Logistics and Organizations –
Brazilian and Polish experience

Edited by
Iwona Otola
Marlena Grabowska
Marcelo T. Okano

São Paulo

Centro Paula Souza

2018

Coordination
Prof. Helena Gemignani Peterossi, Ph.D.

Editorial board
Eliane Antonio Simões, Helena Gemignani Peterossi, José Manoel Souza das Neves, Marcelo T. Okano, Marilia Macorin de Azevedo e Sergio Eugenio Menino.

Edited by
Prof. Marlena Grabowska, Ph.D.
Prof. Marcelo T. Okano, Ph.D.
Prof. Iwona Otola, Ph.D.

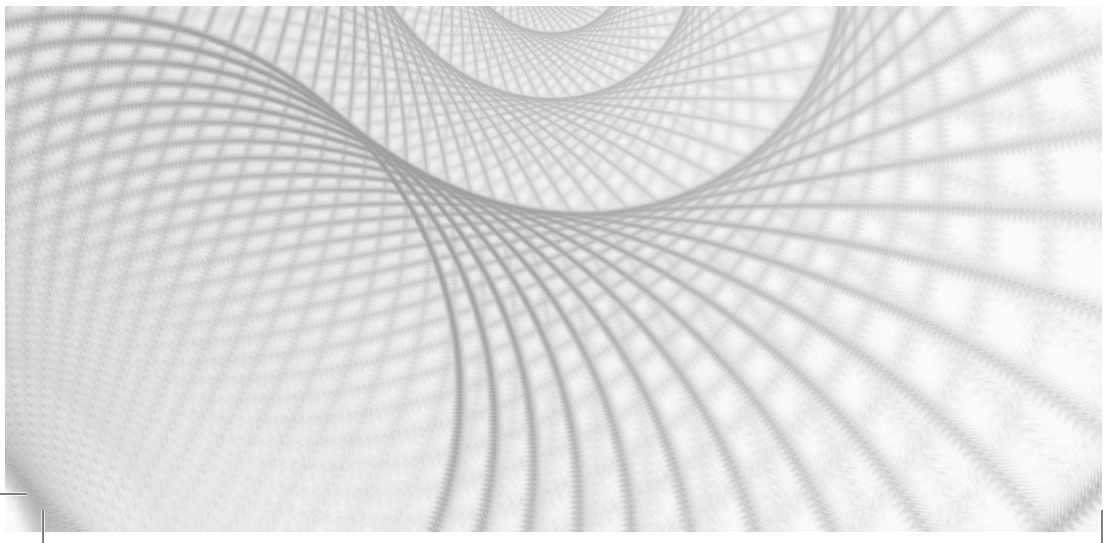
Craphic design, Layout and Cover designer
Urbania Editorial

Printing
Graphium Gráfica e Editora

Logistics and organizations – Brazilian and Polish experience / coordination Helena Gemignani Peterossi ; edited by Marcelo T.
L832 Okano, Marlena Grabowska, Iwota Otola. – São Paulo : Centro Paula Souza, 2018.
176 p.
This book is part of the academic cooperation agreement between Centro Estadual de Educação Tecnológica Paula Souza and Czestochowa University of Technology.
Several authors.
ISBN 978-85-7118-003-1
1. Logistics. 2. Organizations. 3. Corporate management. I. Peterossi, Helena Gemignani. II. Okano, Marcelo T. III. Grabowska, Marlena. IV. Otola, Iwota. V. Centro Estadual de Educação Tecnológica Paula Souza. VI. Czestochowa University of Technology.
CDU 658.5

Unidade de Pós-Graduação, Extensão e Pesquisa do
Centro Estadual de Educação Tecnológica Paula Souza
Rua dos Bandeirantes, 169, Bom Retiro
São Paulo, SP, Brazil, ZipCode 01124-010
Phone: 55-11-3327-3109

CONTENTS



PRESENTATION

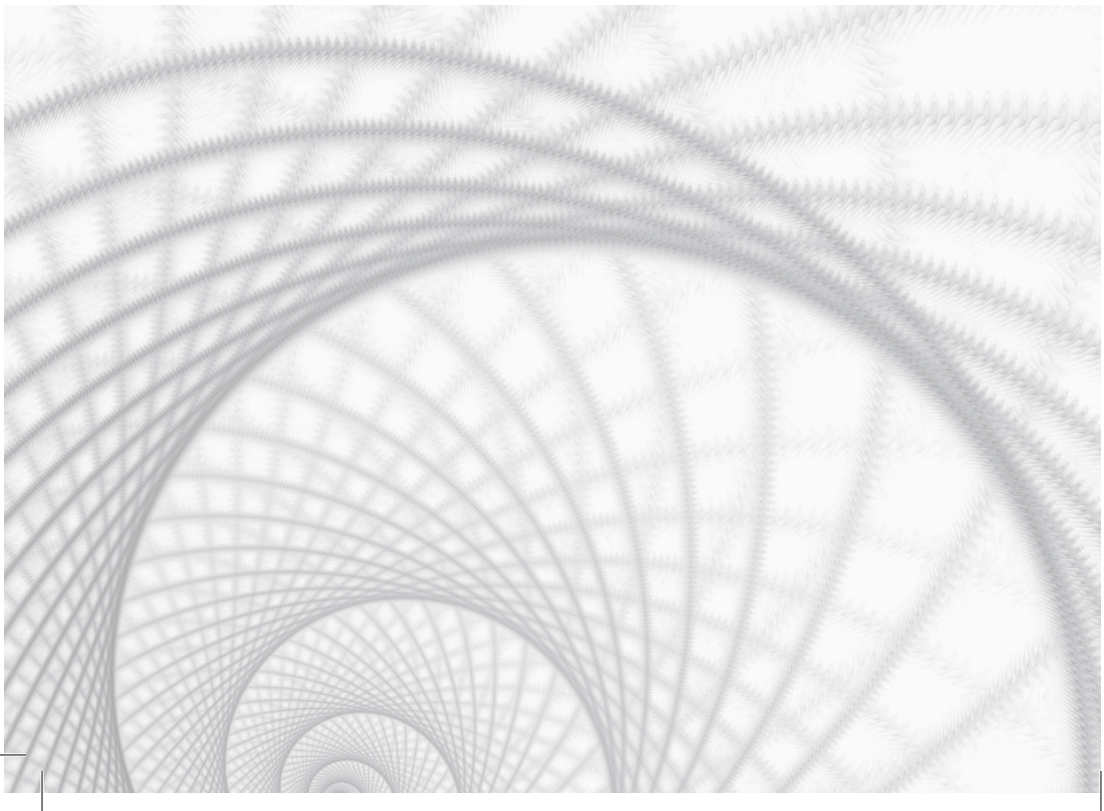
The Postgraduate Programme in Management and Technology of Productive Systems of "Centro Estadual de Educação Tecnológica Paula Souza", complements the nature of the educational action of the institution focused on professional training at its various levels while assuming the challenge of fostering a culture of research and technological innovation within the productive sector through the postgraduate academic training

In this sense, the programme has as differentiated research line the Management of Productive Systems and the Technological Development, which offers students the knowledge to find solutions to practical problems with technological bases that improve applied research in their professional areas. The programme has sought to achieve these objectives through professional training with critical positioning, technical and managerial skills and competencies, which promote a collective efficiency applied to the development, implantation and management of effective productive systems based on scientific methods and focused on the premises of the sustainability.

The "Gestão e Tecnologia em Sistemas Produtivos" collection brings to the public some results of this challenge. The studies and works of professors and students ,converted into the volumes of this collection, offer a sample of the excellence pursued in the training of professionals committed to the postgraduate program and experiences lived in other institutions, such as the Czestochowa University of Technology in Poland.

Thus, the collection is permanently open to contributions from researchers from all areas of knowledge who share the concern to train and qualify in order to improve the Brazilian productive sector in the perspective of innovation.

Professor Helena Gemignani Peterossi, PhD.
Coordinator



PREFACE

The Postgraduate Program in Management and Technology in Productive Systems of the Centro Estadual de Educação Tecnológica Paula Souza, São Paulo, Brazil, and the Faculty of Management of the Czestochowa University of Technology in Poland present the second collection of works of its research professors, initiated in 2017 with the volume "Innovation in business management: Polish and Brazilian experience", fruit of the partnership established by the two institutions of higher education.

Brazil and Poland are mature economies that have led their processes of late industrialization throughout the twentieth century, based on the acquisition and transfer of foreign technology by means of processes of absorption and imitation.

Thus, they have been integrated into a second tier group of world economies, a group of nations that are trying to catch up to those nations of the first-generation industrialization by positioning themselves directly behind the latter ones and continually pursuing the frontier of technological innovation.

A key challenge for Brazil and Poland (and other nations at the same stage of development) is to move from the catching up stage to the diffusion of incremental innovations and join the team of these more developed nations to generate disruptive innovations .

However, the last years of the past century and the first decades of the twenty-first century have witnessed the emergence of a new economy, where leadership is heavily based on a real Technological Revolution of information and communications. Called by various names over time (Economy of Services, Knowledge Economy, Digital Economy, Third Industrial Revolution, Fourth Industrial Revolution) it has led to the breakdown of the paradigms in production methods and ways of doing business.

The new strategies of positioning companies, sectors and nations in global production chains become a vital issue because of the increased standards of competition, which has become a global phenomenon embedded in globalization.

Among the factors that compete for competitive leadership in innovation is the knowledge domain.

During the Technological Revolution knowledge ceased to be just one more factor of production to become the main generator of added value in products and services. As a result, it has also become an asset, a product with investment and consumption value.

Individuals, companies, and society in each nation began to look for ways to produce this asset, this valuable factor with greater efficiency, effectiveness and productivity.

The construction of knowledge goes through academic circles. And more than that, in this also known as Network Society, it is submitted to a collaborative construction between institutions for optimization of resources and maximization of results.

The cooperation agreement between the two institutions of higher education aimed at vocational and technological education emerged from the interest of its researchers in the subject of innovation management, inserted in business and productive systems.

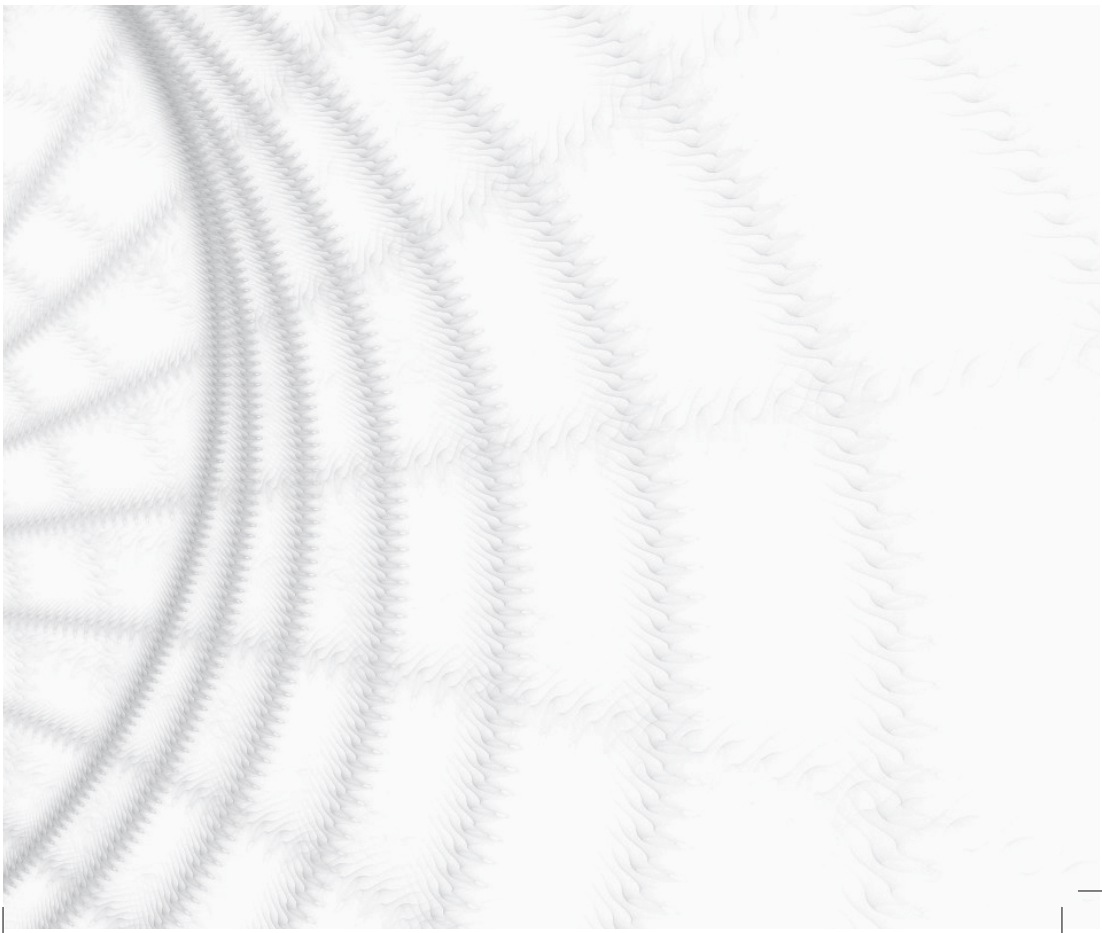
In the first collection (2017) the chapters were dedicated to the general subject of innovation management. In this second collection, the works are presented under the particular aspects of innovation in the area of logistics operations management.

Operations and logistics management, with all the changes being described within the production systems, has become one of the key sectors for increasing productivity and consequently the business competitiveness. Operations and logistics in companies began to incorporate more and more knowledge, organizational and technological innovations in the performance of their duties.

The works are authored by the faculty researchers of the two institutions, followed in many of them by the students under their guidance and they reflect results of research projects, case studies and action research as well as development of technologies applicable to the area.

Topics related to the area of operations and logistics include: supply-chain management, cargo transportation, security, social and industrial ecology aspects, business modeling, applied information technology and technology development.

Helena Gemignani Peterossi
Sergio Eugenio Menino



BUSINESS MODELS IN POLISH AND BRAZILIAN LOGISTICS JOINT-STOCK COMPANIES

Marlena Grabowska

Abstract: In the literature, business models are often considered in general, without setting them within specific sectors. With the specific nature of activities in certain business sectors, the proper approach is to examine and analyse the concepts of business models across the sectors, which would allow for searching common features of business models in similar forms of business activity. The study attempted to compare business models in Polish and Brazilian logistics enterprises. The relevance of this topic results mainly from the importance of business models in building the competitive advantage and creation of business entity value. It was demonstrated that the similarity of the analysed countries in terms of their being numbered among emerging markets is not correlated with similarity of the business models used by the biggest logistics joint-stock companies.

Introduction

Businesses should be managed using a specific logic. Creation of an entrepreneurial idea represents the prerequisite for the initiatives that the enterprise implements. It is critical for each enterprise to determine the methods and actions that reflect the conceptual system of activity and achievement of the goals. Each business entity needs to create a tool which would schematically reflect the business concept and business plan. These generalizations concern a complex phenomenon understood in the literature as a business model.

The main goal of the study was to compare business models in Polish and Brazilian logistics enterprises. Empirical examinations were performed in this area. The relevance of this topic results mainly from the importance of business models in building the competitive advantage and creation of business entity value. The conditions of operation of joint - stock companies, which represent the basis for the development of business models in the two examined countries, differ dramatically. Nevertheless, the basic similarity and motivation for the analysis of business models in Polish and Brazilian entities is that they are numbered among emerging markets1 which are characterized by fast business growth and high level of investments. Therefore, it can be indicated that both Poland and Brazil have seen transition from the developing towards the developed economy. With particular focus on the importance of logistics companies, which are characterized by a broad and varied range of mutual cooperation-based and commercial relations with the contractors who perform logistics services, it is justified to examine the differences and similarities of business models in logistics companies from these two countries.

1 *According to the survey by Morgan Stanley Capital International (MSCI), both Poland and Brazil are numbered among emerging markets. – See. https://www.msci.com/emerging-markets*

1. Idea of business models

In general terms, model means a simplified image of the reality. Therefore, it can be indicated that business model is a simplified image of business reality and, therefore, the pattern of business actions. The interest in these issues in the literature goes as far as the 1950s of the last century and has its genesis in the mathematical modelling of sources of incomes in business simulation. The concept was used for the first time by R. Bellman and C. Clark in the paper that described multipersonal business games.[2] Since that moment, the problems of business models have been discussed in scientific literature while revealing various aspects of the problem.

With reference to the context of the meaning of the business model concept, it can be indicated that the term has been widely and unequivocally interpreted in the literature. The definitional approaches to business models have often accentuated various factors that characterize this concept. Scientific studies have presented leading and often similar categories that emphasized the idea of a business model. The major mainstreams that characterize this problem can be indicated, reflected by the definitions of business model. For instance, the definitions of the concept of business model use the following phrases:[3]

– approach to generating income,
– combination of assets that provide the organization with the capabilities to create value,
– description of business activities,
– plan used for designing the strategy,
– organization logic concerning creating value,

2 *R. Bellman, C. Clark,* On the Construction of a Multi - Stage, Multi - Person Business Game, *"Operations Research", 1957, No. 4, pp. 469-503.*

3 *A broad overview of definitions and components of business model was presented in the study by T. Felencikowski* Spójność modeli biznesu. Koncepcja i pomiar, *CeDeWu, Warsaw 2013.*

– description of relations that occur between key stakeholders,
– idea of managing transactions which is aimed at creating value,
– system of activities that describes business,
– description of business actions,
– concept of the operation of the business,
– the system of the interrelated elements which act on each other in time,
– method of doing business,
– conceptual tool that expresses business logic of the enterprise,
– reflecting methods to achieve adequate economic results,
– approach to the method of creating value
– description of creating and gaining value.

Analysis of this set of concepts allows for observing that the researchers who described and defined business models have often focused on a widely understood concept of value and description of the method of creating the value. For example, an integral correlation between the idea of business model and value has been emphasized by such renowned authors as R. Amit and C. Zott, who argued that business models express contents, structures and principles of managing transactions in order to produce values through utilization of business opportunities.[4] A. Osterwalder and Y. Pigneur defined business model in a manner the organization creates, supplies and captures value.[5] Similar approach to this problem was presented by H.W. Chesbrough, who claimed that a business model describes creation and gaining value.[6]

Therefore, the principal keynote of the definition of business model is value. Value is one of the principal components of these definitions. It can

4 *R. Amitt, C. Zott C.* Value creation in e-Business, *"Strategic Management Journal", 2001, 22(511), p. 493.*

5 *A. Osterwalder, Y. Pigneur,* Business model generation, *Wiley, New Jersey 2010, p.14*

6 *H.W. Chesbrough,* Business model innovation, it's not just about technology anymore, *"Strategy and Leadership", 2007, Vol. 35(6) 12-17.*

be demonstrated that the value generated based on the business model is used both for strengthening of relations with customers and it is useful in supporting competitive position of the enterprise and creation of competitive advantage in the enterprise over its market competitors.[7] It should be emphasized that the development of the theory and application studies connected with business models have been mainly connected with the usefulness of the business model for building a transparent concept of creating value and development of the business architecture and searching for instruments and methods to achieve competitive advantage.[8]

However, the value presented in these definition approaches is not a uniform category and is approached in various contexts. These concern e.g. creating, capturing and supplying the value. Furthermore, with regard to the entities that the value is attributed to, the definitions of business model in this area indicate mostly not only customers but also other stakeholders to be direct beneficiaries of value. For example, it can be indicated that apart from the concept of business model in the conventional meaning, the concept of social business model[9], with its components, similar to the conventional business model, are value proposition and value constellation. Nevertheless, the third component of the conventional business model, i.e. profit equation, was not replaced by the economic profit equation and social profit equation. However, value proposition and value constellation in this case are not focused only on the customer, by they concern all stakeholders. Furthermore, the significant stress in the concept of social business model is not on maximization of financial profits but also on social problems.

