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SUSTAINABILITY IN THE MANAGEMENT OF THE SUPPLY CHAIN AND THE RETURN ON THE REVERSE LOGISTICS

Carlos Eduardo Francischetti[1], Nilcéia Cristina dos Santos[2], Reinaldo Gomes da Silva[3]

[1]Faculdades Integradas Einstein de Limeira (FIEL) / Universidade Paulista (UNIP) e Universidade Metodista de Piracicaba (UNIMEP)
Phone number: +55 19 3454-2450 or + 55 19 99746-5514 –
E-mail: cefrancischetti@gmail.com, cefranc@ibest.com.br

[2]Faculdade de Tecnologia de Piracicaba "Dep. Roque Trevisan" (FATEC PIRACICABA) e Universidade Metodista de Piracicaba (UNIMEP)
Phone number: +55 19 99614-1327 or +55 19 3411-2454 - E-mail: nilceia_santoss@yahoo.com.br

[3]Escola de Engenharia de Piracicaba (EEP)
FUMEP, Fundação Municipal de Ensino de Piracicaba
Phone number: +55 19 99602-1218 - E-mail: reinaldorgda@gmail.com

ABSTRACT. This study addresses sustainability in supply chain management and return on reverse logistics, in order to measure the economic and financial feasibility of implementing reverse logistics projects through insight surveys of costs and expenses involved by company characterized as an effective tool for analyzing and managing costs. This indicator allows comparisons between the savings in relation to the amount of capital invested, making it relevant to the evaluation of results and strategic decisions of the company. The development work is guided by an exploratory research which aims to identify possible ways and procedures that can be followed and evaluated for the construction of the proposed funding model, and indicate possible ways and procedures that can be followed and evaluated for the calculation in question.

Key-words:
reverse logistics, sustainability, supply chain, financial feasibility, economic viability.

1. INTRODUCTION

Globalization has transformed considerably the world in which we live. Increasingly companies are seeking greater efficiency and expansion in their business. Analyzing Brazil's economy, we can identify which companies are increasingly turning to resources funded by the population, ie, increased consumption and the expansion of the middle class or C. According to projections by the IBGE (Brazilian Institute of Geography and Statistics) Brazilian middle class who in 2011 was around 53% of Brazil's total population, and by 2014, it is estimated that there will be a reduction in poverty and approximately 70% 100 million people will be moving from classes D and E for the current class C.

Brazil is a member of several economic organizations such as Mercosur, the G8 +5, G20 and others. He is a member of the BRICS (short for emerging countries Brazil, Russia, India, China and South Africa) and since 1990 has been taking important steps to improve the economic sustainability and consequently provide an environment conducive to economic growth and private sector development.

With the growth of markets, greater investments are needed so that the products can meet the entire geographical extent of the Brazilian consumer market. In this context, logistics is becoming increasingly important and more significant in a business context, it is responsible for the production reaches the final consumer. This scenario is characterized by the search for greater competitiveness and consequently for actions to reduce costs.

You can define logistics as part of the supply chain (SC) that plans, implements and controls the effective flow and storage of goods, services and related information from point of origin to point of consumption in order to meet customer needs (PIRES, 2004).

The business management realizes that business opportunities, today, are increasingly facing the current global economic conditions, which are charged by the social responsibility of their companies, the transparency of its processes and its behavior, the actions of sustainability that practice and the impact that their products cause environment.

One way to reduce the environmental impacts of their products is the use of reverse logistics, a system where companies now have responsibility for the return of the product to the company, which will target suitable either for recycling or disposal. The implementation of reverse logistics involves expenditures that affect costs by the companies, interfering with their financial performance.

Under this context, the present study aims to discuss sustainability in supply chain management and reverse

logistics, in order to measure the economic and financial feasibility of implementing reverse logistics projects.

2. SUPPLY CHAIN MANAGEMENT

Lambert (2001) defines the supply chain as a set of companies directly or indirectly linked to the procurement process or distribution of a company focus.

The supply chain management (SCM) is the integration of business processes from end user to the original suppliers (primary) to provide products, services and information that add value for customers and stakeholders (PIRES, 2004).

The supply chain consists of all stages of meeting the demands of the customer, including several authors as suppliers, retailers, distributors, manufacturers and customers. It is the alignment between companies that carry products or services to market. Represents the constant flow of information, products and capital between different stages, starting on customer request and ending when the customer is completely satisfied. Within systemic structure it is networked with many participants interacting at various levels and stages (SILVA, 2012).

