proposes Godoy (1995) and Montgomey (2000); the investigated company is a sugarcane company, located in the state of São Paulo in Brazil.

Malhotra (2011) also states that exploratory research should be developed to provide a general overview, of approximate type, on certain fact, especially when the subject is still so little explored and there is a need to operationalize the basic information of the problem investigated. The author also states that the deepening in a particular topic, as well as, the definition of hypotheses and visualization of new research issues, is guided in terms of a series of reflective activities about the information found through exploration interviews and /or data mining.

Thus, the issues raised with the manager of materials and logistics of the investigated company aimed to identify (1) the procedures from receipts to disposal of empty pesticide, (2) the continuous permanence of a certain program to inform and train their employees the correct use of these packages, (3) how was the control of packages to avoid accidents at work, (4) the equipment that the company offered for the protection of its employees, (5) development of partnerships between the company and the

entities responsible for recycling or incinerating these packages, (6) the prevention of environmental degradation that can occur through the production process.

Based on these issues, an analysis of the materials and logistics manager answers, identifying the main points and the most relevant uprisings to the theme of this study, as can be seen in the next section.

The Case Study

The investigated company is the Shekinah Farm S.A., based on Sao Paulo, region with the largest production of sugar and ethanol in Brazil, with a large number of employees and a large area for the cultivation of their raw material (sugarcane), nearby the population housing, thereby it is necessary to be more careful in the cultivation and application of pesticides, because if a problem occurs in the application of these products, soil and rivers can be affected, endangering the whole community living in the region.

According to the material and logistics manager of the investigated company, the company has included in a its strategic planning, the concern for the environment, because both the receipt, storage and the application of pesticides in the fields, there is a whole training process involved to protect their employees and the environment which it operates, where it follows the guidelines of proper use, application and washing and proper disposal of pesticides packages. And so that they can have control of the process, there is an annual audit, in which, a team specializing in the “6S”, examines whether there is any problem regarding storage of these pesticides.

Moreover, it is adopted in the process of receiving the pesticide, strict control in which the entire input is received in the warehouse, to its proper storage; these containers are not taken to the crop, but only the proper dosage for the application. After, is performed a triple washing in the empty containers and are sent to the collection station through reverse logistics.

Another concern highlighted by the administrator of the investigated company is with social projects involving the local population of awareness for the preservation of the environment. This concern is somewhat embedded in company policy that seeks the ISO14000 certification, within its scope of green marketing, making it the differential of the business.

The ISO14000, which the company is seeking to enter, refers to standards developed for environmental management, which means, the search for minimizing the effects on the environment due their activities, seeking prevention across the production process, avoiding environmental contamination, such as soil, water, air, flora and fauna contamination .

Therefore, it is very clear that environmental laws are of great concern to the agribusiness sector, mainly in the sugar and alcohol segment. This concern has also given due to high penalties that the law provides. It appeared that the companies in this segment seek to follow the rules and

laws that regulate their activity and how this affects the environment in which it is, because the market has a differentiated gaze for environmentally responsible companies.

Final Conclusions

With the objective of analyzing the measures taken from the storage to transportation for the collection posts of pesticides empty packages, of a major Brazilian sugar and ethanol company, this study brought considerations about the alcohol sector that can benefit and be the starting point for further studies in this context.

Additionally, it appears that in the Brazilian economy the sugar and ethanol industry is of a great importance as well as being a segment that is growing around the world because it can be used as renewable energy. To this, the sugarcane companies have an important role, because this energy is interesting to the new consumer who cares about the environment. However, companies should seek mechanisms to minimize interference to the environment.

To this, this research aims to study about how it is made the storage and handling of pesticides empty containers and, in counterpart, the behavior of the companies of this sector, especially looking at the issue of disposal of plant protection products packages, which aid in the production field, but also are the great villains for the environment.

What is noticed is that there are entities involved in the whole production process to assist and inform the farmers and businesses, about specific environmental laws to these products, as well as an effort of the companies to target certifications such as ISO14000, or even the preference of their consumers through green marketing.

Also it's noteworthy the limitation of this work, for only study one company in the sector, with a larger sample we could identify more precisely the scenario of this segment in relation to the issue of disposal of pesticides and their empty containers. Thus, we suggest future studies that seek to study a larger number of companies in the industry, checking its policies concerning the proper final destination of the empty packages of pesticides.

Still, study in a more detailed way a larger number of businesses and the amount of disposal of empty packages of pesticides, retroactively can, in some years, show is a more clearly and close to reality way, the manner in that sugarcane companies behave in the process of reverse logistics of empty pesticide containers.

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