---

7 *M. Grabowska,* Value as a Principal Dimension in Business Model, *[in:] 15th International Academic Conference, Rome, Italy (14 to 17 April 2015), International Institute of Social and Economic Sciences (IISES), Prague, 2015, p.352.*

8 *J. Brzóska, D. Jelonek,* Koncepcja pomiaru wartości tworzonej przez aplikacje modeli biznesu. Podstawy teoretyczne i studium przypadku, *„Przegląd Organizacji", No. 9, 2015, pp. 48-55.*

9 *M.T. Okano,* Interorganisational networks and social innovation: a study in milk production chain, *"Int. J. Innovation and Sustainable Development", 2017, Vol. 11, No. 4, 2017, p. 322-327.*

Furthermore, they refer to other aspects of business model concept. It should be emphasized that market success in contemporary economic conditions is inseparably connected with continuous verification of the model. In this context, the view that to build a good business model is often better than to be the first to reach the market should be also mentioned.[10] Business model is not given once and for all but is constantly modified, adjusted to the requirement of the market.[11] With fast rate of innovations, changes in legal regulations, changes in customer tastes, actions of competitive enterprises and increasingly short market cycles, more and more enterprises decide to redefine their business models. As a response to such activities, enterprises make decisions about modifications, change, and even entire reorganization of their business models.

2. Business models in logistics enterprises

In the literature, business models are often considered in general, without setting them within specific sectors. With the specific nature of activities in certain business sectors, the proper approach is to examine and analyse the concepts of business models across the sectors, which would allow for searching common features of business models in similar forms of business activity. However, this analytical concept does not negate individuality and originality of the business model implemented in this business entity and relates to presentation of general solutions dedicated to the specific sector. Therefore, this involves creation of a general

10 *R. de S. Fabricio Jr., F.R. da Silva, E. Simoes, N.V. Galegale, G.K. Akabane G.K.*, Strengthening of Open Innovation Model: using startups and technology parks, *[in:] A. Dolgui, J. Sasiadek M. Zaremba (eds.), Proceedings of the 15th IFAC Symposium on Information Control Problems in Manufacturing INCOM 2015, IFAC-PapersOnline Vol. 48(3), p. 15.*

11 *I. Otola, M. Grabowska,* Zmiany w modelach biznesu w przedsiębiorstwach inteligentnych, [in:] Zarządzanie przedsiębiorstwem inteligentnym. Wybrane zagadnienia *(ed.) Gregorczyk S., Mierzejewska W., Oficyna Wydawnicza Szkoła Główna Handlowa w Warszawie, Warsaw 2016, pp. 85-96.*

design that is characteristic of activities in an economic sector and starting activities to monitor threats and contribute to indicating adequate preventive measures. Therefore, the analysis of business models functioning in individual sectors may become a modern method and tool for evaluation of enterprise activity.

While referring these problems to logistics enterprises, one should focus on the principal character of activities of these entities. Logistics enterprises provide services of forwarding, transport, warehousing and related services and those that support the process of flow of goods between the supply chain links. One should emphasize that the supply of services offered by logistics enterprises is complex and does not have a uniform character. In this area, there are entities which are responsible for forwarding and transport, which can be national or international, and performed within specific modes (e.g. automotive, rail, maritime, air transport). The logistics enterprises also include logistics operators, combined transport operators, warehousing and distribution centres, airports and seaports and logistics electronic platforms.

Previous studies devoted to the logistics sector identified business models with various types of logistics service-providers, characterized by various scopes of logistics activities.[12] With regards to the criterion of the degree of complexity and correlations of the provided logistics services, the related literature distinguishes between five principal groups that classify logistics services:[13]

– 1PL (First Party Logistics Service Provider) – which involves internal logistics of a producer,

---

12 *M. Zysińska,* Koncepcja modelu biznesowego i jej znaczenie w analizie przedsiębiorstw branży TSL, *Transport Samochodowy, 4 (2013), p. 46.*

13 *W. Rydzkowski, A. Trzuskawska-Grzesińska,* Rozwój logistyki kontraktowej 3PL i 4PL na świecie i w Polsce. [in:] Nowe wyzwania-nowe rozwiązania. Materiały konferencyjne Polskiego kongresu Logistycznego Logistics 2008, *ILiM, Poznań 2008, p. 107; Rynek usług logistycznych, ed. M. Ciesielski, Difin, Warsaw 2005, p. 16; Z. Jedynak,* Struktura przedsiębiorstw logistycznych, *Zeszyty Naukowe Politechniki Śląskiej 2015. Seria: Organizacja i Zarządzanie, No. 82 (1940), p. 93.*

– 2PL (Second Party Logistics Service Provider) – concerning performing simple logistics services (i.e. transport, forwarding, warehousing),
– 3PL (Third Party Logistics Service Provider) – relating to performing comprehensive services, including forwarding, transport, warehousing and a range of services, such as value-added services,
– 4PL (Fourth Party Logistics Service Provider) – aimed at integration of processes along supply chains and planning, coordination and control of the network of supplies,
– 5PL (Fifth Party Logistics Service Provider) – which consist in managing all the entities in the supply chain combined with e-business

With these criteria, it can be indicated that the 1PL and 2PL models are characterized by a substantial simplicity of the performed services but also high capital intensity and demand for the material resources necessary for performance of logistics services. Furthermore, the least capital-intensive are 4PL and 5PL models, which mainly focus on the processes of logistics management based on the extended communication and information area.

With more detailed investigations of business modelling in the logistics sector, one can cite the view that has been presented in the literature, pointing to five business models in the logistics sector. Their classification is connected with such dimensions of business model as value of services for the customer, enterprise resources, value chain (being the series of activities performed inside the enterprise) and serviced market segments. This leads to distinguishing between the following business models typical of the logistics sector:[14]

14 *M. Zysińska,* Koncepcja modeli biznesowych w branży TSL i ich klasyfikacja, *„Autobusy. Technika, Eksploatacja, Systemy transportowe", 3(2013), pp. 615-617.*

– *A model:* the entities performing standard logistics services; this group includes transport enterprises or those that offer rent of warehousing space and provide simple services in such areas. The major sources of value for customers include in this case financial benefits, related in particular with the price of services and terms of payment. Another resource of the entities that use this business model is infrastructure and means of transport. In the case of the series of operations, processes and activities performed inside the enterprise are termed value chain, which is not complex. It should be emphasized that due to a high number of competitors, the entities that perform standard logistics services have poor bargaining power with respect to suppliers and recipients.

– *B model:* conventional logistics services operator; in this model, the source of value for the customers is also financial benefits. These entities play a passive role in the supply chain i.e. they perform contracted logistics and transport processes without maintaining the control over the entirety of their performance. Competitiveness is achieved through cost advantage. This model is typical of the enterprises with relatively high scale of activity and established position in selected national market segment.

– *C model:* specialists and operators of niche services: in the case of this model, the source of basic value to customers is not financial benefits but other reasons i.e. supply safety. The resource potential of enterprises that perform this business model is high, with the principal source of competitive advantage being the developed competencies, knowledge of the market or the recognizable brand.

– *D model:* leading logistics services operator; the enterprises which use this business model have a substantial and established market

share and developed partnership relations with suppliers and recipients. The source of value for customers is both financial and non-financial benefits of the performed logistics services. Such entities have substantial resources and extended value chain which they usually control strategically. Therefore, they have a high bargaining power compared to suppliers and recipients. This model allows for increasing international expansion.

– *E model:* logistics services integrator; this model is used by entities with the highest level of maturity in the logistics sector. Value to customers is build based on financial and non-financial benefits. This type of enterprises is characterized by a high and unique resource potential, which includes in particular the exceptional managerial competencies, advanced IT systems and well-recognizable brand. In this case, the key area of activities is focused on managing the integrated supply chain and the related risk. Nevertheless, it should be noted that most of logistics operations in this business model are subcontracted, whereas a high competitive position of the entities is based on the synergy effect of internal and partners' activities created by the network of enterprises.

In conclusion of the examinations, it can be indicated that the most developed business model in logistics enterprises is the E model, whereas the least - the A model. The presented models differ in particular with their degree of complexity and, therefore, they are characterized by different proposal of value for the customer, individual resources necessary for the activity, specific series of activities performed inside the enterprise and own market segments. Depending on the method of managing these four dimensions by the enterprise, a business model is obtained, characterized by various level of development, which in the logistics sector means various range of services.

3. Business models in Polish and Brazilian logistics (transport) enterprises: a case study

The empirical examinations were based on the analysis of business models in Polish and Brazilian logistics (transport) companies listed in the stock exchanges. These assumptions led to distinguishing of five entities listed in the Warsaw Stock Exchange and seven companies listed in the BM&F BOVESPA S.A., a stock exchange in São Paulo. List of the entities analysed in the study is presented in Table 1.

Table 1 — List of Polish and Brazilian logistics (transport) joint-stock companies

Polish companies		Brazilian companies	
Name	**Quotation market**	**Name**	**Quotation market**
ENTER AIR S.A.	Main Market	AZUL S.A.	N2
OT LOGISTICS S.A.	Main Market	GOL LINHAS AEREAS INTELIGENTES S.A.	N2
PCC INTERMODAL S.A.	Main Market	LOG-IN LOGISTICA INTERMODAL S.A.	NM
PKP CARGO S.A.	Main Market	COSAN LOGISTICA S.A.	NM
TRANS POLONIA S.A.	Main Market	RUMO S.A.	NM
		JSL S.A.	NM
		TEGMA GESTAO LOGISTICA S.A.	NM

Source: author's own study based on: www.bmfbovespa.com.br and www.gpw.pl

While bringing closer the structure of the capital market in the two examined countries, one should conclude that there are segments of quotations in the São Paulo stock exchanges which depend on the imple-

mented corporate governance standards. Therefore, there are such segments as:[15] Novo Mercado (NM – designed for trading shares issued by the companies that adopt corporate government practices that go beyond the requirements specified by Brazilian legislation (listing in this special segment involves adoption of a set of corporate governance principles that improve shareholders' rights and contribute to building the structures of monitoring and control), Nivel 1 (N1 – in this segment, companies are obliged to improve the methods to reveal information in the market and distribute their shares among as many shareholders as possible), Nivel 2 (N2 – companies of this market, apart from the obligations as in Nivel 1, have to adopt and respect substantially more practices of the corporate governance and minority stakeholder rights, Bovespa Mais (BM – segment designed for entities that want a gradual access to the formal market, with the goal of this segment being to support the development of small and medium-sized enterprises through capital market), and Bovespa Mais Nivel 2 (segment also for small and medium-sized enterprises through capital market; in this case, the capital offers can be designed for selected investors and, in general, have medium- and long-term perspectives).

In the Warsaw Stock Exchange, the companies can be listed in the Main Market and the NewConnect.[16] The Main Market is the principal system of financial instruments turnover. It operates in a constant and organized manner and is supervised by the Financial Supervision Authority. It provides all the participants with general and equal access to market information at the same time and the same conditions of purchasing and sale of these instruments. The NewConnect market is designed to finance and help develop small and medium-sized entities with high growth potential. It represents the proposal for investors that accept elevated risk in exchange for potentially high return on investments. Table 2 presents the results of the examinations of the business models used in Polish logistics companies.

15 http://www.bmfbovespa.com.br/en_us/listing/equities/listing-segments/about-listing-segments/

16 https://www.gpw.pl/

Table 2 — Business models in Polish logistics companies

Name	Business model	Description of model functioning
ENTER AIR S.A.	C model: specialists and operators of niche services	the company's incomes are obtained due to services of international charter of the flights; it has a specialized resource potential in the form of several airplanes and increases the scale of activities in foreign markets; the services are uniform; the company has constant recipients and maintains partnership relations with them; the bargaining power of the company is strong
OT LOGISTICS S.A.	D model: leading logistics services operator	the company is the biggest port operator in Poland, southern Baltic Sea and in Croatia, leader in inland water transport from Kaliningrad, Russia through to ports in Germany and the Netherlands; the company includes the entities specialized in road transport, rail transport, forwarding and logistics; the bargaining power of the company is first and foremost complex range of services, several years of experience and specialization of individual companies, the range of services is international
PCC INTERMODAL S.A.	E model: logistics services integrator	the company organizes intermodal transport and forwarding services, uses the services of subcontractors, has a insignificant amount of material resources and its activities are performed mainly based on tenancy and lease contracts, the scope of activities is international, and the range of serviced market segments is narrow
PKP CARGO S.A.	C model: specialists and operators of niche services	the company is a leader in the market of rail transport in the country and one of the biggest operators in the European market and has constant recipients with strong relationships; the company is responsible for two thirds of the market of coal transport in Poland according to the transport work and has strong bargaining power
TRANS POLONIA S.A.	C model: specialists and operators of niche services	The company organizes the transport of liquid goods, has specialized resource potential in the form of tractor units, semitrailer tankers, tank containers and container chassis; the area of activities includes both the national market and international markets, especially Western Europe; transport services are performed mainly based on long-term contracts and concern the vehicle fuel transport

Source: author's own study based on the reports of the boards of managers in these companies

Description of the business models which function in Brazilian logistics companies was presented in Table 3.

Table 3 — Business models in Brazilian logistics companies

Name	Business model	Description of model functioning
AZUL S.A.	C model: specialists and operators of niche services	the company offers services in terms of logistics transport and is the biggest airline in Brazil in terms of the number of flights and destinations; the source of value is cost advantages; the company has a well-recognized brand and experienced team of managers, with material resources based mainly on a well optimized aircraft fleet
GOL LINHAS AEREAS INTELIGENTES S.A.	C model: specialists and operators of niche services	the company organizes passenger air transport; it is an airline that transports most of the passengers in Brazil, with also important share in the world market and high material resources in the form of the aircraft fleet, well-recognizable brand; the source of value is non-cost benefits i.e. varied and specialized services; the source of competitive advantages is managerial competencies and knowledge about the market
LOG-IN LOGISTICA INTERMODAL S.A.	D model: leading logistics services operator	the company offers intermodal transport services and services of logistics planning; it has a specialized and unique resource potential, plays an important role in the supply chain and performs activities in various market segments
RUMO S.A.	D model: leading logistics services operator	the company is the biggest logistics operator in Latin America, with independent railway and substantial material resources; it combines intermodal logistics projects with rail transport; it has well-developed partnership relations with customers; it runs the activities in various market segments
JSL S.A.	D model: leading logistics services operator	company offers a wide range of logistics services i.e. from transport of goods through to complete outsourcing of logistics services to many sectors; it is a leader in the logistics market and has the biggest portfolio of logistics services in Brazil and operates in many market segments
TEGMA GESTAO LOGISTICA S.A.	B model: conventional logistics services operator	the company offers services focused on road transport and warehousing; it has substantial material resources and offers solutions adjusted to the needs of various segments of the industry

Source: author's own study based on the reports and websites of the companies

Based on the business models in the entities studied, one can indicate that a model of specialist and operator of niche services is dominant in Polish joint-stock companies. In Brazilian companies, most entities function as leading logistics services operators. Therefore, it can be concluded that Polish joint-stock logistics companies are mainly focused on narrow areas of their operations. These companies play an important role in the value chain, but this role is passive as it consists in performing contracted and specialized logistics processes. In the case of most of Brazilian joint-stock logistics companies, this role consists in coordination and characterizes the situation where the company maintains full control over the chosen processes or most of processes in the supply chain.

4. Conclusion

In conclusion of the above investigations, it should be emphasized that logistics companies are very important for functioning of the economy of each country. In these terms, due to a wide range of cooperation and commercial relations, the entities operating in the logistics sector play an important role. Therefore, there is the need for monitoring of the enterprises that function in this sector using a wide range of analytical tools. One of the methods to diagnose the sector and its entities is to verify their business models. The lack of consistency in the literature concerning the concept of business models in the logistics sector should also be indicated. In general terms, creation of a business model typical of logistics entities would allow for presentation of the methods to achieve the results in the enterprises from this sector of business. Nevertheless, creation of the business model which is separate for the specific sector requires adoption of certain generalizations, whereas the concept presented in this manner is usually schematic and simplified.

In consideration of the research perspective, the substantial differences that occur between Polish and Brazilian business models used by joint-

stock logistics companies should be also emphasized. First and foremost, Polish companies show specialization of services dedicated to a concrete group of customers. In Brazilian companies, the focus is on integration of all or a substantial part of logistics services. The range of activities and, consequently, the scope of the resources used, is also substantially different. Therefore, it can be indicated that the similarity of the analysed countries, in terms of their being numbered among emerging markets is not correlated with similarity of the business models used by the biggest logistics joint-stock companies.

REFERENCES

Amitt R, Zott C. *Value creation in e-Business,* "Strategic Management Journal", 2001, 22(511).

Bellman R., Clark C., *On the Construction of a Multi - Stage, Multi - Person Business Game,* "Operations Research", 1957, No. 4.

Brzóska J., Jelonek D., *Koncepcja pomiaru wartości tworzonej przez aplikacje modeli biznesu. Podstawy teoretyczne i studium przypadku,* "Przegląd Organizacji", Nr 9, 2015.

Chesbrough H.W., *Business model innovation, It's not just about technology anymore,* "Strategy and Leadership", 2007, Vol. 35(6).

Fabricio Jr. R. de S., da Silva F.R., Simoes E., Galegale N.V., Akabane G.K., *Strengthening of Open Innovation Model: using startups and technology parks,* [in:] A. Dolgui, J. Sasiadek M. Zaremba (eds.), Proceedings of the 15th IFAC Symposium on Information Control Problems in Manufacturing INCOM 2015, IFAC-PapersOnline Vol. 48(3).

Falencikowski T., *Spójność modeli biznesu. Koncepcja i pomiar*, CeDeWu, Warszawa 2013.

Grabowska M., *Value as a Principal Dimension in Business Model,* [w:]

15th International Academic Conference, Rome, Italy (14-17 April 2015), International Institute of Social and Economic Sciences (IISES), Prague, 2015.

https://www.gpw.pl/

http://www.bmfbovespa.com.br

https://www.msci.com/emerging-markets

Jedynak Z., *Struktura przedsiębiorstw logistycznych*, Zeszyty Naukowe Politechniki Śląskiej 2015. Seria: Organizacja i Zarządzanie, No. 82 (1940).

Okano M.T., *Interorganisational networks and social innovation: a study in milk production chain*, "Int. J. Innovation and Sustainable Development", Vol. 11, No. 4, 2017.

Osterwalder A, Pigneur Y, *Business model generation*, Wiley, New Jersey 2010.

Otola I., Grabowska M., *Zmiany w modelach biznesu w przedsiębiorstwach inteligentnych*, [w:] *Zarządzanie przedsiębiorstwem inteligentnym. Wybrane zagadnienia* (eds.) Gregorczyk S., Mierzejewska W., Oficyna Wydawnicza Szkoła Główna Handlowa w Warszawie, Warszawa 2016.