Second, Chopra and Meindl (2003), one supply chain encompasses all stages involved, directly or indirectly, in the care of a request from a client. The supply chain not only includes manufacturers and suppliers, but also transporters, warehouses, retailers, and customers themselves. Within each organization, for example, a factory, the supply chain includes all functions involved in the request, such as new product development, marketing, operations, distribution, finance, service and customer service, among other.

A study published in 2016 by GCI - Global Commerce Initiative & Capgemini Consulting (Revised Tecnologística, Aug/2008), and presents a new integrated model of supply chain, which takes into account new parameters associated with current forms of management and measurement performances understood as indicators of sustainability, ie, energy consumption, carbon emissions, traffic congestion, water consumption, commitment to safety, infrastructure, among others, should be considered in conjunction with the current indicators, such as product availability, costs and financial indicators such as ROI.

3. SUSTAINABILITY AND PERFORMANCE

Sustainability can be defined as the ability of humans to interact with the world without compromising the natural resources for future generations, seeking the conscious use of factors of production (land, labor and capital) to obtain profits and capital returns and while preserving the environment. Thus, the ideas of business projects that meet the criteria of sustainability began to multiply and spread.

The performance of a company should be measured based on their contribution to economic prosperity, environmental quality and social capital.

4. DIMENSIONS OF SUSTAINABILITY

The business management realizes that the business opportunities today are increasingly focused on current economic conditions and social responsibility, making companies realize the need for transparency of purpose for your conduct among various stakeholders (shareholders, customers, employees, business partners, governments, local communities, etc.). directly or indirectly linked to your business.

To Rattner (1999) the argument of economists in favor of sustainability revolves around knowing how to use the planet's resources with efficient allocation of resources in a competitive market, in which there would be market distortions that could be corrected by the internationalization of environmental costs and / or fiscal reforms. Thus, sustainability would be achieved by economic rationalization local, national and global.

5. REVERSE LOGISTICS

Reverse logistics in a business logistics perspective, the term refers to the role of logistics in product returns, source reduction, recycling, materials substitution, reuse of materials, waste disposal, refurbishment, repair and remanufacturing (MILK 2003, p. 15).

According to Lacerda (2002), the processes of reverse logistics have brought considerable returns for companies. The reuse of materials and economy returnable packaging have brought gains increasingly stimulating new initiatives and efforts in developing and improving the processes of reverse logistics.

In reverse logistics companies now have responsibility for the return of the product to the company, either for recycling or for disposal. Its costing system should therefore have a very broad approach, such as the Life Cycle Costing full. For Atkinson et al (2000, p. 676), this system enables managers to manage their costs from beginning to end. The life cycle of the product covers the time from the beginning of the Planning and Development (P & D) to the end customer support (HORNGREEN et al., 2000, p.313). In this cycle reverse logistics extends also comprising returning the product to the point of origin or reuse, for recycling is the recycling of materials as a raw material for a new product.

Keys and Martins (2005) point out that reverse logistics provides a great economic potential, and possibilities mercadológicas regarding the return to investment in the area can bring to businesses, but also emphasize that so far it has not been properly explored

It is speculated that reverse logistics costs are high and there is a return or pay for playback implementation. In fact, the problem boils down solely on analyzing the designs of reverse logistics as a normal project, where there is the process that we could call the reverse, ie, the

reuse of materials. And yet, that is done, there are still problems and difficulties in quantifying and defining these reaproveitamentos inputs. To be sure of the viability of reverse logistics must also calculate it in reverse. This is nothing more than quantify how much resources will be spared from the company and how much weight it will have in the overall process by providing a return on reverse logistics and operational real.

6.THE IMPORTANCE OF REVERSE LOGISTICS

Removal and recycling of scrap study and manage how the byproducts of the production process are discarded or reintroduced to the process. Due to environmental regulations becoming increasingly strict, the responsibility of the manufacturer's product is widening. Besides the waste generated in its own production process, the manufacturer is responsible for the product until the end of their useful way. This has extended an activity that was hitherto restricted its premises.

According to the Brazilian Association of Moving and Logistics Reverse Logistics costs in Brazil represent about 4% of the total cost of logistics. These numbers tend to grow as activities to increase between logistics companies. Although many companies know the importance of the reverse flow most of them have difficulties in implementing its management.

The lack of a computerized system that integrates with existing system of traditional logistics (CALDWELL, 1999), the difficulty in measuring the impact of returns of products and materials, with a consequent lack of need to control it (Rogers and Tibben-LEMBKE, 1999), the fact that the reverse flow is not revenue, but costs and as such are given little or no priority in business (Mintzberg and Quinn, 2001), are some of the reasons for non-implementation of the reverse Logistics companies.

7. REVERSE LOGISTICS: MEMORANDUM AND CAUSES

According to the group Revlog the main reasons that lead firms to act more strongly on Reverse Logistics are (DAHER et. Al. 2004):

1) Environmental law: forcing companies to return their product and take care of the necessary treatment;

2) Economic Benefits: Use of products returned to the production process rather than the high costs of proper waste disposal;

3) Environmental awareness of consumers aware that the product can be used and reused harm the environment less.

The Reverse Logistics does not necessarily serve to improve logistics productivity, however, the reverse movement is justified on a social basis and must be accommodated in the planning of the logistics system. The most important point is that the logistics strategy can not be formulated without careful consideration of the requirements of reverse logistics (BOWERSOX et al., 1986, p. 16).

A Reverse Logistics involves planning almost the same elements of a conventional logistic plan: level of service, warehousing, transport, inventory levels, flow of materials and information system.

Bowersox et al. (1986, p. 267) state that the goal is to obtain fundamental administrative integration across all components in the logistics system. This integration should be pursued at three levels: a) the integration of the components in the areas of physical distribution, b) and c manufacturing support) purchases on a basis of total cost. Then, these three areas need to be coordinated in a single logistical effort. And finally, the logistics company policy must be consistent with the overall objectives and provide support to other areas in the pursuit of these goals. Integrating Reverse Logistics into politics logistics company is today one of the great challenges of Logistics Management.

According Krikke (1998), the differences between the systems with normal flow and logistics Reverse Logistics are four:

a) The first difference is that the traditional logistics ahead is a system where the products are pulled ("pull system"), while the Reverse Logistics is a combination of push and pull products through the supply chain;

b) traditional patterns are basically different logistics, while the reverse flows may be strongly divergent and convergent at the same time;

c) return flows following a diagram of predefined processes in which waste products are processed into secondary products, components and materials. In the ordinary course, this transformation happens in a production unit, which serves as a supplier network;

d) Reverse Logistics in the transformation processes tend to be embedded in the distribution network, covering the whole process of production, supply (discard) the demand (reuse).

All these factors lead to the conclusion that a system of reverse logistics even though it involves the same basic elements of a traditional logistic system must be planned and executed as independent activity. The authors Tibben-Lembke and Rogers (1999) discuss the advantages of outsourcing this area of business. But outsourcing it or not, that most authors believe is that the teams responsible for the traditional logistics and reverse logistics should be independent, since the characteristics of the flows with which they deal are quite different.

Lacerda (2002) identifies six critical factors that influence the efficiency of reverse logistics, these factors are:

a) Good input controls;

b) Processes mapped and formalized;

c) Cycle time reduced;

d) information systems;

e) Network planned logistics;

f) Collaborative relations between customers and suppliers.

The more adjusted these factors, the better the performance of the logistics system.

8. FINANCIAL VIABILITY

The issue of global crisis garbage requires agility and efficiency in the search for alternatives to the treatment and disposal of municipal waste. There are numerous possible solutions, among which, a program to reduce the generation of waste, with posting of industrialization and of course, recycling.

Population increases and the intensity of industrialization become garbage inexhaustible. Of what is produced today in Brazil, 76% are in open dumps (SOUZA, 2004), with a strong commitment to the environment, especially in relation to soil, air and water resources. There is also a social issue of entire families living in garbage dumps around without the smallest hygiene and dignity.

The solid waste management is a fundamental practice in the economies concerned with sustainable development because it takes into account: the importance of environmental preservation, the importance of reducing waste generation and saturation of spaces available for landfills.

Companies need to track the life cycle of their products. This becomes clearer when we observe an increase in the number of companies working with recycled materials. An example of this concern is the Replaneta project, which consists of collecting cans and PET bottles for recycle, and whose base of support for the success of the business automation and efficient reverse logistics operation (FERREIRA, 2002).

The environmental standards and regulations, in particular relating to the waste come forcing logistics operations in their calculations with the "external costs and benefits." And because of this, it is understood that green logistics can be seen as a new paradigm in the industry. The logistics green or ecological acts together with reverse logistics, such as to minimize the environmental impact of waste not only in the sphere of production and post-consumer, but all impacts throughout the life cycle of products (OLIVEIRA 2012).

Reverse logistics can reduce losses with inputs and outputs that would not be recovered, reverse logistics begins when the product is consumed, and this time, the company must be prepared for what Staff (2005) calls 4'Rs: Recovery, reconciliation, Repair and Recycling.

The recovery allows a company to maintain and control the output and reliability of the product, so it is always better on the market. Already reconciliation is the analysis of defective products that are returned to the company, they are evaluated and, if there is no problem, they are re-stored to be sent to market. The repair is the waiting time for the customer that the product is repaired or replaced. And recycling is the return to the cycle of the product that would be discarded by consumers and industry in order to reduce process costs and open new possibilities.