Rydzkowski W., Trzuskawska-Grzesińska A., *Rozwój logistyki kontraktowej 3PL i 4PL na świecie i w Polsce*. [W:] *Nowe wyzwania-nowe rozwiązania*. Materiały konferencyjne Polskiego kongresu Logistycznego Logistics 2008, ILiM, Poznań 2008, s. 107.

Rynek usług logistycznych, ed. M. Ciesielski, Difin, Warszawa 2005.

Zysińska M., *Koncepcja modeli biznesowych w branży TSL i ich klasyfikacja*, "Autobusy. Technika, Eksploatacja, Systemy transportowe", 3(2013), pp. 615-617.

Zysińska M., *Koncepcja modelu biznesowego i jej znaczenie w analizie przedsiębiorstw branży TSL*, "Transport Samochodowy", 4 (2013).

THE ROLE OF A SOCIAL ENTERPRISE IN REVERSE LOGISTICS: A STUDY OF THE PRODUCTIVE SYSTEM OF A RECYCLING COOPERATIVE

Graziela Bizin Panza, Marcelo T Okano, Eliane A Simões

Abstract: The objectives of this research are to verify the social and economic characteristics of the cooperatives through the Social Business Model Canvas and what are the benefits to the reverse logistics of the agreement between cooperatives and companies and associations of manufacturers. The qualitative approach will be used in this research, and the method to be employed is the multiple case study, where more than one object of study will be considered, with an exploratory and descriptive character. The objectives were achieved, the reverse logistics productive chain of a recycling cooperative can be mapped. The main social characteristics are to perform the correct waste disposal for large generators; cleaning, correct disposal, collection and sorting of garbage for the municipalities and income, work, education, rescue of citizenship and self-esteem for the members. The economic characteristics are that the cooperatives have agreements or partnerships with the prefectures that provide sheds, trucks for collections, water and light; the main source of revenue is the sale of recyclable material; providing services to large generators is another source of revenue and partnerships are important for cooperatives.
Keywords: Recycling cooperative, Reverse Logistics, Social enterprise.

1. Introduction

Recycling cooperatives have played an important role in the post-consumer reverse logistics of various products, although legislation requires manufacturers to be responsible for the return of manufactured products, several production chains have not yet been able to implement their reverse logistics system.

Some initiatives by companies and manufacturers associations with recycling cooperatives have resulted in a kind of informal and social reverse logistics, where in addition to environmental and social benefits, companies and associations become partners in recycling cooperatives.

These initiatives, on the side of cooperatives, allow them to have a form of revenue, create their own productive chain and transform themselves into social enterprises, where the main objective of a social enterprise is to deliver social value and not profit maximization (Defourny & Nyssens, 2010)

The objectives of this research are to verify the social and economic characteristics of cooperatives through the Social Business Model Canvas and what are the benefits to the reverse logistics of the agreement between cooperatives and companies and manufacturers' associations.

2. Reverse logistics

Recently, reverse logistics has gained importance in the business environment due to environmental concerns, legislation, corporate social responsibility and sustainability (AGRAWAL; SINGH; MURTAZA, 2015).

Although reverse logistics research has evolved in recent years, the term environment was first added to reverse logistics by Carter and Ellram (1998). However Roger and Tibben Lembke (1999) defined the

purpose of reverse logistics as: "process of planning, implementing and controlling the flow of finished products and their information, from the point of consumption to the point of origin, seeking its recovery of value or appropriate destination ".

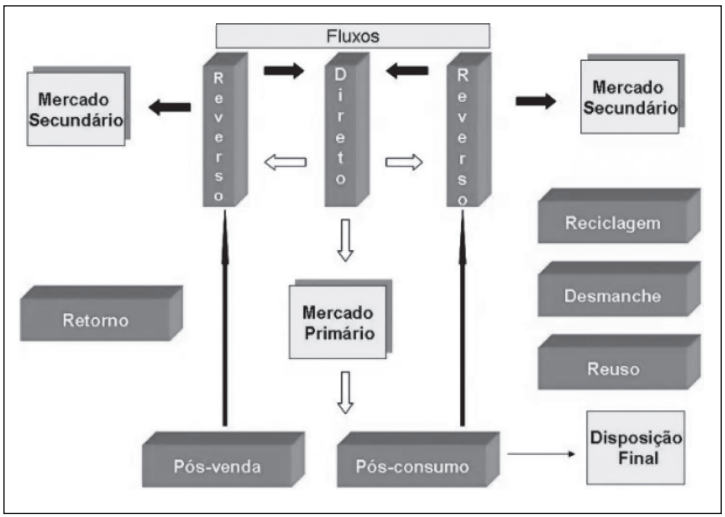
For Caxito (2012) reverse logistics deals with the movement between the final destination of the product until its return to the business cycle, or adequate final disposal. It deals with the return to the productive centers of materials, products and packaging, that is, the management of the inverse path of materials.

For Leite (2009), reverse logistics is the area that deals with the flow of post-consumer goods and after-sales from their point of consumption to their place of origin, aiming to return them to the production cycle through reverse channels. The reverse logistics of after-sales goods deals with the return of goods to the manufacturing cycle of manufacturing companies immediately after their sale, such as products sold with defects but still under warranty. The reverse logistics of post-consumer goods deals with the return of goods at the end of their useful life to the manufacturer.

In figure 1, one can observe the flow of the products in the direct and reverse distribution channels. The flow of products in the direct distribution channel begins with the acquisition of the primary raw materials until the arrival in the primary market, through distributors or wholesalers reaching the final consumer / retail (LEITE, 2009).

The reverse flow distribution channels are constituted by the reverse flow of a portion of products and materials from the disposal, at the end of its useful life, returned to the production cycle through three subsystems or reverse channels: reuse, remanufacturing and recycling. According to Leite (2009), there is the possibility that some of these post-consumption items may be taken to safe or controlled final disposal systems that do not pollute or cause major environmental impacts.

Figure 1 — direct and reversal distribution channels



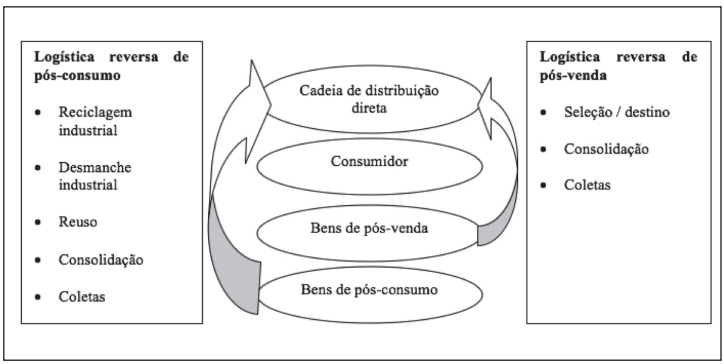
Source: Leite, 2009

With regard to reverse logistics and after-consumption reverse channels, product manufacturers should be concerned about their return, their packaging and other materials, to their production chain. In addition, solid waste is collected and returned to the production cycle of the manufacturing company itself, after being discarded by consumers as a result of its use. Therefore, the company does not become responsible solely for the manufacture and correct use of its products, and must also deal with the disposal and collection of the product at the end of its useful life so that it is not disposed of inappropriately in the environment.

Figure 2 shows the areas of reverse logistics, which have been treated independently, being differentiated by the product life cycle in the return process, being these reverse logistics post-consumption and after-sales. Post-consumer reverse logistics also equates and operates the physical flow and the information regarding end-of-life goods

discarded by consumers in general, which return to the production cycle through the appropriate reverse distribution channels. According to Leite (2009), its strategic objective is: "to add value to a logistic product made up of goods insensitive to the original owner or that still have conditions of use, to products discarded because their useful life has come to an end or waste industrial ". Such products can come from disposable or durable goods and transit through the reverse subsystems such as reuse, remanufacturing, recycling or adequate final disposal (LEITE, 2009). In figure 2, the collection is presented among the post-consumer reverse logistics channels.

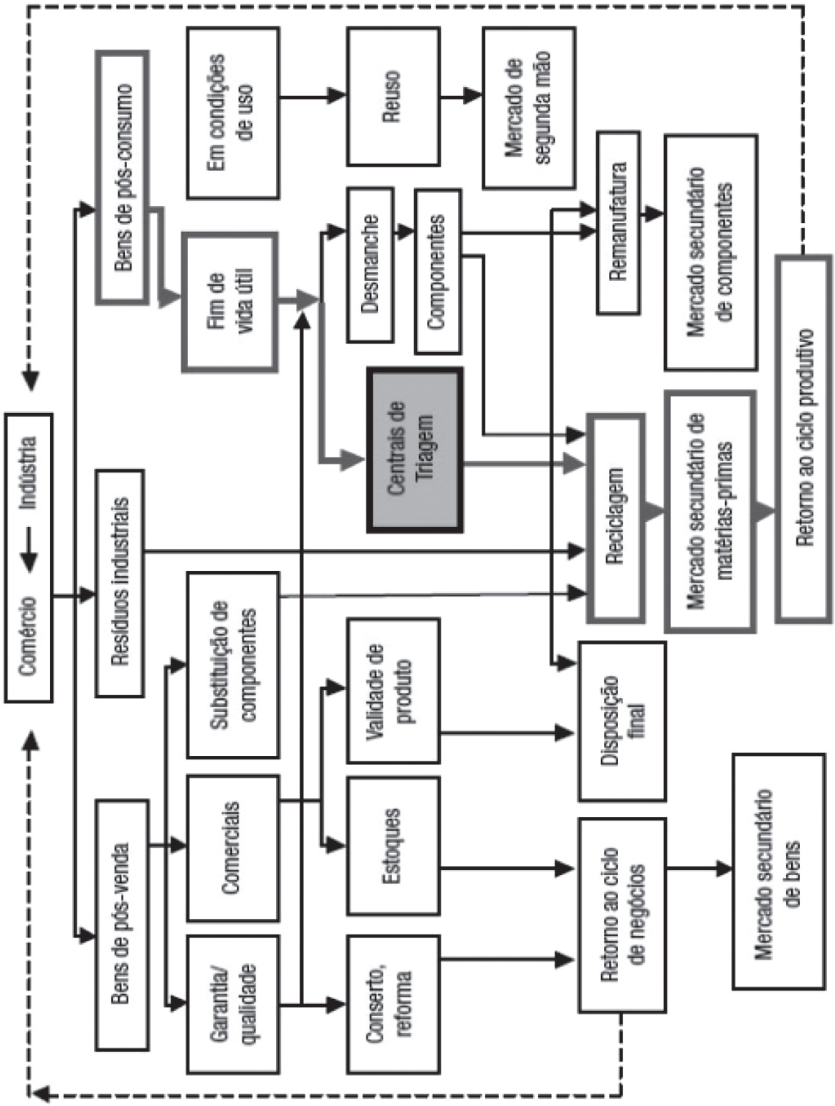
Figure 2 — Reverse logistics and its areas of action



Source: Leite, 2009

In this study, the reverse distribution channels called post-consumption will be considered. According to Leite (2009), this distribution channel is formed by different modalities of return to the manufacturing cycle until the end of its useful life, being subdivided into reuse, dismantling, recycling and collection. The main modality to be studied will be the selective collection of recyclable material, and the development of social enterprises within the post-consumer reverse logistics chain, considering recyclable materials collectors as the object of study.

Figure 3 — Focus on reverse logistics



Source: Souza; Paula; Pinto, 2011; Leite, 2009.

According to law n.12.305 / 2010, reverse logistics enables economic and social development through its activities, as it facilitates the collection and return of solid waste to the industrial sector, so that the waste material is reused in the production cycles, or receive adequate environmental allocation (BRASIL, 2010).

Thus, the purposes of the cooperatives and associations of collectors are focused on the generation of work, the search for the improvement of the living conditions of the members and associated, as well as the distribution of income, and consequently environmental preservation.

In figure 3 of Souza; Paula; Pinto (2011) and Leite (2009), one can observe the interactions between post-consumption and post-sale reverse logistics. In figure 3, according to activities classified as "end of life", are subsystems dismantling, components and recycling. It was added to figure 3 of Souza; Paula; Pinto (2011) and Leite (2009), the sorting centers that carry out the selective collection activities and consequently the sorting of the recycled material, thus illustrating how the sorting plants and, consequently, the recycling cooperatives fall within the chain of post-consumer reverse logistics.

3. Social enterprise

Social entrepreneurship refers to a general process or behavior, so it is still possible to distinguish a broad definition encompassing several organizations. The term "social enterprise", on the other hand, refers to the tangible results of social entrepreneurship and, consequently, it is much more difficult to refer to a single description covering all existing practices (Deraedt, 2009). However, some characteristics common to all social enterprises can be distinguished:

– The main objective of a social enterprise is to deliver social value rather than maximizing profit.

– Second, a social enterprise produces goods or services on an ongoing basis. Defourny & Nyssens, 2008). In the case of a non-profit organization, it is important to note that there is a clear need for a better understanding of social flows.

Social enterprises have the following characteristics:

1. Business Orientation – They are directly involved in producing goods or providing services to a market.
2. Social Orientation – They have explicit social and / or environmental objectives, such as job creation, training or the provision of local services. Their ethical values may include a commitment to building competencies in local communities. Your profits are reinvested primarily to achieve your social goals.
3. Many social enterprises are also characterized by their social ownership. They are autonomous organizations whose governance and structures are usually based on the participation of interest groups (eg workers, users, clients, local community groups, and social investors) or managers or directors who control the company on behalf of a larger group of stakeholders. They are accountable to their stakeholders and the broader community for their social, environmental and economic impact. Profits can be distributed as profit-sharing to stakeholders or used for the benefit of the community (SOCIAL ENTERPRISE COALITION, 2003). "

4. Recycling cooperatives

In large and small cities, the process of collecting recyclable material is characterized by the formation of collectors' cooperatives, in which workers act in a cooperative way with an employment relationship with the cooperatives; there is also the presence of independent (autonomous) collectors

who collect recyclable material on their own, reselling it for the recycling companies, and these collectors do not have any link with any type of institution, and their performance, in most cases, happens under precarious work conditions, individually, in an autonomous and dispersed manner in the streets and in dumps (MMA, 2017); and there are also the presence of traditional scrap dealers, which are formalized companies that buy and sell recyclable material such as aluminum, cardboard, plastic, glass and others.

According to Leite (2009), collectors of recyclable materials are characterized as important distribution channels of reverse logistics, which is characterized as the area of business logistics that plans, operates and controls the flow and logistical information corresponding to the return of goods after-sales and after-consumption to the business cycle or to the production cycle, through the reverse distribution channels, adding them value of several types: economic, ecological, legal, logistic, corporate image, among others.

According to Monteiro et al. (2001), collecting means: "collecting garbage conditioned by whoever produces it to transport it, by means of adequate transport, to a possible transfer station, to eventual treatment and final disposition". On the other hand, the figures of recyclable waste pickers are workers who are unemployed, or who, for lack of better work options, for many years work full time, since childhood with families, or with other jobs, as a way of complementing income. (IPEA, 2013).

For the poorest populations, selective collection represents an important source of income, contributing significantly to the livelihoods of families.

The first associations and cooperatives of collectors appeared in the 1990s, along with the emergence of the National Movement of Collectors of Recyclables (MNCR) in 1999. Then, in 2000, the occupation was identified by the Brazilian Occupation Classification (CBO) due to the demonstrations and struggles of the collectors, and to the national mobilization for better living and working conditions (BORTOLI, 2009). It is observed that the number of collectors of recyclable materials is constant-

ly increasing, year after year. It is estimated that in Brazil there were more than 380 thousand waste pickers in 2010, which had average pay above the minimum wage (IPEA, 2016).

The concept of cooperative can be confused with the concept of social enterprise. The ownership of the cooperative is owned by its members, and is managed by its owners, and the profit generated for the benefit of the cooperative, in order to economically empower the poor, encourage self-sufficiency, and promote economic development. (YUNUS, 2007).

The cooperative paradigm, in contrast to the competitive paradigm, emphasizes collaboration that allows small entrepreneurs access to new resources that they could not develop or buy on their own, the main advantage of collaborative agreements being the grouping of leveraged resources by the partners that leads to the development of a broader and networked portfolio. (YUNUS, MOINGEON, ORTEGA, 2010).

However, many cooperatives are operated to maximize profit within their operations, creating a business structure through people, and infrastructure to increase personal profit, which differs from a social enterprise.

However, according to Yunus (2010) it is possible for a cooperative to become a social enterprise, provided that the owners of the cooperative are low-income people, because in that case whatever profit the cooperative generates would be destined to the poor and would help them out of poverty, thus becoming a socially beneficial economic activity.

5. Social business model canvas

According to Burkett (2013), understanding the business model of a social enterprise can bring two main benefits:

- Understand, design, articulate and discuss the details of social business concepts;
- Test, develop prototypes to assess in a practical way the impact of social business.

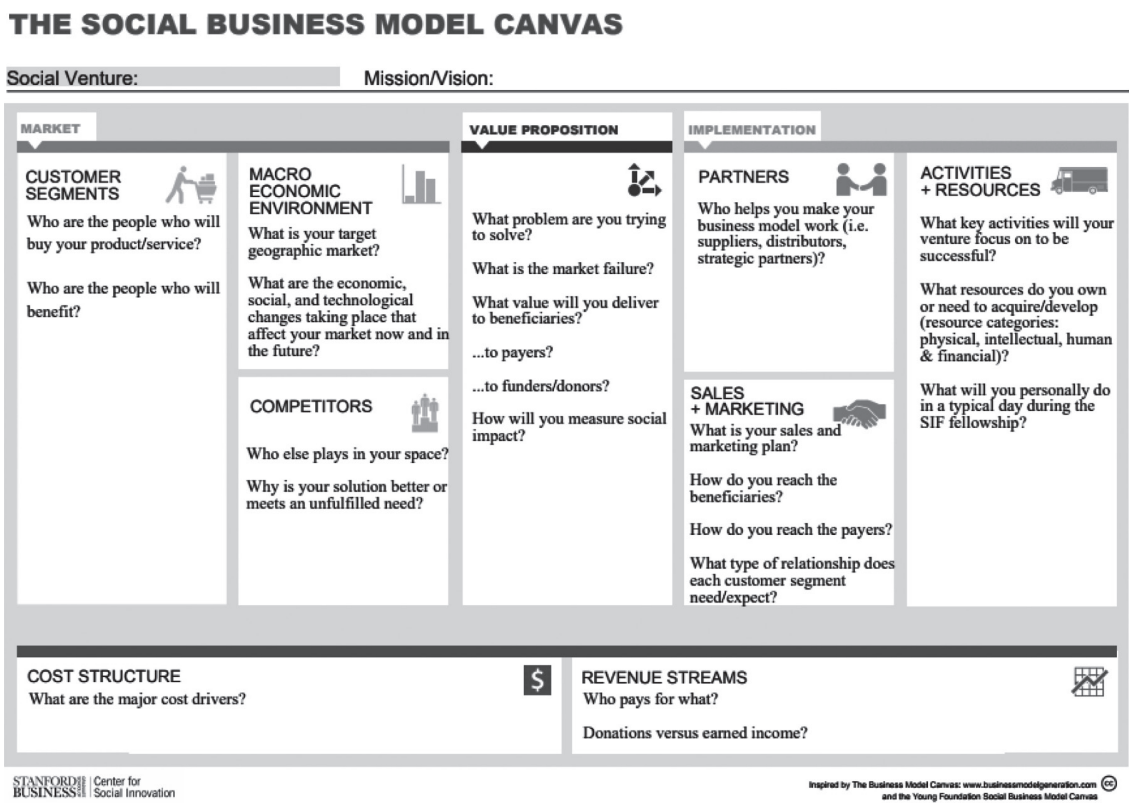


Figure 4 — Social business model canvas

Source: Stanford, 2014.

Considering both of the benefits mentioned above, it is understood that the more social companies learn to use and develop their own business models, many of their challenges can be easily identified in their initial stages, thus favoring the opportunities to work the design of viable business solutions. In this way, social businesses would become financially viable and sustainable in terms of social impact.

In Figure 4, "Social business model canvas" of Social Entrepreneurship Hub, Stanford University (2014), we notice the ninth blocks of the canvas, however, some questions were added to the model of Osterwalder and Pigneur (2011).

6. Methodology

The qualitative approach will be used in this research, and the method to be employed is the multiple case study, where more than one object of study will be considered, with an exploratory and descriptive character. For Yin (2001), a case study is "an empirical investigation that investigates a contemporary phenomenon within its real-life context, and when the boundaries between phenomenon and context are not clearly defined." And with regard to the question of research, the case study seeks to answer how and why a phenomenon happens; does not require control over behavioral events; and still has a focus on contemporary events (YIN, 2001). And, also, the case study can be classified as exploratory and descriptive according to its content and final objective (YIN, 2001). For Marshall; Rossman (1995) and Dane (1990), the purpose of the research is exploratory when one intends to investigate little understood phenomena; identify or discover important variables; or generate hypotheses for future research; and concomitantly for the descriptive purpose of documenting the phenomenon of interest.

The case study is a research strategy that focuses on understanding the dynamics present within individual configurations, and may still involve a single, or multiple, case (EISENHARDT, 1989).

For this case study the recycling cooperatives will be considered as object of study and the qualitative evidences will be used. According to Eisenhardt (1989) case studies can be used to provide a description; test a theory; or generate a new theory. Theories about social enterprises and business model canvas will be tested within the reverse logistics chain to verify the recycling cooperatives as social enterprises that are developing reverse logistics.

And for the field research will be considered sources of external and internal evidence (YIN, 2001). The sources of external evidence that will be researched: documentary analysis, which will include literature review, and revision of the legislation relevant to the topic, from PNRS (National Policy on Solid Waste), Law No. 12,305, August 2, 2010. Sources of internal evidences: interviews using a script with open questions with the directors responsible for the recycling cooperatives, and the accomplishment of techniques of direct observation in the place.

The researched recycling cooperatives are characterized in table 1, the names were excluded at the request of the interviewees.

TABLE 1 — Research Cooperatives

Cooperative	City	Number of participants	Self-sustaining
A	Sorocaba	58	no
B	Barueri	53	yes
C	São Paulo (Capital)	35	yes
D	Itu	46	ye

Source: Authors

7. Results and analysis

Table 2 presents the responses of the interviewees organized through the ninth blocks of the Social business model canvas that was used to elaborate the interview script.

TABLE 2 — Respondents' responses

Cooperative	Customer Segment
A	Buyers: brokers and industries
	Beneficiaries: cooperative, residents of the city of Sorocaba, prefecture.
B	Buyers: brokers and industries
	Beneficiaries: large generators, cooperatives and residents of Barueri
C	Buyers: brokers and industries;
	Beneficiaries: large generators, cooperative and residents of São Paulo (South and East Zone), prefecture.
D	Buyers: brokers and industries
	Beneficiaries: large generators, cooperative, residents of the city of Itu, and city hall.
Cooperative	**Macroeconomic Environment**
A	Municipality of Sorocaba (14000 points)
B	Municipality of Barueri
C	Municipality of São Paulo (South and East Zone - 17 km radius of the cooperative)
D	Municipality of Itu, 100% of urban area
Cooperative	**Competitors**
A	Carriers and Morcegões
B	Carriers and Morcegões
C	Other cooperatives in the East Zone, garbage dealers, carcasses and batches.
D	Carroceiros

Cooperative	Value offer
A	Crossers and industries: material in quantity
	Big generators: correct disposal and social cause
	Cooperated: income and work
	Municipality: cleaning, correct disposal, garbage collection and sorting
B	Crossers and industries: material in quantity
	Big generators: correct disposal and social cause
	Cooperated: income and work
	Municipality: cleaning, correct disposal, garbage collection and sorting
C	Crossers and industries: material in quantity
	Big generators: correct disposal and social cause
	Cooperated : income, work, education, rescue of citizenship, self-esteem and joy.
	Municipality: cleaning, correct disposal, garbage collection and sorting
D	Crossers and industries: material in quantity
	Big generators: correct disposal and social cause
	Cooperated: income and work
	Municipality: cleaning, correct disposal, garbage collection and sorting
Cooperative	**Privacy Policy**
A	Brazilian Association of the Personal Hygiene, Perfumery and Cosmetics Industry (ABIHPEC), middlemen, Sorocaba City Hall, UNISO
B	Brazilian Association of the Personal Hygiene, Perfumery and Cosmetics Industry (ABIHPEC), Barueri City Hall, Fatec Barueri.
C	Rotary, São Judas University, Uninove, FGV, USP, Movement in Defense of the Favelados (MDF), European Union, Tetra Pak, Coca-Cola, São Paulo City Hall, Paulista Network.
D	Brazilian Association of the Personal Hygiene, Perfumery and Cosmetics Industry (ABIHPEC), middlemen, Industry, City Hall through the Environmental EPPO

Cooperative	Sales and Marketing
A	City Hall and Own Trucks
B	City Hall and Own Trucks
C	City and city trucks, social media (Facebook, Channel on Youtube and Instagram), tracking the waste (17 photos), and door to door.
D	City Hall and Own Trucks
Cooperative	**Activities and Resources**
A	Activities: garbage collection in Sorocaba, garbage sorting, recyclable press, weighing of recyclables and sale of recyclables.
	Features: cooperates, trucks, scale, mat, presses, bags
B	Activities: garbage screening in Barueri, recyclable press, weighing of recyclables and sale of recyclables.
	Features: cooperates, trucks, scale, mat, presses, bags
C	Activities: garbage collection in São Paulo, garbage sorting, recyclable press, weighing of recyclables and sale of recyclables, advertising via social media (Facebook, Youtube Channel and Instagram).
	Features: cooperates, trucks, scale, mat, presses, bags
D	Activities: collect waste in Itu, waste sorting, recyclable press, weighing of recyclables and sale of recyclables.
	Features: cooperates, trucks, scale, road balance, conveyor belt, presses, bags
Cooperative	**Cost structure**
A	Cooperated,
	truck, shed, water and electricity (paid by the city hall)
B	Cooperated,
	Maintenance of shed, maintenance and fuel for trucks, meals, transportation of cooperative
	truck, shed, water and electricity (paid by the city hall)
C	Rent, water and electricity (paid by the city hall);
	Cooperated,
	Telephone, transportation voucher, lawyer, accountant, IT, providing production and statistical engineering services, cleaning lady, driver, the entire office structure, truck and cooperative maintenance
D	Warehouse (ceded by the city hall)
	Cooperated,
	electricity, internet, office supplies, water, fleet maintenance and equipment, fuel

Cooperative	Revenue stream
A	Sale of recycled material
B	Sale of recycled material
C	Sale of recycled material; advertising and advertising through social media (Facebook, Youtube Channel and Instagram). Provision of service for commercial points and companies, and large generators, values charged per rounded kilometer (round trip).
D	Sale of recycled material, provision of service to commercial points and companies, large generators, being charged the hour / men value of round trip for exclusive collection.

Source: Authors

According to the interviewees' answers, the following characteristics could be analyzed:

a) *Customer segments:* Canvas used asks about the buyers (customers who buy the products or services of the cooperatives) and the beneficiaries (customers that have received social or environmental benefits).
The main buyers are the industries that recycle the materials or the manufacturers themselves such as Tetra Pak and the middlemen are people or companies that buy the material from the cooperatives and resell to the industries, the cooperatives do business with them because often it does not have the volume enough to sell to the industries. The beneficiaries are the cooperative because the cooperatives offer a job and income, the city hall and the residents of the city or a region because they collect and separate the garbage and the big generators that are companies, condominiums, etc. which generate large amounts of garbage and are responsible for collecting and disposing of and thus resort to cooperatives.
b) *Macroeconomic Environment:* Cooperatives A, B and D located in cities in the interior of the state of São Paulo, have as collection area the whole municipality or a large region, municipalities are responsible for collecting the garbage and delivering in the cooperatives or give up trucks and drivers and the cooperatives schedule the collections.

Cooperative C, which is in the municipality of São Paulo, serves the south and east zones up to 17 km from its headquarters in agreement with the city and also collects with own trucks in the big generators.

c) Competitors: All the interviewees reported the truckers as competitors, they are the pickers who use trolleys they draw to collect the material and sell it to the junkyard. Another type of competitor is the bat, it is the collector who collects the recyclable material during the night before the collection of the city hall. In São Paulo, cooperative C reported the competition from other recycling cooperatives.

d) *Value proposition:* The perception of value proposal changes in relation to the customer segment, for the middlemen and industries, the value is the material in quantity, for the big generators it is the correct discard and social cause, for the cooperative it is the generation of income and work and in the case of the Municipality is the cleaning, correct disposal, garbage collection and sorting.

e) *Partners:* Cooperatives consider as partners the organizations, companies and institutions that help in some way whether they are giving money, services or assets. We can see in Table 2 several partners such as universities, companies, NGOs and city halls. We can highlight two, the first is the Brazilian Association of the Personal Hygiene, Perfumery and Cosmetics Industry (ABIHPEC), which has partnerships with cooperatives A, B and D, in which cooperatives do reverse logistics, collecting the material to recycle and sending to them, having goals in contract and in counterpart ABIHPEC performs services and donates equipment such as trucks and scales to the cooperatives. The second partnership, which was cited by cooperatives A and D, are the middlemen who help when cooperatives need equipment or service.

f) *Sales and Marketing:* Respondents reported that the sales and marketing channel with customers are the city or own trucks. Only the cooperative C that signaled that it has social media (Facebook, Channel on Youtube and Instagram), monitoring the waste (17 photos), and door to door.

g) *Activities and Resources:* The main activities are garbage collection, garbage sorting, recyclable press, weighing of recyclables and sale of recyclables. Features are cooperated, trucks, scale, treadmill, presses and bags.
h) *Cost structure:* The sheds of all cooperatives surveyed are ceded or leased by city halls. Truck, water and light are paid by the city hall. The costs of maintenance, cooperatives, food, etc. are maintained by the cooperatives.
i) *Revenue stream:* The main source of revenue for cooperatives is the sale of recycled material, but some cooperatives are leaving to provide service to commercial points and companies, and large generators.

8. Conclusion

The objectives were achieved, the reverse logistics productive chain of a recycling cooperative can be mapped. The main social characteristics are to perform the correct waste disposal for large generators; cleaning, correct disposal, garbage collection and sorting for municipalities and

income, work, education, rescue of citizenship and self-esteem for the members. The economic characteristics are that the cooperatives have agreements or partnerships with the prefectures that provide sheds, trucks for collections, water and light; the main source of revenue is the sale of recyclable material; providing services to large generators is another source of revenue and partnerships are important for cooperatives. Reverse logistics truly happens through agreements between cooperatives and companies and manufacturers' associations, such as the ABIHPEC case that has been reported, the cooperatives see these agreements as partnerships.

Another aspect observed is that cooperatives are becoming self-sufficient economically, only cooperative A has not reached this level, indicating that they are migrating to be social enterprises

REFERENCES

AGRAWAL, S.; SINGH, R.K.; MURTAZA, Q. A Literature Review and Perspectives in Reverse LogisticsResources.Conservation and Recycling, 97, 76-9, 2015.

BORTOLI, M. A. Catadores de materiais recicláveis: a construção de novos sujeitos políticos. Revista Katálysis, Florianópolis: Edufsc, v. 12, n.1, p. 105-114, jan. /jun. 2009. Disponível em: <http://www.scielo.br/pdf/rk/v12n1/13.pdf>. Acesso em: 25 mai. 2017.

BRASIL. Lei nº 12.305, de 2 de agosto de 2010. Política Nacional de Resíduos Sólidos. Diário Oficial [da] República Federativa do Brasil. Disponível em: < http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12305.htm> Acesso em: 18 de mai. 2017.

BURKETT, I. Using the Business Model Canvas for Social Enterprise Design, 2013.

CARTER, C. R.; ELLRAM, L. M. Reverse Logistics: a review of the literature and framework for future investigation. Journal of Business Logistics. Vol. 19, no 1, 85 – 102, 1998,

CAXITO, F. Logística: Um enfoque prático. São Paulo: Saraiva, 2012.

DERAEDT, E. (2009). Social enterprise: a conceptual framework. Conceptual Discussion Paper for the ILO social Enterprise Developing Targeting Unemployed Youth in South Africa (SETYSA) project.

DEFOURNY, J. & NYSSENS, M. Social Enterprise in Europe: Recent Trends and Developments, Social Enterprise Journal 4 (3): 202-228. 2008

DEFOURNY, J.; NYSSENS, M.; Conceptions of Social Enterprise and Social Entrepreneurship in Europe and the United States: Convergences and Divergences. Journal of Social Entrepreneurship, 2010.

EISENHARDT, K.T. Building theories from case study research. Stanford University, 1989.

IPEA. Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável, IPEA, Brasília 2013.

IPEA. Catadores de Materiais Recicláveis: Um encontro nacional. IPEA,

Brasília 2016. LEITE, P. R. Logística Reversa: meio ambiente e competitividade. São Paulo: Pearson Prentice Hall, 2009.

MARSHALL, C.; ROSSMAN, G. B. Designing qualitative research. Sage: Thousand Oaks, 1995.

MMA. Catadores de Materiais Recicláveis. Disponível em:

<http://www.mma.gov.br/cidades-sustentaveis/residuos-solidos/catadores-de-materiais- reciclaveis > Acesso em: 04 de nov 2017

MONTEIRO, J. H. P. et al. Manual de gerenciamento integrado de resíduos sólidos. Rio de Janeiro: IBAM, 2001.

OSTERWALDER, A.; PIGNEUR, Y. Business Model Generation - Inovação em Modelos de Negócios: um manual para visionários, inovadores e revolucionários. Rio de Janeiro: Alta Books, 2011.

ROGERS, D. S., TIBBEN-LEMBKE, R. S. Going Backwards: Reverse Logistics Trends and Practice. Reverse Logistics Executive Council, 1999.

SOCIAL ENTERPRISE COALITION. 2003. There is more to business than you think. A guide to social enterprise. London: Social Enterprise Coalition.

STANFORD. The Social Business Model Canvas. Social Entrepreneurship Hub, Stanford University, 2014. Disponível em: <https://sehub.stanford.edu/sites/default/files/Social%20Business%20Model%20Canvas_1.pdf> Acesso em: 12 de nov. 2017.

SOUZA, M.T.S.; PAULA, M.B.; PINTO, H.S. O Papel das Cooperativas de Reciclagem nos Canais Reversos Pós-Consumo. Revista de Administração de Empresa- RAE, Vol. 52, nº. 2, 2012, p. 246-262.

YIN, R.K. Estudo de caso: planejamento e métodos. Porto Alegre: Bookman, 2001.

YUNUS, M.; WEBER, K. Building Social Business: the new kind of capitalism that serves humanity's most pressing needs. New York: PublicAffairs, 2010.

YUNUS, M.; WEBER, K. Creating a World Without Poverty: social business and the future of capitalism.New York: PublicAffairs, 2007.

YUNUS, M.; MOINGEON, B; ORTEGA, L.; Building Social Business Models: lessons from the Grameen Experience. Long Range Planning, Vol. 43, 308-325, 2010.

SAFETY IN ROAD TRANSPORT IN THE EUROPEAN UNION

MONIKA STRZELCZYK, BÓL PRZEMYSŁAW

Abstract: The first part of the paper presents selected theoretical issues in the field of the role of transport played in the economy and its impact on the environment. Furtherly, European statistics are presented showing the most important data on road transport safety. Particular attention was focused on presenting the number of accidents and the number of injured in road accidents in the European Union. The aim of the article is to examine how these numbers change over time. The transport policy of the European Union is presented in the further part of the article. Particular attention has been paid to the presentation of strategic actions to ensure safety in road transport in the Member States. For this reason, the second objective of the paper is to examine whether the implemented activities bring effects.

Key words: transport safety, road transport, European Union transport policy

Introduction

Transport management is one of the most important activities carried out at all levels of public administration. Transport is one of the sectors of the national economy. It is complementary to other fields. Disruptions in the functioning of the transport system contribute to disturbances in the economy. The consequences of disturbances in the transport system are primarily experienced by entrepreneurs and the public. For this reason, it is so important to constantly monitor the functioning of the transport system, which allows the detection of any irregularities. The purpose of this action is to respond to the existing situation and quickly counteract the threats. The monitoring of the transport system has one more important function. Experience in solving transport problems can be the basis for planning actions that should be implemented in the event of the same or similar disruptions in the future.

It is the responsibility of the authorities of each Member State to specify the types of hazards encountered in road transport. Determining the hazards having the greatest impact on the level of road safety plays a very important role. It allows us to learn the causes of existing threats and is the first step on the road to reducing the incidence of road accidents, thereby improving the quality of the transport system.

As indicated in the summary, one of the objectives of the article is to examine how the number of deaths and injuries in the accidents on European roads changes over the years. The second objective of the paper is to check whether the actions taken by the European Union to improve safety in road transport in the Member States have produced results. The verification of research hypotheses will be used to achieve goals. They are defined as follows:

Hypothesis 1. There is a noticeable decrease in the dynamics of road accident victims in 2008-2015 in the majority of European Union Member States;

Hypothesis 2. The number of injured in road accidents is much higher than the number of deaths;

Hypothesis 3. The share of drivers and passengers of motor vehicles in the total number of victims and injured in road accidents was the highest in 2016.

Verification of research hypotheses was possible thanks to own research. The research method was the analysis of existing data (the so-called Desk Research method), while the research technique was the analysis of available data from public statistics, reports, reports and publications. The results of the completed research were collected and presented in the summary.

Transport and its impact on the environment

Transport is the basis for the smooth functioning of national economy entities (Urbanyi-Popiołek 2013, p. 6). It allows to supply production, commercial and service enterprises with raw materials, materials, semi-finished products and goods necessary for running businesses. Distribution of products to customers would also not be possible without the implementation of a number of interrelated transport operations (Kabus, Nowakowska-Grunt 2017, p. 277). This is because, as a rule, production and provision of services do not take place in the same place as their consumption. Especially now this aspect takes on special significance. The processes of globalization, influencing the shaping of consumer behaviour (Włodarczyk 2013, p. 623), and internationalization of enterprises (Karczewska 2016, p. 39). caused that the distance that the product has to travel to reach the final recipient, significantly increased. Delivering the product in the right quantity, condition, in the right place and on time, to the right customer and at the right price depends on the quality of the transport processes being carried out. Transport is one of the most expensive logistics processes (Kovacs 2017, p. 121). Implementation of

undisturbed, efficient distribution processes allows to generate profits in enterprises and in the long run to maximize their profits (Grabowska 2011, p. 461).