According to Lacerda (2002), the reverse logistics processes have brought considerable returns for companies. The reuse of materials and economy returnable packaging, for example, have generated gains increasingly stimulating new initiatives and efforts for the development and improvement of reverse logistics processes.

In research conducted by Rogers and Tibben-Lembke (1998) with large companies in the United States, showed that over 20% of the companies included in the survey reported that recapture value and recover assets were strategic and another 20% use the capabilities of reverse logistics to protect their profit margins. Among the powers of reverse logistics is also the reuse of goods and products from customers. In the survey, it was observed that auto companies have very liberal return policies and a comprehensive reverse logistics network that allows them to take back parts and components of its resellers. These pieces are often remanufactured. Reverse logistics is a strategic variable for competitive reasons in 65.2% of the respondents in the survey, where most of the retailers and manufacturers have liberalized their return policies during the last years due mainly to competitive pressures.

9. ECONOMIC ASPECTS OF REVERSE LOGISTICS

From a business standpoint, when you mention in supply chain management, reverse logistics and the environment under the economic aspect, the idea is that there will be increased costs and the consequent additional costs in the production process. Actually a well structured management system can be self financing as process changes, waste treatment, reuse of materials make it possible to account for gains. According to Donaire (1995, p 51).

Some companies, however, have shown that it is possible to make money and protect the environment, while not an organization that operates in the Green Market, since companies have a certain amount of creativity and internal conditions that may transform the restrictions and threats into opportunities business.

Among these opportunities can be cited as savings from the recycling of materials that can bring a great resource savings for businesses, and the reuse of waste materials or their sale to other companies, the possibility of developing new products, the use of returnable packaging, the creation of new patents, the development of new production processes, among others.

10. MEASUREMENT OF COSTS AND RETURN ON REVERSE LOGISTICS

In any situation, to establish a measure of measurement is no easy task, especially when it comes to measuring the costs of reverse logistics, as they must be linked to a

specific program and particular reality and structure of each company.

Each department should establish a function of their problems and needs, indicators showing the situation involving the activities of reverse logistics in comparative tables.

Business projects that aim to implement reverse logistics programs need to be funded. Of course, there is the possibility of obtaining third-party resources (funding) and also to undertake the project with their own resources. Both the first and second cases, it is essential to obtaining positive re ults return and profitability, demonstrating the self-financing.

The **RRL_R = Return on Reverse Logistics** is given by the ratio of savings generated by the project and investments and necessary

$$RRL_R = \frac{Economy Generated}{Additional Investments}$$

Funds applied reverse logistics advantages must meet the medium and long term, with the recovery of your spending and repayment of invested capital (additional investment), plus remuneration in the form of interest above the normally obtained in the financial market. Funding for these projects must submit financial and economic viability and then demonstrate your fit with sustainability principles.

The implementation of organizational strategies of a company is dependent on the proper management of projects, programs and portfolios. Accordingly, the financial responsibility increases continuously and its measurement is mandatory. Although today, the use of this tool of analysis is generalized to all kinds of investments, calculating the ROI (return on investment) is however not a "fashion" recent. Already in the Harvard Business Review in 1920 referred to as the measure of ROI analysis essential to know the value of the result of capital investment and in our case the result of RRL_R (return on reverse logistics) will be a direct relationship between the additional investment in the form of capital investment and how this amount will generate gains and operational savings over the current logistics and supply chain management used by the company.

11. FINAL CONSIDERATIONS

The calculation of ROL_R (return on reverse logistics) enables business managers to plan their actions through monitoring of supply chain costs, regarding the evaluation of strategies which can verify both financially and economic feasibility of its implementation.

The proposed model has no news regarding its determination, because although the denominator of return on reverse logistics, it still is the return on investment or ROI. But what we understand as essential for this model to be valid is precisely how much the survey will be saving or saving with the use and implementation of reverse logistics. When analyzing the costs of reverse logistics found significant values, which are almost entirely lead us to discard them. If we analyze based on opportunity costs and the reduction of existing cash disbursements and existing without the project implementation, we derive the relationship between the costs and disbursements and receipts and revenues and then, how much are we really losing or leaving to win.

Depending on the level of activity, such as production volume and sales, generating operating profit and the rate of interest on the loans available in the market, not always a project appears feasible, but like every enterprise needs to capture or create sources of sufficient resources to keep the ROLR (Return on reverse logistics) helps us in making decisions because checks what is the return rate of implementation of reverse logistics in supply chain, as well as composing important information tools for the manager of the company because with this additional information, it will be safer to make their decisions.

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