Transport, however, is not only transporting loads. It is also a set of activities related to the movement of people, so-called passenger transport (Nowakowska-Grunt, Chłąd 2015, p. 133). It allows to meet the transport needs of the society. The foundation of the emergence of transport needs is the willingness of the population to move for various purposes. These purposes include employment, educational, purchasing, health, recreational, cultural, etc. objectives (Strzelczyk 2013, p. 108). Over time, the number of passengers using passenger services is increasing (Matczak 2011, p. 201). Undoubtedly, the increasing mobility of society has also impact on that. The implementation of passenger transport services means that the kilometers separating people are no longer so important. Thanks to it, the quality of life of the society has improved, and even those so far distant places are becoming available (*Transport. Zrozumieć politykę*, p. 3).

The authors of the paper claim that the importance of transport in the national economy is undoubtedly enormous. However, one should bear in mind some unpleasant consequences related to the provision of transport services. They are, among others threats related to the occurrence of negative ecological, social and economic effects. An increase in consumerism manifested by an increase in the demand for transport services (Matczak 2011, p. 197), particularly road transport (Nowicka-Skowron, Mesjasz-Lech 2013), led to the escalation of the impact of transport on the environment. Traffic congestion is on the roads is no longer surprise for anybody (Szołtysek 2008, p. 25; Żochowska and all 2014, p. 11851; Cichosz 2015, p. 27). The creation of this phenomenon is favored not only by the intensification of freight transport, but also by the increase in the number of passenger journeys made with individual means of transport (Şimşekoğlu and all 2015, p. 113). Transport, in particular road transport, is responsible for the emission of many hazardous substances into the atmosphere. It causes pollution of the natural environment, causing

catastrophic, irreversible effects on flora and fauna (Nowakowska-Grunt, Strzelczyk 2014). At the same time, the emission of hazardous substances contributes to the increase in the occurrence and mortality of civilization diseases (Bonisławska 2012, p. 127), to which environmental pollution and noise contributed indirectly. Road transport also creates threats in traffic. Hurry, carelessness, ignorance of traffic rules by drivers contributes to the occurrence of traffic incidents. Road accidents include accidents that involve casualties in people and road collisions causing material damage (Rozenek and all 2015, p. 8). That is why it is so important to take actions that allow the development of other modes of transport and promote intermodal transport (Jacyna-Gołda and all 2014, p. 17).

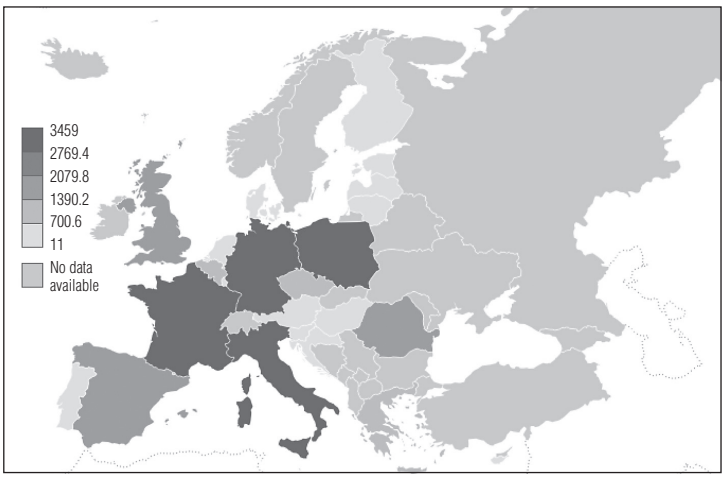
Removing the nuisance effects resulting from the transport is expensive. Expenditure related to this consumes a large part of the state budget. It can be assumed that the increased importance of transport will increase its impact on the environment and further increase of this expenditure. That is why it is so important to take remedial actions. This will allow you to reduce the impact of transport and save money that can be spent in a different way.

Safety in road transport in the European Union

Road transport has been the most popular transport branch in the Member States for many years (Marczyk , Kot 2010, p. 99). It is not surprising, therefore, that most of the deaths and injuries is suffered in road accidents from all transport modes. In the Eurostat database, one can find data on the number of road deaths on an annual basis. According to the definition given in Regulation No. 31 of the Police Commander-in-Chief, a traffic accident casualty is considered a person who died on the spot or within 30 days from the day of the traffic accident as a result of injuries he/she suffered (*Zarządzenie nr 31 Komendanta Głównego Policji*). The victim of a road accident can be either a driver and/or passenger of a motor vehicle, motorcyclist, cyclist or pedestrian.

In 2015, 26 100 people died on the roads due to injuries (*Road safety in the European Union* 2016, p. 6), while in 2016 there were 25 500 (2016 road safety statistics: What is behind the figures? 2017, p. 1) persons, that is 600 less than in the previous year. The latest full data reflecting the number of road accident victims is from 2015 and was published in November 2017. These data were provided for 24 Member States. Data for countries such as Bulgaria, Ireland, Slovakia and Sweden are not available.

Diagram 1 — Number of road accident victims in 2015



Source: Eurostat, *People killed in road accidents* [code: tsdtr420], online access: http://ec.europa.eu, last update: 2017-11-28.

Among the Member States, the largest number of fatal road accidents in 2015 were recorded in Germany and France (Diagram 1). At that time, 3,459 people died in road accidents. Subsequently, there were countries like Italy (3,428), Poland (2,938), Romania (1,893), the United Kingdom (1,804) and Spain (1,689). Among the Member States with the least road traffic accident victims were Malta (11), Luxembourg (36), Cyprus (57), Estonia (67) and Slovenia (120).

Table 1 — Change number of persons killed in road traffic accidents between 2009 and 2015 (%)

Years / Country	2008	2009	2010	2011	2012	2013	2014	2015	2008-2015	2012-2015
Belgium	944	944	840	862	770	723	727	732	-22%	-5%
Bulgaria	1061	901	:	:	:	:	:	:	:	:
Czech Republic	1076	901	802	773	742	654	688	734	-32%	-1%
Denmark	406	303	255	220	167	191	182	178	-56%	7%
Germany	4477	4152	3648	4009	3600	3339	3377	3459	-23%	-4%
Estonia	132	98	79	101	87	81	78	67	-49%	-23%
Ireland	280	238	212	186	162	188	:	:	:	:
Greece	1553	1456	1258	1141	988	879	795	793	-49%	-20%
Spain	3064	2687	2444	2042	1889	1667	1680	1689	-45%	-11%
France	4275	4273	3992	3963	3653	3268	3384	3459	-19%	-5%
Croatia	664	548	426	418	393	368	308	348	-48%	-11%
Italy	4725	4237	4114	3860	3753	3401	3381	3428	-27%	-9%
Cyprus	82	71	60	71	51	44	45	57	-30%	12%
Latvia	316	254	218	179	177	179	212	188	-41%	6%
Lithuania	:	:	:	:	:	256	267	242	:	:
Luxembourg	35	48	32	33	34	45	35	36	3%	6%
Hungary	996	822	740	638	605	591	626	644	-35%	6%
Malta	9	15	13	16	9	17	10	11	22%	22%
Netherlands	677	644	537	546	562	476	476	531	-22%	-6%
Austria	679	633	552	523	531	455	430	479	-29%	-10%
Poland	5437	4572	3908	4189	3571	3357	3202	2938	-46%	-18%
Portugal	867	823	937	891	718	637	638	593	-32%	-17%
Romania	3065	2796	2377	2018	2042	1861	1818	1893	-38%	-7%
Slovenia	214	171	138	141	130	125	108	120	-44%	-8%
Slovakia	606	384	371	:	:	:	:	:	:	:
Finland	344	279	272	292	255	258	229	266	-23%	4%
Sweden	397	358	266	319	285	260	270	:		:
United Kingdom	2645	2337	1905	1960	1802	1770	1854	1804	-32%	0%

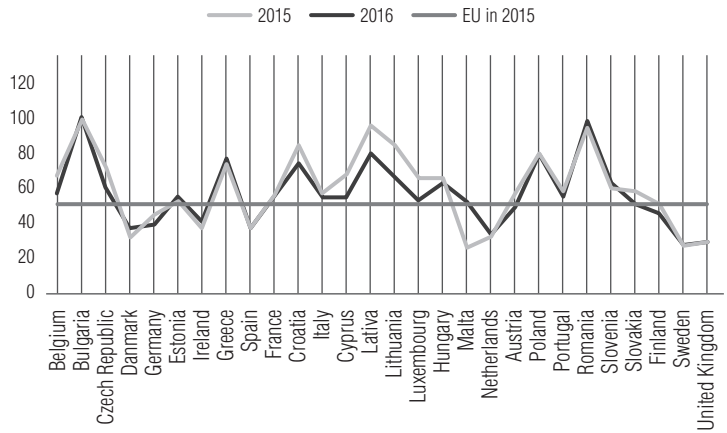
Source: Eurostat, *People killed in road accidents* [code: tsdtr420], online access: http://ec.europa.eu, last update: 2017-11-28.

The number of road accident victims varies with the passage of time. Table 1 presents the dynamics of changes in this area over the years 2008-2015 and 2012-2015. The dynamics of changes in the number of road accident victims in the years 2008-2015 was negative in most Member States. Thus, a clear downward trend is noticeable in these years. The largest drop in the number of victims was recorded in Denmark - the dynamics of changes were equal to -56% there. The number of road accident victims in Estonia (-49%), Greece (-49%), Croatia (-48%) and Poland (-46%) also decreased almost by half. Pessimistic statistics apply to countries such as Luxembourg and Malta. In these Member States an increase in the number of road accident victims has been recorded. In Luxembourg, this increase was 3%, in Malta as much as 22%.

The dynamics of changes in the number of road accident victims is not so optimistic after taking into account the period from 2012 to 2015. In the case of as many as 8 Member States (from 23 countries for which dynamics could be determined), the number of road accident victims increased. The largest increase was recorded in Malta (22%) and Cyprus (12%). The largest downward trend was in Estonia (-23%), Greece (-20%), Poland (-18%) and Portugal (-17%). It should be noted that in Denmark, where the change dynamics in 2008-2015 was the most advantageous, in the second period taken under consideration it was not as significant. Over the years 2012-2015 there was an increase in the number of road accident victims by 7%. The dynamics of changes in 2012-2015 compared to the period 2008-2015, in most Member States was also not so significant. Therefore, it can be concluded that the effects of actions taken to improve safety in transport are more noticeable in the long run.

An indicator perfectly reflecting the state of safety in road transport is the number of deaths per million inhabitants. In 2015, this indicator for the European Union was 51.5, a year later it was 50. It should be emphasized that the statistics presented suggest that European roads are the most dangerous in the world. There were 174 deaths per million inhabitants worldwide (2016 road safety statistics: What is behind the figures? 2017, p. 1).

Graph 1 — Fatalities per million inhabitants by country in 2015 and 2016



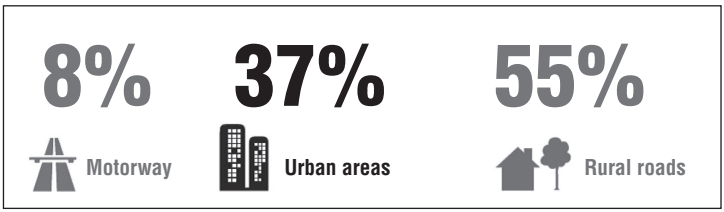
Data for 2016 are based on temporary data. There may be minor changes in the final data for individual countries. Data for Italy are estimated on the basis of data from January to June, while for the Netherlands and the United Kingdom they are based on data from January to September.

Source: Road deaths per million inhabitants (2017), European Commision, 28 March 2017, [online access: 2017-12-21], *https://ec.europa.eu/transport/sites/transport/files/2017-03-28-road-deaths-per-million-inhabitants.pdf.*

The highest mortality rates in 2015 and 2016 were recorded in Member States such as Bulgaria, Lithuania and Romania (Graph 1). The countries with the lowest mortality rate in 2015 were: Malta, Sweden and the United Kingdom, and in 2016 - Sweden, the United Kingdom and the Netherlands.

Taking into consideration the type of roads on which road incidents took place in 2015, the most dangerous were rural roads. 55% of all road accident victims in the entire European Union lost their lives. 37% of them suffered death on urban roads, least - 8% on motorways (Diagram 2).

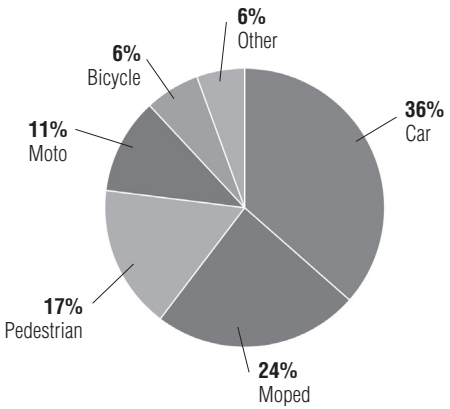
Diagram 2 — Road fatalities in the EU by type of roads



Source: *2016 road safety statistics: What is behind the figures?*, European Commission - Fact Sheet, La Valette, 28 March 2017.

The largest (36%) share of all road accident victims was recorded for people traveling by car (drivers, passengers) (Graph 2). On the other hand, road users who are least protected during a road accident (ie pedestrians, cyclists, moped users and motorcyclists) accounted for a total of about half of the victims of road accidents. It should be emphasized that the most frequent accidents with their participation occurred on urban roads.

Graph 2 — Road fatalities in the EU by transport mode in 2016



Source: *2016 road safety statistics: What is behind the figures?*, European Commission - Fact Sheet, La Valette, 28 March 2017.

Road traffic participants may become victims of road accidents. However, the statistics are even more frightening. It turns out that every year more than victims of road accidents, people injured in road accidents are registered (Diagram 3).

Diagram 3 — Number of injured in road accidents

Source: *Road safety in the European Union. Trends, statistics and main challenger* (2016), European Commission, Mobility and Transport, Brussels, p. 10.

Until 2014, no data was collected on the number of injured in road accidents in Member States due to the lack of definition of serious injuries. It is only from 2015 that the international maximum abbreviated injury scale (MAIS) has been officially recognized by the high-level group on road safety of the European Commission on a scale that allows to easily determine the overall severity of injuries in an accident in a traffic accident (Wierzchołowski 2015, p. 12). In the Abbreviated Injury Scale (AIS) from 1 to 6, each damage resulting from five body areas is assessed: general injuries, head and neck,

chest, abdomen, limbs and pelvis (Machała, p. 29). 1 means a small amount of damage while 6 does not give a chance to survive. In addition, there is also code 9, which is used if you do not have enough information to encode the injury (Estimating clinically seriously injured (MAIS3+) road casualties in the UK 2015, p. 8). As MAIS, the largest value from the previously defined numbers is determined (Unarski 2008, p. 29). For example, when an injured person in a traffic accident suffers one injury in AIS2 (moderate injury) and the other in AIS4 (severe trauma), then MAIS is 4. Victims who have suffered an injury that is classified with a score of 3 and more in AIS is considered seriously injured (MAIS3 +) (*Estimating clinically seriously injured (MAIS3+) road casualties in the UK* 2015, pp. 2, 8).

Table 2 — Number of seriously injured in EU member states in 2015

Country	Seriously injured MAIS3+
Belgium	265
Czech Republic	271
Germany	190
Ireland	74
Spain	137
France	388
Italy	246
Cyprus	98
Netherlands	444
Austria	164
Poland	338
Portugal	197
Slovenia	103
Finland	95
Sweden	122
United Kingdom	78

Source: *Road safety in the European Union. Trends, statistics and main challenger* (2016), European Commission, Mobility and Transport, Brussels, p. 11.

Currently, data on the number of injured in road accidents are collected and supplemented. It is estimated that as a result of traffic accidents on EU roads, 135,000 people were injured in 2016 (schedule). Unified data on the number of serious injuries in road accidents according to the MAIS3 + scale were published last year. They come from 16 Member States, which are inhabited by 80% of the population of the European Union (Table 2).

Most seriously injured in road accidents in 2015 were recorded in such countries as the Netherlands, France and Poland, and the least in Ireland, the United Kingdom and Finland. The number of injured and seriously injured in road accidents is high and it significantly exceeds the number of fatalities. In the European Union, there are 5 injured people per 1 victim of a traffic accident. The largest group of injured are pedestrians, cyclists and motorcyclists. Most of them are elderly (*Road safety in the European Union. Trends, statistics and main challenger* 2016, p. 10).

In order to ensure road safety, efforts should be made not only to reduce the number of victims, but also the number of people injured. In particular, the social costs of removing the effects of road accidents (costs of medical care and rehabilitation) are estimated at around 100 billion (Press release: *Bezpieczeństwo ruchu drogowego: nowe dane statystyczne przemawiają za podjęciem kolejnych działań na rzecz ratowania życia na drogach UE* 2016). Therefore, maintaining the health and life of road users should become a priority for the European Commission.

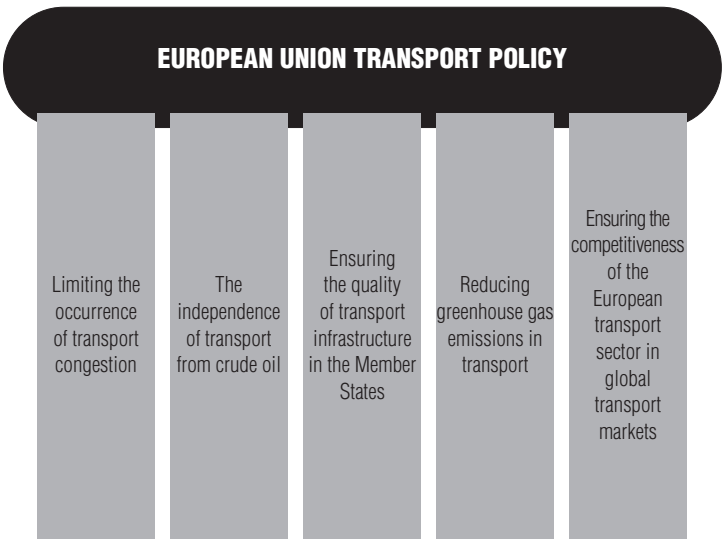
European Union transport policy

Transport is the basis for the smooth functioning of not only the national economy but also the European and world economy. Enterprises providing transport services operating in the Member States are a place of employment for many people. In addition, they contribute to the economic growth of the entire European Union. It is not surprising, therefore, that the European Commission is taking steps to regulate transport poli-

cy in the area indicated. The main purpose of this policy is to shape and support transport policy. This goal is to be achieved by offering effective, safe and sustainable solutions in this area. The result of these activities is to create the right conditions for a competitive industry, which is to become a source of employment. It is also intended to bring about a higher level of social well-being (*Polityka transportowa UE*).

The implemented transport policy is designed to solve the five basic problems faced by the transport sector in the Member States (Diagram 4).

Diagram 4 — Assumptions of the transport policy of the European Union



Source: study based on: *Polityka transportowa UE* [access: 2017-12-20] https://europa.eu/ european-union/topics/transpo-rt_pl.

The challenges for shaping an effective European transport system have been divided into five stages. These stages are diverse due to the problem to be resolved. One of them is striving to reduce the occurrence of transport congestion. This is a particularly important task due to the fact

that traffic congestion paralyzes passenger and freight traffic in transport branches having the largest share in transport, i.e. road and air transport.

The independence of transport from oil is the second challenge faced by the European Union. Transportation is dependent on oil. It is estimated that the price of oil will increase over time. This will increase the prices of transport services provided. This, in turn, will contribute to the increase in production costs and the costs of services provided. The costs can be transferred to the consumer's prices (ie the costs of goods and services offered for sale will increase). That is why it is so important in this case to eliminate the dependence of transport on crude oil as a result of using unconventional drive sources in vehicles.

Another problem of the European transport sector is too high emission of greenhouse gases into the atmosphere, which contributes to global warming. In order to prevent the occurrence of this phenomenon, it is necessary to take appropriate measures. The Commission has set a goal related to this. To prevent global warming by more than 2°C, a reduction of 60% of greenhouse gas emissions must be achieved by the transport sector by 2050. The basis for determining the dynamics of changes is to be given for data on greenhouse gas emissions from 1999.

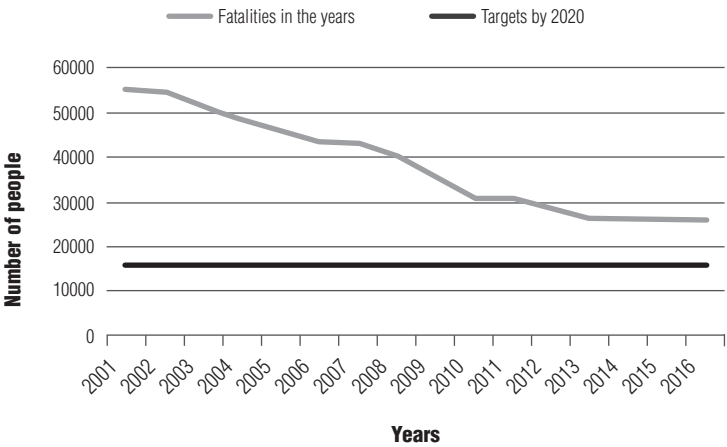
Ensuring the quality of transport infrastructure is another challenge for the European Union. The implementation of this task is very important especially from the perspective of ensuring the smooth functioning of the common market of the European Union. The European Union's transport policy is always focused on overcoming obstacles to the implementation of transport processes between Member States. Ensuring an adequate level of quality of transport infrastructure will undoubtedly reduce or even eliminate disproportions in this area between individual EU Member States.

The last problem to be solved by implementing the European Union's transport policy is to ensure the competitiveness of the European transport sector. In the future, it is to become competitive against the rapidly growing global transport markets.

Activities implemented in the European Union in the last two decades have allowed to develop the first positive changes in the transport sector. They include first and foremost: (*Polityka transportowa UE*)

– increased safety in transport;
– regulating the working hours of people employed in transport;
– increasing the choice of means of transport that performs all types of transport;
– reducing the impact of transport on the surrounding environment, and in particular the impact on the natural environment;
– introduction of ecological technologies in transport.

Graph 3 — EU death victims and targets 2001-2020



Source: study based on: *EU road fatalities*, European Commission - Directorate General for Mobility and Transport, February 2016, p. 1, [online access: 2017-12-27], https://ec.europa.eu/transport/road_safety/sites/roadsafety/files/pdf/observatory/trends_figures.pdf.

According to the authors, the most important change introduced was the reduction of the number of road accident victims. This action

became a priority because European roads were and are considered the most dangerous ones. Strategic actions designed and implemented by the European Commission assume a decrease in the number of injured people while halving the number of road accident victims by 2020. The reference point is data from 2010. At that time, 31,500 people died on European roads (Graph 3).

The goal to be achieved was developed on the basis of historical data from the years 2001-2010. During this period, the number of deaths has been reduced by 43%. In 2016, the number of road accident victims amounted to 25,500. Achievement of the indicated target by 2020 will be possible thanks to the reduction of this number by another 9,700 people. It will be a difficult task to accomplish. Actions must be taken immediately to achieve the goal. These activities should be implemented at the national and local level. They include first and foremost: (*2016 road safety statistics: What is behind the figures?* 2017)

– reviewing and harmonizing and monitoring legislation;
– development and maintenance of transport infrastructure;
– use of innovative technologies in transport;
– the development of knowledge about serious injuries to which occurs as a result of a road incident.

An important task to implement becomes the review, monitoring and harmonization of legislation in the European Union. In particular, one should focus on introducing changes to the regulations governing road transport, drivers' work time, transport of dangerous goods, etc. It is significant to make changes to the road traffic law and enforce this right thanks to frequent roadside inspections.

A very important task is to ensure the appropriate quality of transport infrastructure, which is undoubtedly one of the determinants of ensuring road safety. It is equally important to strive for proper traffic organization. The bad organization causes an increase in the number of road accidents

and, what is connected with it, an increase in the number of injured and accident victims.

The development of technology and related civilizational progress can make a significant contribution to ensuring safety in transport. The introduction of innovative solutions takes place at an increasingly faster pace. According to the authors, the way to achieve the planned goal of reducing to 15,770 the number of road accident victims by 2020 is to install systems in vehicles: (*Safer Roads in the UE. Innovative technologies for safer roads*; Zieliński 2017)

– eCall allowing instant notification of relevant services on the occurrence of a traffic accident;
– ISA (Intelligent Speed Assistance) reading road signs and adjusting the speed of travel to the identified limits;
– AEB, which is an automatic emergency braking system, which system will allow first of all to preserve health and life of the so-called unprotected road users;
– LKA so-called lane assistant - a system warning against unintentional lane change;
– the active speed control system - ACC, which allows to maintain a constant speed and time interval from the vehicle in front;
– a system reminding one to fasten the seat belts to people in the transport.

It is assumed that the installation of the aforementioned systems in vehicles will become compulsory over time. What's more, most of them are already used in selected vehicle models.

The activities that can affect the improvement of road safety are the organization of educational campaigns. These campaigns should be carried out among children in early school age. The knowledge transmitted should be adapted to the age of the recipients. This activity allows to increase awareness of methods of preventing traffic

incidents and shapes social attitudes. It is also important to carry out nationwide information campaigns. They are aimed at providing information on the effects of occurring traffic incidents and shape desired behavior among traffic participants.

The measures to ensure transport safety have a wide scope. They should complement each other. The Member States that are part of the community should strive to implement these actions to achieve the intended goal. Carrying out transport policy in the EU should be based on broadly understood cooperation, sharing experiences and creating a catalog of good practices.

Summary

The main objective of the paper was to examine whether the actions taken by the European Union to improve safety in road transport are effective. In the course of conducting own research, it was possible to verify research hypotheses. The first hypothesis was: there is a noticeable decrease in the dynamics of road accident victims in 2008-2015 in most EU Member States. This hypothesis was confirmed in the collected research material. Out of 23 Member States for which data on the number of road accident victims was presented, in 21 cases a decrease in dynamics was noted. Only in Malta and Luxembourg there was an increase in the number of people who lost their lives in road accidents. The highest number of road accident victims was recorded in such countries as Germany, France, Italy, Poland and Romania, and the lowest in such countries as: Malta, Luxembourg, Cyprus, Estonia and Slovenia. The highest mortality in 2015 in 1 million inhabitants occurred in Bulgaria, Lithuania and Romania. The countries with the lowest mortality rate in 2015 were: Malta, Sweden and the United Kingdom.

The largest number of road accident victims was recorded in the case of people traveling by car. It amounted to 36%. This confirms the

assumption that the share of drivers and passengers of motor vehicles in the total number of victims and injured in road accidents in 2016 was the largest and allows the adoption of a second research hypothesis. However, it should not be forgotten that also a large number of victims are so-called unprotected participants of the movement. The share of pedestrians, cyclists, moped users and motorcyclists in the total number of deaths in road accidents amounted to 58% during the period considered.

People who suffer as a result of a road incident are not only their victims, but also wounded. It can not be determined whether the number of injured, like the number of victims, is also decreasing. This is due to the fact that it was only in 2015 that the MAIS scale was accepted that allowed the collection of data on this subject. Undoubtedly, the coming years will allow us to answer this question. However, according to the European Commission, the number of people injured in accidents is five times higher than the number of fatalities. These data allowed us to verify and confirm another research hypothesis. It means the following: the number of injured in road accidents is much higher than the number of deaths.

Due to the fact that the life and health of the citizens of the Member States is extremely valuable, the European Union is undertaking efforts to reduce the occurrence of road accidents and their negative effects. Activities planned for implementation can be divided into four basic groups. The first one concerns the introduction of changes in legislation, its unification and more effective enforcement. This applies both to persons traveling by individual means of transport as well as entrepreneurs who carry passengers and goods for profit. The second change should concern the improvement of the quality of road infrastructure and proper organization of road traffic. Subsequent changes are possible to implement thanks to the use of innovative technologies. These technologies are to be used in vehicles. They allow you to safely navigate the roads. The last group of activities undertaken by the European Union is conducting educational and

information campaigns. This is a very important action. It allows educating the public in the area of safe travel on the roads from an early age. On the other hand, information campaigns allow to make citizens aware of the tragic consequences of not being able to comply with the requirements of even road traffic. Information campaigns are often brutal and cause public opposition. But this is the sense of their pursuit. They shock the audience's attention drawing it to the seriousness of the problem.

Actions aimed at improving transport safety should be undertaken by all member countries, without any exception. Only such cooperation will allow achieving a very ambitious goal by 2020. This goal is to reduce the number of injured people in road accidents. It is also important to reduce the number of road accident victims up to 15 750 people by then. This goal remains ambitious but at the same time feasible to achieve.

LITERATURE

2016 road safety statistics: What is behind the figures?, European Commission - Fact Sheet, La Valette, 28 March 2017.

Bezpieczeństwo ruchu drogowego: nowe dane statystyczne przemawiają za podjęciem kolejnych działań na rzecz ratowania życia na drogach UE, Komisja Europejska - Komunikat prasowy, Bruksela, 31 marca 2016 r..

Bonisławska B. (2012), *Współczesne zagrożenia dla bezpieczeństwa publicznego*, Zeszyty Naukowe WSEI seria: Administracja, No. 2, 113-128.

Cichosz M. (2015), *Innowacje w logistyce miejskiej - zrównoważony transport publiczny*, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, No. 383, 26-39.

Estimating clinically seriously injured (MAIS3+) road casualties in the UK (2015), Reported road casualties Great Britain: 2015 annual report, Department for Transport, p. 8 [online access: 2017-12-21] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/556648/rrcgb2015-03.pdf.

Eurostat, *People killed in road accidents* [code: tsdtr420], online access: http://ec.europa.eu, last update: 2017-11-28.

Grabowska M. (2011), *Analiza kapitału pracującego i przepływów pieniężnych w zarządzaniu spółkami kapitałowymi*, „Zeszyty Naukowe Uniwersytetu Szczecińskiego. Finanse, rynki finansowe, ubezpieczenia nr 47", No. 686 finanse, p. 461-475.

Jacyna-Gołda I., Żak J., Gołębiowski P. (2014), *Models of traffic flow distribution for various scenarios of the development of proecological transport system*, "Archives of transport", Vol 32, Iss. 4, 17-28.

Kabus J., Nowakowska-Grunt J. (2017), *Managing the company's distribution system*, "World Scientific News", 78 (2017), p. 277.

Karczewska A. (2016), *Globalizacja i konsumpcjonizm jako uwarunkowania zmian i potencjalne źródła zagrożeń w sferze pracy*, Zeszyty Naukowe Politechniki Częstochowskiej. Zarządzanie, No. 24 Vol 2, 38-46.

Kot S., Marczyk B. (2010), *Bezpieczeństwo w transporcie drogowym w UE*, „Logistyka" No. 4, p. 99-103.

Kovacs G. (2017), *Development of performance evaluation software for road freight transport activity*, "Polish Journal of Management Studies", Vol 15 No. 1, 121-134.

Machała W., *Skale standaryzujące poszkodowanych z obrażeniami, leczonych w OIT*, II Zakład Anestezjologii i Intensywnej Terapii, Uniwersytet Medyczny, Łódź, Uniwersytecki Szpital Kliniczny nr 2.

Matczak M. (2012), *Transport w gospodarczym układzie rynkowym*, „Logistyka" No. 2, 197-202.

Nowakowska-Grunt J., Chłąd M. (2015), Mobilność jako element zarządzania miastem, *„Zeszyty Naukowe Politechniki Częstochowskiej. Zarządzanie"*, No. 20, p. 128-138.

Nowakowska-Grunt J., Strzelczyk M. (2014), *Influence of Road Transport on the Environment - Poland Against the European Union*, The Publications of the Multi-Science - XXVIII. microCAD International Multidisciplinary Scientific Conference. 10-11 April, Miskolc.

Nowicka-Skowron M., Mesjasz-Lech A. (2013), *Globalization and the Development of Logistics Infrastructure of the Freight Transport by Road*, Regional Integration: Europe, the Mediterranean and the World Economy. 53rd ERSA Congress.

Polityka transportowa UE [access: 2017-12-20] https://europa.eu/european-union/topics/transpo-rt_pl.

Road deaths per million inhabitants (2017), European Commision, 28 March 2017, [online access: 2017-12-21], https://ec.europa.eu/transport/sites/ transport/files/2017-03-28-road-deaths-per-million-inhabitants.pdf.

Road safety in the European Union. Trends, statistics and main challenger (2016), European Commission, Mobility and Transport, Brussels.

Rozenek R., Przasnyski J., Gemza M. (2015), *Kwalifikacja zdarzeń drogowych oraz polecenia i sygnały wydawane przez policjanta na miejscu zdarzenia drogowego. Materiały dydaktyczne 142*, Zakład Ruchu Drogowego, Centrum Szkolenia Policji, Legionowo.

Safer Roads in the UE. Innovative technologies for safer roads [online access: 2017-12-27], https://ec.europa.eu/transport/road_safety/sites/ roadsafety/files/pdf/ statistics/dacota/edwaad-static-infog-technologies-160914.pdf.

Şimşekoğlu Ö., Nordfjærn T., Rundmo T. (2015), *The role of attitudes, transport priorities, and car use habit for travel mode use and intentions to use public transportation in an urban Norwegian public*, "Transport Policy", No. 42, 113-120.

Strzelczyk M. (2013), *Determinanty wyboru środka transportu przy przejazdach pracowniczych na obszarze miasta Częstochowa*, [w:] Lewandowski J., Sekieta M., Jałmużna I., Skuteczna logistyka warunkiem rozwoju regionów i przedsiębiorstw. Wydawnictwo Politechniki Łódzkiej, Łódź, 107-123.

Szołtysek J. (2008), *Kierunki poszukiwań rozwiązań problemów z przemieszczaniem się we współczesnym świecie*, "Gospodarka Materiałowa i Logistyka" No. 7, p. 25.

Transport. Zrozumieć politykę Unii Europejskiej (2014), Urząd Publikacji Unii Europejskiej, Luksemburg, p. 3. *Transport. Zrozumieć politykę Unii Europejskiej* (2014), Urząd Publikacji Unii Europejskiej, Luksemburg.

Unarski J., Wach W., Dąbczyński Z., Bohatkiewicz J. (2008), *Ryzyko obrażeń w kolizjach z obiektami przydrożnymi*, [w:] *Informacja nr 65*, Klub Inżynierii Ruchu, Bochnia-Tuchów-Raciechowice, p. 29, [online access: 2017-21-12] http://www.klir.pl/biuletyny/biule-tyn65.pdf.

Urbanyi-Popiołek I. (2013), Podstawy organizacji i ekonomiki transport, [w:] Urbanyi-Popiołek I. (red) *Ekonomiczne i organizacyjne aspekty transportu*, Bydgoszcz, p. 6.

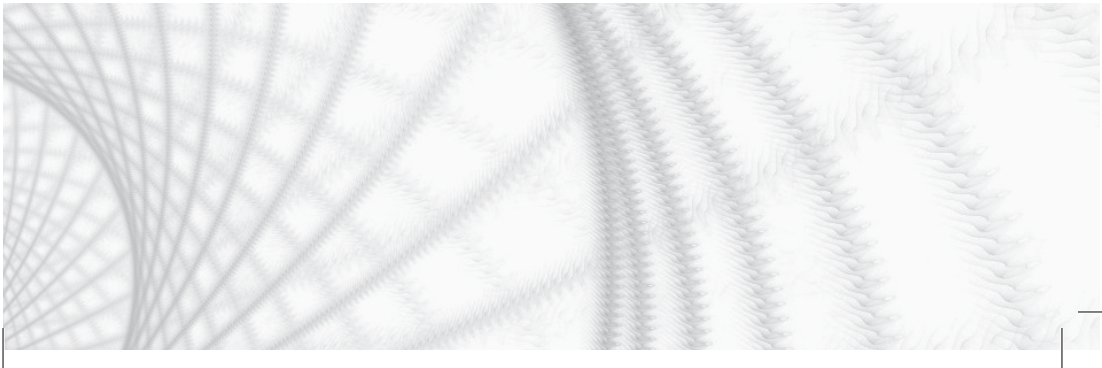
Wierzchołowski W. (2015), *Ocena zależności morfologii obrażeń w obrazach tomografii komputerowej całego ciała do mechanizmu urazu*, Rozprawa na stopień doktora nauk medycznych, Poznań.

Włodarczyk K. (2013), *Obszary globalizacji konsumpcji w Polsce-wybrane zagadnienia*, Zeszyty Naukowe Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie. Polityki Europejskie, Finanse i Marketing, 09 [58], 623-637.

Zarządzenie nr 31 Komendanta Głównego Policji z dnia 22 października 2015 r. w sprawie metod i form prowadzenia przez Policję statystyki zdarzeń drogowych, online access: http://www.infor.pl, odczyt 2017-12-13.

Zieliński M. (2017), *Samochód nie pozwoli przekroczyć prędkości i zjechać z pasa. Nowe przepisy planowane na 2020* [online access: 2017-12-27, last update: 2017-10-26], https://moto.wp.pl.

Żochowska R., Karoń G., Sobota A. (2014), *Zarządzanie kongestią w sieciach miejskich - wybrane aspekty*, "Logistyka" No. 6, 11850-11861.



MODELING OF A LOGISTIC PROCESS FOR A BASIC SANITATION CONCESSIONAIRE

Givanilda de Moraes Silva, Roberto Kanaane,
Luciano da Silva Ferreira

1. Introduction

The purpose of this chapter is to characterize the modeling of a logistics process, from a basic sanitation concessionaire, under a case study approach, adopting a documentary research and data collection, from the following stages: identification of the organization value chain processes and process scope diagram with concept alignment; validation of the value chain and the process scope diagram; survey of information for preliminary analysis of the process; elaboration of the process flow and / or selected activities.

It is sought, from the theoretical basis, to subsidize and analyze the data surveyed, presenting an alternative action, aiming to optimize the logistics process of the said concessionaire.

2. Theoretical reference

2.1 Logistics and concept development

For a full understanding of logistics, it is necessary not only to master concepts and practices, but also a broad understanding of its historical evolution and correlation with the evolution of all industrial management. The vision of historical evolution embodies a critical view of the current situation, as well as of the logistic tendencies.

Five main steps in logistic evolution are pointed out in recent studies by Fleury et al. (2000), being the first called "from the field to the market", located at the beginning of the 20th century, focused on the problem of the flow of agricultural production. The starting point of this stage is the publication by John F. Crowell in 1901 of a treatise on the costs and factors that affect the distribution of agricultural products. This was the first text to address such issues.

The second stage, "segmented functions," occurred between the 1940s and 1960s and was characterized by specialization and emphasis on functional performances. In those years the logistical focus was departmental, and the efforts were all to improve the efficiency of the links, without concern for the integration of the chain.

Beginning in 1960, the third stage begins, called "integrated functions". The focus was then on the integration of internal logistics, with emphasis on the concept of total cost and systemic treatment. At this time the first major association of logistics professionals and academics emerges, the National Council of Physical Distribution Management (NCPDM).

The fourth stage, "customer focus", began in 1980 and focuses on the study of productivity and cost of inventories. It is from this time the change of the NCPDM to CLM - Council of Logistical Management.

Finally, the last step is "logistics as a differentiating element", which corresponds to the current situation. Now logistics is seen as a means to gain

competitive advantage. It also highlights the emergence of the concept of supply chain management. In the decade of 2000 the CLM changes its name to Council of Supply Chain Management Professionals – CSCMP, which defines logistics as being:

> Logistics Management is the part of supply chain management that efficiently and effectively plans, implements, and controls the direct and reverse flows, the storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customer requirements.

Logistics is responsible for the integration and synchronization between two flows: information and the physical. In this way, through logistics it is possible to ensure customer satisfaction over time, from suppliers, transportation, distributors, retailers, customers, material flow, recovery and recycling, information flow, financial flow and human resources.

2.2 Organizational Processes

Prior to the Industrial Revolution the craftsman was a specialist who had complete mastery of the entire production cycle, from product design to after-sales. At that time, the client was close to the artisan, explaining his needs, which the craftsman tried to meet, since he knew that the commercialization of his products depended very much on the reputation of quality. With the Industrial Revolution, the organization of work changed drastically. What was once done in the family nucleus with the knowledge passed from father to son, now it was made in the cities, in factories and was only part of the work. This revolution that massified production and brought the diversity of products had to deal with several factors, such as raising productivity and managing people (JESUS, MACIEIRA, 2014).

And it was in this scenario that the world entering the industrial age, leaving the craft age behind, that the engineers Frederick Winslow Taylor and Henri Fayol developed the first and pioneering works on Administration (CHIAVENATO, 2011).

The modern company that emerged as a result of this process and is made up of many specialized functional departments, such as sales, engineering, marketing, production, operations and finance (HAMMER & HERSHMAN, 2011), which separately seek goals and report to the executive Responsible for the department.

This logic leads to the need for coordination of professionals and tasks throughout a process, making concern about process coordination become a manager's responsibility (JESUS, MACIEIRA, 2014).

In this way, understanding how organizational processes work is important in determining how they should be managed to achieve maximum results, since those processes define how organizations do the work to deliver value to their customers and other stakeholders.

2.2.1 Definition of processes and Value Chain

Proper process management enables the organization to identify its predictability. For Maranhão and Macieira (2004), the predictable processes are those that are under control, that is, the inputs are planned, the transformation is controlled and the outputs are expected.

It is understood that inputs from suppliers must meet the requirements of the process - requirements which have already been previously identified by the organization and agreed with suppliers. Process inputs should be planned and controlled primarily in terms of quantity, time and quality. The activities that add value are controlled in order to guarantee the fulfillment of the requirements of the clients, in order to deliver them products / services according to their needs and expectations. Monitoring activities that add value also ensures less variability in the products / services, i.e., the outcome of the process is the planned result.

In general, it can be interpreted that a process is the way a business consumes resources to generate products and services to which have their value perceived by clients

Organizations have all sorts of processes and structuring them in chain also assists in efficient management. The Value Chain (process chain or process architecture) reflects the way in which the company organizes its various processes, in order to create value for stakeholders and ensure their current and future strategic positioning. In order to build the Value Chain, the organization promotes the basic understanding of the business through the identification of the value stream, stakeholders and their needs, organizational structure and strategic objectives of the company (FNQ, 2015).

The Value Chain is a living system formed by a set of interrelated processes with feedback from customers and society. Organizational beliefs and values permeate the execution of all activities so that the value of the organization is perceived by all stakeholders in each attitude / behavior (FNQ, 2015).

The feedback from clients and society, as well as their needs and expectations guide the organization's strategy.

Vision and mission of the company, defines the processes necessary to reach the organizational objectives (Value Chain). These processes are executed through the organizational structure (functional or not). The processes must generate products and services, which through the evaluation of customers, feed again the vision of the company.

The systemic vision becomes fundamental in orienting the organization's objectives. The analysis and treatment of the impacts of the actions within the departments / units is a prime factor to guarantee the adequate interdependence relation between the components that form the organization and the final result (product / service) for the interested parties. The next chapter discusses how the process can be managed with the purpose of optimizing its management, enhancing systemic thinking by perceiving that processes form a living organism that is the organization.

2.2.2 Processes Management

Once an isolated vision of the work functions is not enough to ensure exceptional products and services for customers and stakeholders, organizations must manage the process life cycle by understanding and solving overall customers' needs from their Functional units (JESUS, MACIEIRA, 2014).

Maranhão and Macieira (2004) explain that shortly after the advent of scientific management, some theoreticians began to develop tools of a more objective nature, such as American professor and statistician Walter Shewhart who in the 1930s postulated in his studies the need for administrators of using, in their work, the Specify-Product-Inspect cycle, that is, Specify-Do-Inspect. One of Shewhart's students, WE Deming, who became famous for guiding the development of postwar Japanese quality, completed the Shewhart's cycle, adding another stage, thus establishing the PDCA cycle, the initials of the English words Plan (plan) , Do, Control / Check and Action.

For ABPMP (2013) processes must be managed in a continuous cycle to maintain their integrity and enable transformation. Figure 09 presents the typical life cycle of managing a predictable behavior process. This cycle includes a set of activities, such as modeling, analysis, design, performance measurement and process transformation, ensuring alignment with organizational strategy and customer focus.

When detailing the PDCA for the management of a process, the following actions are perceived:

– *P - Plan:* the company plans objectives / goals for its processes according to customer requirements, defining the actions necessary to reach those goals / objectives (JESUS, MACIEIRA, 2014).
– *D - Do:* the company implements the planned actions, changing the processes (JESUS; MACIEIRA, 2014).
– *C - Check:* the company periodically monitors and evaluates the results of the processes perceived by its clients, confronting them with

the planned ones and reports these results (JESUS; MACIEIRA, 2014).

– *A - Act:* the company acts according to the results, identifying the lessons learned and determining actions to continually improve process performance (JESUS, MACIEIRA, 2014).

It is perceived that the basis for process management and delivery of better products and services are in translating customer needs into performance requirements that guide the review of how processes should be performed. The management of the process life cycle, when properly designed and implemented, is an important tool to mobilize the organization in the continuous search for better products and services (JESUS, MACIEIRA, 2014).

One of the ways to start the process management is to know and / or establish its scope (objective, purpose, delimitation, constraints) and for this, it is possible to start from the activity of modeling and analysis.

2.2.3 Process Modeling

Organizational process modeling is the knowledge and analysis of the processes and their relationship with the data, structured in a top-down view, to a level that allows them to perfectly understand and satisfactorily obtain the products and services, objectives and results of the processes (MARANHÃO; MACIEIRA, 2004). For Pavani Júnior and Scucuglia (2011) modeling is to graphically represent (through maps, flows or diagrams) a process that is comprehensible by stakeholders, who can be from the top of the company to the system programming personnel, process owners and analysts themselves. Process modeling is justified to document the process, to provide training, to establish work standards, to identify opportunities for improvement, to design a new process, to communicate and measure performance (PAVANI JÚNIOR; SCUCUGLIA, 2011). The purpose of modeling is to create a complete and accurate representation of the process (ABPMP, 2013).

The ABPMP (2013), different from Maranhão and Macieira (2004), points out that process modeling can be approached top-down or bottom-up. The approach varies according to the purpose and scope of the effort. Bottom-up approaches, centered on workflows and tasks, present better results when mapping the functioning of functional areas. However, depending on the purpose of the modeling, the top-down approach is best indicated when there are process transformation efforts that begin with the development of a future state model, and then determine what needs to be done to implement this fashion model.

There are no rules to select which organizational processes should be modeled, however, Maranhão and Macieira (2004) recommend using the following prioritization criteria:

– Processes that primarily impact operating results (survival);
– Critical processes for the implementation of the organizational strategy (future);
– Processes that impact the interactions or interfaces of other priority processes, strangling or limiting the organization's results (management).

It can be seen that these criteria can cover any type of process, be it primary, support or management.

The next step of modeling is the construction of how the process should be, i.e., the future or ideal situation, eliminating bottlenecks or redoing the process. This desired situation is called to be (future situation) and aims to make the process capable of meeting the needs of customers by adding value, thus providing competitiveness to the process. The modeling work will consist of working on the difference between the current situation (as is) and the future situation (to be), overcoming the distance between them, which is called a gap (MARANHÃO; MACIEIRA, 2004).

Modeling can take advantage of numerous tools (from the use of a simple whiteboard, colored Post-it, to advanced and specific software) and there are several notations to perform this activity.

According to Porter (1992) every company is a gathering of activities that are performed to design, produce, market, deliver and sustain its product. All these activities can be represented by making use of a chain of values. The value chain of a company and how it performs its individual activities is a reflection of its history, its strategy, its method of implementing its strategy, and the basic economics of its activities. Value activities can be divided into two general types, primary activities and support activities.

From the primary activities, generic to any organization, it is possible to subdivide the categories according to the specifics, including, giving emphasis to what best characterizes the management and / or focus of the company.

The other specialized notation for mapping processes is the SIPOC notation. This notation is a style of process documentation used in Lean Six Sigma to emphasize input sources (suppliers) and the target of outputs (customer) and has the advantage of agility and simplicity in information (ABPMP, 2013). The SIPOC notation, as well as the Value Chain, provides an overview of the process.

2.2.4 Process analysis

Pavani Júnior and Scucuglia (2011) define process analysis as a set of tasks and techniques used to act as a facilitator between the different stakeholders in order to understand the organization and its respective modus operandi, making possible recommendations for solutions that can achieve the purposes, involving : understand how the organization works; define the capabilities that the organization holds and / or needs; determine action plans; identify forms of interaction between the various units; understand and interfere in the forms of stakeholder interaction.

Process analysis provides an understanding of process activities and the outcomes of these activities and processes in relation to their ability to meet the intended goals (ABPMP, 2013). It is also part of the process analysis to identify constraints and ruptures that interfere with its performance.

Process analysis can be performed in response to deviations in process performance or triggered by external or temporal events. Performance is-

sues can manifest themselves in various ways, such as unacceptable product or service quality or non-compliance with regulatory requirements, for example. In these cases, process analysis can help identify root causes. External or temporal events that trigger the need for process analysis may come from: strategic plans that require new methods and new ways of executing processes; Advances in technology that can impact process performance; mergers, acquisitions and business spin-offs that may result in disjointed processes; changes in economic conditions, market strategies, and regulations that may result in processes no longer satisfying their original performance (ABPMP, 2013).

For ABPMP (2013) the analysis of processes serves to create a common understanding of the current state of the process and if it is meeting the objectives of the organization, however, it should be emphasized that the analysis should not be limited to generating merely illustrative documents, but deliver a diagnosis of the processes to provide support for future transformations.

And to carry out the analysis it is important to seek the general understanding of the reason for the process to exist within the business environment, answering questions such as: why was it created; where the process fits into the organization's value chain; the process is supporting the organization's strategic objectives; provides value to the organization; what the process is trying to accomplish; what is its criticality; why this process is being analyzed.

Among the many benefits that modeling and analysis of processes bring to management, one of the most relevant is the organization to identify the critical points of the process that must be monitored to support corrective actions or the preparation of proposals for improvements. This is possible by establishing performance indicators that can, among other information, measure the performance of the process with information on its effectiveness and efficiency. The next chapter addresses performance indicators, bringing key concepts and the need for building measurement systems.

3. Research method

3.1 Descriptive and explanatory method

This study is classified as descriptive and explanatory, since it was adopted an organizational unit, which served as a laboratory, characterizing a case study, describing and explaining the intervention in the real life context.

3.1.1 Case study approach

Yin (2010) defines a case study as an empirical research that investigates a contemporary phenomenon in depth and in its real life context, thus allowing its ample and detailed knowledge. The case study research faces the technically differentiated situation in which there will be many more variables of interest than data points; has multiple sources of evidence and benefits from the development of theoretical propositions to guide the collection and analysis of data (YIN, 2010).

The case study comprised documentary research and data collection. The documentary research was done from reports and computerized systems, with the aim of collecting primary data inherent to the Logistics process. The data collection took place through the use of observation techniques and interviews.

3.1.2 Documentary research and data collection

Because it is a qualitative research, the non-probabilistic sample was conveniently selected from the universe of the organization, due to the accessibility of the researchers (GIL, 2008). The organizational unit selected is a department responsible for the relationship with the final customer, covering the activities of service and execution of services. In total, three interviews were conducted, one with the leader of the process and two with executor specialists in the logistics activities.

Process modeling followed the steps outlined in Table 01.

Table 01 — Steps for modeling processes

Stages	Techniques	Participants	Goals
1) Identification of the processes of the organization's Value Chain and Process Scope Diagram with concept alignment.	Documentary analysis, individual interviews and direct observation (in loco).	Responsible / process leader.	Level knowledge and bring higher quality responses to interviews. Raise key process information.
2) Validation of the Value Chain and the Process Scope Diagram.	Preparation of minutes of the Value Chain and the Process Scope Diagram and meeting with the interviewees.		
3) Survey of information for preliminary analysis of the process.	Documentary analysis and structured interview.	Responsible / leader and key people who act in the process.	Identify opportunities for improvement.
4) Process flow elaboration and validation (SIPOC).	Elaboration of the SIPOC draft of the process with the interviewees and meeting with the interviewees.	Responsible / leader and key people who act in the process.	Identify the critical points in the process to define performance indicators.

Source: Prepared by the authors

4. Analyzed context

The logistics process of the concessionaire includes the management of the materials and equipment necessary for the execution of the services performed for the clients, such as:

– *Water services:* water connection, easel repair, repair in the water network, repair of mains, among others;
– *Sewage services:* sewage connection, sewage clearing, clearing of collectors, repairing sewage networks, among others.

This macro-management starts with a) identifying the needs of materials and equipment; B) goes through the management of purchases / supplies; C) receipt of material / equipment and inventory management; D) distribution of material / equipment.

Currently, the concessionaire has six Maintenance Poles (areas responsible for executing customer services), where the Logistics process is carried out, more specifically in the warehouse cells. Of the six cells of warehouse, two are suppliers, since they receive the materials and equipment and distribute to the other four. This differentiation is due to the geographical location of these cells.

4.1 The Concessionaire of Sanitation

The Sanitation Concessionary was created in the 1970s, with the purpose of planning, executing and operating basic sanitation services, including the abstraction, treatment, and distribution of water and collection, removal, treatment and final disposal of sewage, marketing those services (PEREIRA and MOGGI, 2001). It is a mixed-capital company and is considered one of the largest sanitation companies in the world in population served. The mission of the organization is to "Provide sanitation services, contributing to the improvement of the quality of life and the environment" and the vision is "In 2018 ... To be recognized as a company that has universalized sanitation services in its area of operation, in a sustainable and competitive way, with excellence in customer service ".

5. Results and discussion

5.1 Process modeling Logistics

Based on the analysis of the documents of the Concessionary of Sanitation, its organizational principles (Mission and Vision) and the infor-

mation obtained through interviews (first stage of the modeling of the Logistics process) were defined:

– The Organization's Value Chain Processes.
– The Process Scope Diagram
– The SIPOC of the Logistics process.

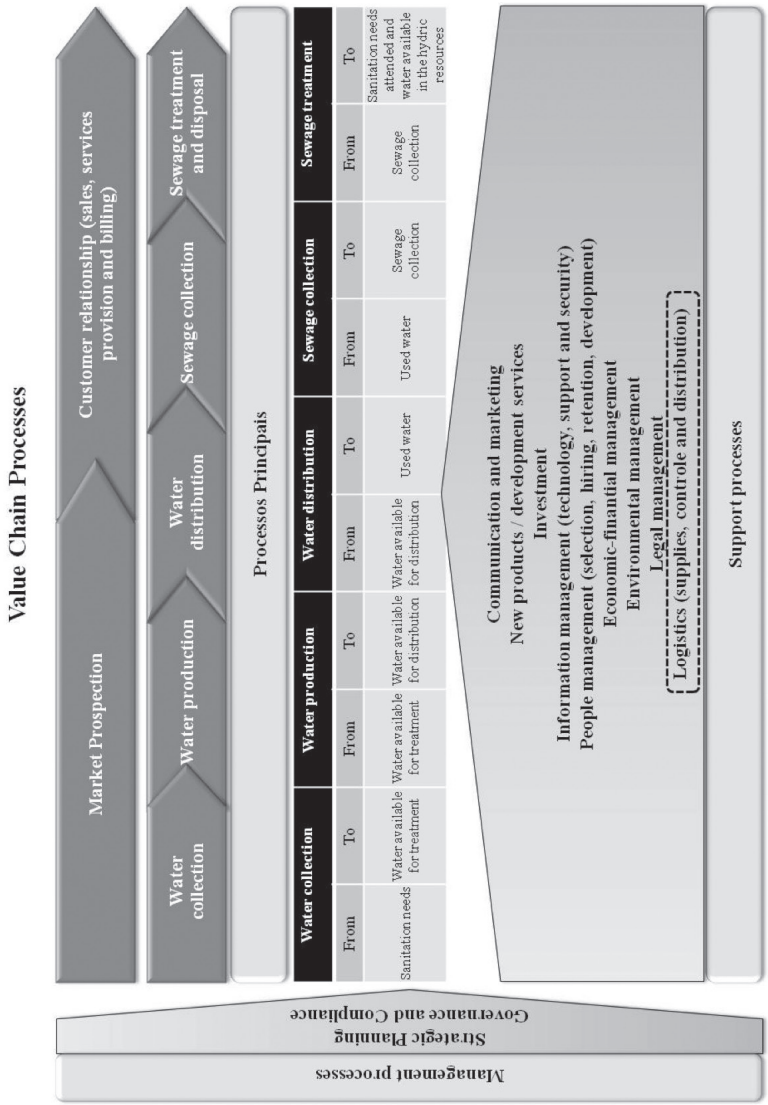
5.1.1 Processes of the Organization's Value Chain

The Value Chain processes (Figure 01)were identified starting from the Sanitation Cycle.

In general, a sanitation cycle covers:

– Water harvesting: harvest the water in the river or in the spring;
– Water treatment: makes water healthy, in the standards of potability;
– Adduction: it transports the water through conduits to the reservoirs;
– Reservation: stores the water in large disinfected tanks;
– Water distribution: places the water with adequate quality and quantity in the residences;
– Sewage collection: receives wastewater and faecal matter from residences;
– Sewage treatment: overrides the risk factor for domestic sewage contamination.

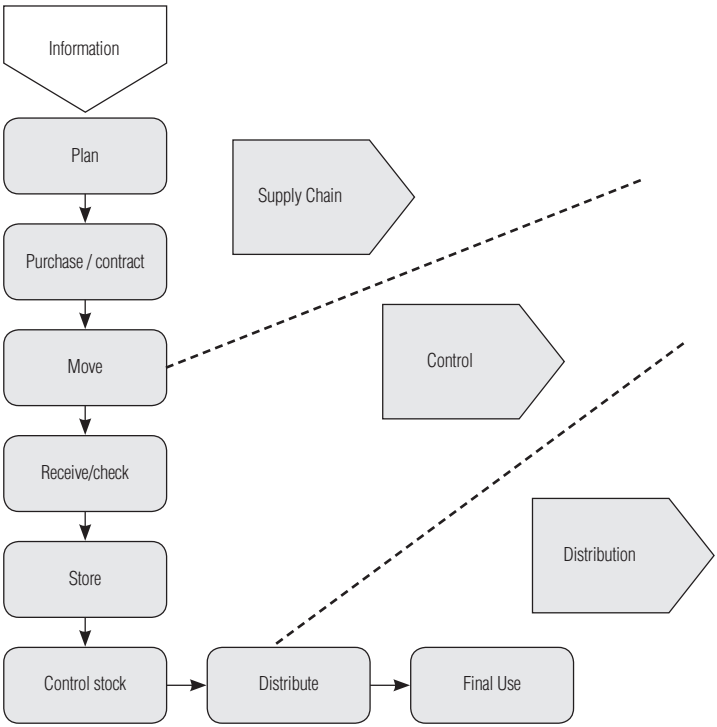
Figure 01 — Value Chain Processes



Source: Prepared by the authors

The Logistics process was highlighted (dotted line) for the continuity of the modeling, following the architecture shown in Figure 02.

Figure 02 — Logistics Process Architecture



5.1.2 Logistics Process Scope Diagram

The validation of the Process Scope Diagram (second stage), Table 02, occurred in a meeting with the process manager and hierarchical leadership. The Diagram aims to provide information needed to delimit the modeling work.

Table 02 — Scope Diagram of the Logistics Process

Purpose of the process	Perform management of materials and equipment necessary for the proper functioning of organizational processes, meeting the needs and expectations of stakeholders.		
Stakeholders	**Stakeholders Requirents**	**Critical Success Factors**	**Performance Indicators**
Suppliers	– Fidelity in the purchase – Cooperation in research and development – Partnerships	– Automated and all time information – Space dimensioned and suitable for storage of materials and equipment – Human resources – Clear interface with predecessor and successor processes (Predecessors: Investments and Supplies; Successors: Execution of customer service and maintenance of water and sewage systems)	– Expenses and investment budgets – Annual physical inventory – Monthly count by material group – Stock turn
Internal Clients (Organizational Units)	– Deadline – Quality – All time attendance		
External customers (ventures)	– Deadline – Quality – All time attendance		
Shareholders	– Costs reduction – Resouces optimization		
Workforce	– Supply of Personal Protective Equipment (PPE) and Collective Protection Equipment (CPE) – Materials and equipment required to carry out the work		

Laws	**Policies**	**Management Standards (procedures) and Records**
– Law 8666/13 – Sarbanes Oxley	– Institutional Policy - Supplies and Contracting	**Management Standards:** – Stock Management Procedures – Material Return Procedure / Technical Report **Records** – Dossier and Bidding and Hiring – Material Return / Simple Shipment Note – Technical Report

Functional areas involved in the process	
– Operating areas – Maintenance areas – Commercial areas	Internal customers
– Financial areas – Bidding areas – Legal áreas	Units that support the process

Initial event (de): **Material / equipment need.**		**Result (to):** **Product delivered to the applicant.**		
Process Dimensions – SIPOC				
Suppliers	**Inputs**	**Process Activities**	**Outputs**	**Customers**
Internal and External Customer (demands)	Material / Equipment Requisition	1. Customer request 2. Warehouse receives request 3. Warehouse verifies resource 4. Financial releases resource 5. Purchase makes a bid or punctual purchase agreement	Materials and equipment made available / distributed to customers	Internal and External Customers
Supplier companies	Material / Equipment	6. Supplier delivers as per contract and technical specifications 7. Warehouse receives material and verifies if material is as per required 8. Warehouse stores and controls up to final delivery to customer		

Adverse social impacts	**Adverse Environmental Impacts**
There is not	Waste - material waste from the main processes of the organization
Treatment of social and environmental impacts	
– Identification / mapping of disposal needs.	

Professionals involved (functions / positions)	**Information Systems**	**Infrastructure**
– Responsible for warehouse – Technical assistant – Driver	– Computerized Material Management System	– Physical space – Automotive vehicles (cars and trucks) – Equipment for the transport of materials and equipment

Source: Prepared by authors

The definition of the objective of the process consistently establishes its effort to contribute to the organization's mission. The objective provides guidelines and directs the commitment of activities. Specifically for the Logistics process, the business guidelines are: follow the technical specifications; conduct inspection of strategic materials; testing the materials provided; laws and regulations. These guidelines are communicated to stakeholders through the means of internal communication channels and organizational tools (institutional procedures and policies).

The stakeholder identification of the process, as well as its requirements, directs the process to establish goals and targets to satisfy the parties. Translation of stakeholder requirements into process performance requirements enables improvement and innovation in service delivery.

Stakeholder and process performance requirements as well as Critical Success Factors are amenable to monitoring and measurement and can provide process managers and processors with accurate information for quick decision making.

The identification of laws, regulations, and policies that apply to the process provide important information on the requirements necessary for execution. This type of document can be translated by means of Operational Procedures to determine the working rules of the process. In addition, the Registers ensure the traceability of the execution of the process. It should be noted that the elaboration of procedures requires constant revision. Revisions can be made from identifying process improvements (corrective or preventive) and should rely on the collaboration of the workforce directly involved in the activity.

The process dimensions from the SIPOC tool (Suppliers, Inputs, Process Activities, Outputs and Clients) make it possible to identify the items that can be measured. The activity highlighted in bold was selected for modeling using flow charts. The selection took into account the criticality of the activity for the clients and the complexity of the execution.

The identification of the functional areas involved in the process helps the cooperation between areas and the effective systemic vision through the managers and executors of the process. The commitment of the func-

tional areas improves the communication process and consolidates the necessary partnership to improve the interfaces and value the activity.

The identification of the social and environmental impacts adverse to the process enables the organization to establish plans, actions, programs and management practices to minimize, mitigate or even eliminate these impacts. The management of the aspects that cause social and environmental impacts demonstrates the organization's commitment to its clients and to society. It is suggested for the organization the implementation of the adequate destination of materials and equipment

Finally, the Process Scope Diagram presents information regarding the resources required for proper execution as skilled professionals, information systems and infrastructure.

The skills required for the professionals involved in the process are: organization, leadership, systemic vision, creativity, flexibility and resilience. Internally, people can be trained on the job in the routine activities of the process and for the development of interpersonal skills, external trainings can be carried out according to the need of each employee.

5.1.3 SIPOC of the Logistics process

The SIPOC presents the end-to-end process, that is, from the identification of the material / equipment need necessary for the execution of the organizational processes, to the product delivered to the applicant.

For a better management of the Logistics process, it was divided into three subprocesses: a) Supplies; B) Control and; C) Distribution, as shown in Figures 03, 04 and 05.

Figure 19 — Supply chain sub process

Source: Prepared by authors

Figure 20 — Control sub process

Source: Prepared by authors

Figure 21 — Distribution sub process

Source: Prepared by authors

From the subprocesses it was possible to establish performance indicators that, when monitored, analyzed and the deviations corrected, could become a highly qualified tool for decision making by the management of the organization. Therefore, the indicators presented in Table 03 are suggested as a way to assist the organization in the management of the process.

Table 03 — Performance Indicators for the Logistics Process

Sub process	Performance
Supplies	Purchases made on time Deliveries made on time Vendor resupply time Receipt of products within specifications Deliveries with faults Supplier Performance Evaluation
Control	Operating costs with inventories Reverse logistics cycle time Inventory accuracy Stock Visibility Nonconforming products Average stock level
Distribution	Deliveries made on time Transport failures Internal customer satisfaction

Source: Prepared by authors

It is suggested that the analysis of the indicators is done by the various organizational structure instances, but, necessarily, by the medium and high management in monthly or bimonthly meetings (depending on the periodicity of the indicator).

In addition to enabling the assessment and control of logistic performance through real and accurate figures to support decision making, the indicators also enable transparent disclosure of process results to relevant stakeholders.

6. Final considerations

The purpose of this chapter was based on the relevance of the topic that enables current organizations to focus on logistics management, seeking the standardization and simplification of routines, thus obtaining clarity of the process mainly for internal stakeholders.

Therefore, the objective was to characterize the modeling of a logistics process of a basic sanitation concessionaire, under a case study approach, adopting documentary research and data collection. Thus, based on the theoretical foundation that approached the logistics theme and the management of organizational processes, it was possible to map the logistics process of the organization and propose improvements, as presented in the chapter Results and Discussion. And, as improvements to the process, it is suggested that the organization develop a routine to allocate materials that have been dimensioned beyond need (leftovers) or have been replaced by new materials; that implements the process of reverse logistics with the proper destination of materials returned or not used in other organizational processes and, finally; which develops partnerships with suppliers to carry out adaptation of segregated materials and equipment, but which are in perfect state of conservation.

Logistic management seeks to contribute to excellence in the process of management and organizational strategy, aiming at cost reduction and improvement of services, therefore, any and all changes in the process must be carried out in a planned manner obeying the PDCA cycle and involving the relevant stakeholders in implementing the improvement.

REFERENCES

ASSOCIATION OF BUSINESS PROCESS MANAGEMENT PROFESSIONALS – ABPMP. *Guia para o Gerenciamento de Processos de Negócio – Corpo Comum de Conhecimento*. São Paulo, 2013.

CHIAVENATO, Idalberto. *Introdução à Teoria Geral da Administração*. Rio de Janeiro: Elsevier, 2011.

CSCMP - Council of Supply Chain Management Professionals. Disponível em: https://cscmp.org/iMIS0/CSCMP/ - Acesso em 30/03/2017.

Fleury, P. Fernando *et al. Logística Empresarial: A Perspectiva Brasileira*. São Paulo: Altlas, 2000.

FUNDAÇÃO NACIONAL DA QUALIDADE – FNQ. *E-book: Gestão por Processos*. Disponível em: <http://www.fnq.org.br/informe-se/publicacoes/e-books>. Acesso em: 04 jul. de 2015.

GIL, Antonio Carlos. *Métodos e técnicas de pesquisa social*. São Paulo: Atlas, 2008.

HAMMER, Michael; HERSHMAN, Lisa. *Mais rápido, barato e melhor: determine o sucesso dos negócios alinhando processos organizacionais à estratégia*. Tradução de Thereza Ferreira Fonseca. Rio de Janeiro: Elsevier, 2011.

JESUS, Leandro; MACIEIRA, André. *Repensando a gestão por meio de processos: como transformar negócios e gerar crescimento e lucro*. Rio de Janeiro: EloGroup, 2014.

MARANHÃO, Mauriti; MACIEIRA, Maria Elisa Bastos. *O processo nosso de cada dia: modelagem de processos de trabalho*. Rio de Janeiro: Qualitymark Editora, 2004.

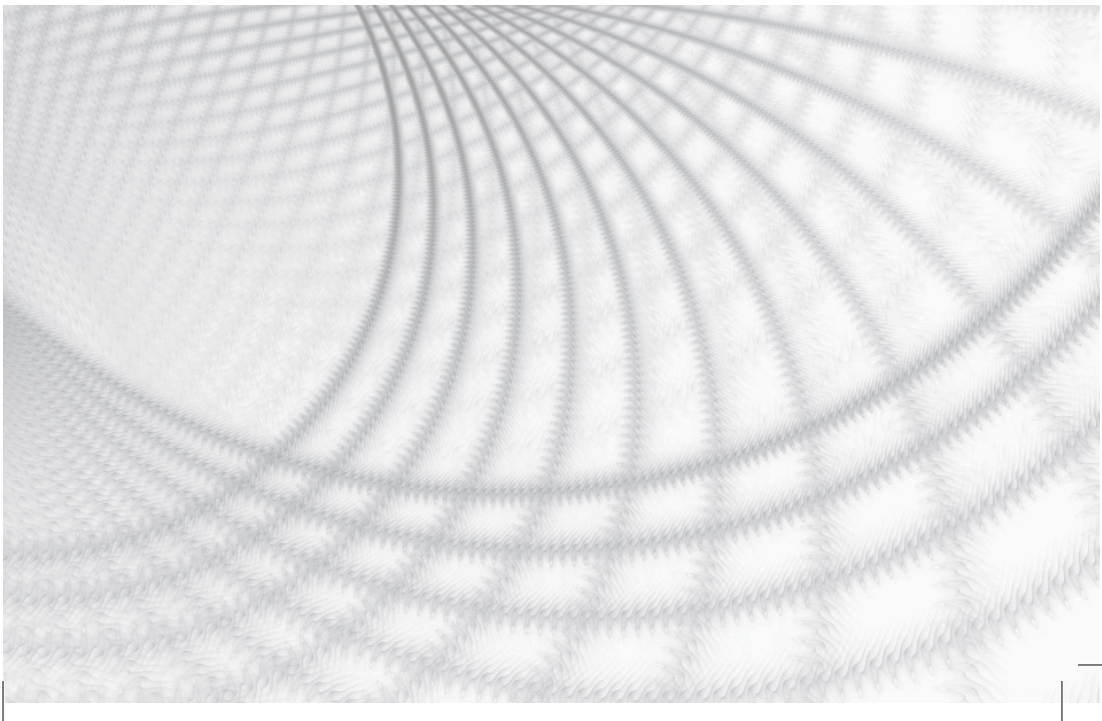
NATIONAL COUNCIL OF PHYSICAL DISTRIBUTION MANAGEMENT – Disponível em: http://www.worldcat.org/identities/lccn-n80046675/ - Acesso em 30/03/2017.

PAVANI JUNIOR, Orlando; SCUCUGLIA, Rafael. *Mapeamento e Gestão por Processos – BPM: gestão orientada à entrega por meio de objetos – metodologia GAUSS*. São Paulo: M. Books do Brasil Editora Ltda., 2011.

PEREIRA, Maria Isabel; MOGGI, Jair. *Sabesp: rumo ao futuro*. São Paulo: Pioneira Thomson Learning, 2001.

PORTER, Michael E. *Vantagem competitiva: criando e sustentando um desempenho superior*. Rio de Janeiro: Campus, 1992.

YIN, Robert K. *Estudo de caso: planejamento e métodos*. Porto Alegre: Bookman, 2010.



ORGANIZATIONAL ASPECTS AND PLANNING IN THE MANAGEMENT OF THE PROCESSES OF ROAD OVERSIZE CARGO TRANSPORT

ROBERT SAŁEK

Abstract: Road transport as the most developed branch in the structure of the global logistics system constitutes the basis for the appropriately functioning economies worldwide. This particularly relates to international transport in terms of the aspect of the growth in demand for services and market competition. A particular case in mind is that of oversize cargo road transport which enables the transportation of special and untypical orders. In the herein paper an analysis has been conducted of the activities undertaken during the course of organizing and planning the transportation process for oversize cargo in international transport.

Key words: transport, logistics, management, transportation process, oversize cargo road transport.

1. Introduction

Road transport may be characterized on many levels. It is primarily divided into national and international transportation. In light of the Act dated 6 September 2001 relating to road transport, national transport is the execution of economic activities in the sphere of transporting people or items by vehicles registered in the territory of the Republic of Poland, whereby the place of commencement, the travel time of the vehicle and conclusion of the journey are all in the territory of the Republic of Poland. International transport is however executed when the travel time of the vehicle between the starting point and the destination involves crossing the borders of the Republic of Poland[1]. It is essential to remember that by executing transportation in the territory of another country, e.g. Germany, it is necessary to adhere to the binding regulations there.

Oversize loads are also termed abnormal or overgauge loads. Such loads may be referred to those that require the use of specialized means of transport, as well as equipment for the purpose of transshipment. Overgauge loads may be divided up as follows: typical, special, heavy, heavy load of concentrated mass, spatial and long. The organization of the transportation of oversize loads encompasses several important actions which first and foremost include the following:[2]

– checking the state of the vehicle and its equipment,
– adhering to the date of delivery of the load,
– the appropriate loading of the vehicle,
– inspection of the route (permit, navigation, escort),
– adjustment of the work time schedule of the driver,
– rapid resolution of problems during transportation,
– adhering to the date of unloading.

1 *Act dated 6 September 2001 relating to* road transport *(Law Gazette. no 125, pos. 1371), p. 9765.*

2 *J. Neider,* Transport międzynarodowy. *Polskie Wydawnictwo Ekonomiczne. Warszawa 2008 p. 158*

2. Vehicle transport as a fundamental element of the global transport system

Road transportation is so popular due to its characteristics. Firms frequently decide to choose this method of transport because of certain factors that lead to the fact that it is the most appropriate means of transport for this type of load, or a situation whereby an enterprise needs to avail of it. The principal positive features of road transportation are certainly the speed of transportation and its flexibility by comparison with rail or water transportation. This stems from the availability of linear and nodal infrastructure as the density and cohesion of the road network in road transportation is much greater than in other areas of transportation[3]. Likewise, it is also possible to add the lack of necessity of reloading between the starting point and the destination to the list of advantages as road transportation facilitates the service of "door to door", namely directly from the despatching point to the destination point. It is a very convenient option by comparison with, for instance rail transportation, in which despite the fact of lower costs than road transportation, we are forced to use additional means of transport in order to deliver to the final destination that is not directly located near the railway siding. A further positive feature of this type of transport is its universality. It is adjusted to the transportation of almost all types of goods, ranking from loose material, dust, fluid products, LCL to oversize loads of varying and large dimensions. This is possible thanks to the varied and specialized fleet that is adjusted to the transportation of loads of varying susceptibilities[4].

---

3 *J. Nowakowska-Grunt, M. Strzelczyk,* Influence of Road Transport on the Environment - Poland Against the European Union. *The Publications of the MultiScience - XXVIII. microCAD International Multidisciplinary Scientific Conference. Miskolc, 10-11 April 2014, p. 2.*

4 *D. Leończuk,* Transport drogowy towarów w Polsce. *W: Ekonomia i Zarządzanie. Politechnika Białostocka, Wydział Zarządzania, Katedra Informatyki Gospodarczej i Logistyki, 2011, p. 99.*

The priority factor that decides on the choice of this branch of transportation is that of the delivery time. Firstly, the forwarder is able to assure the client of a shorter time period for the delivery of loads than in the case of rail or water transportation. The only option for faster delivery is air transportation which is unfortunately associated with restrictions on dimensions and high costs of delivery. This time period is shortened thanks to the fact that the load is sent directly from the sender to the receiver while bypassing the need to reload as happens at for instance a port area[5]. The time of transportation is influenced by such factors as the following:

– speed of use of road vehicles particularly on dual carriageways and motorways (the only factor that may have an impact on this feature is that of the congestion on the roads, namely the so-called traffic jams),
– the possibility of availing of the most convenient traffic routes,
– the most beneficial availability of these means of transport in terms of time for people searching for a forwarder,
– high frequency of deliveries (in the case of ferries it is much lower),
– timeliness of deliveries, if they have not been disrupted by another factor[6].

Road transportation in EU countries is responsible for the transportation of millions of tons of goods of all types annually. As illustrated by research, road transportation is most frequently utilized due to the large number of advantages associated with it. In addition, it has the largest share of the whole overland transportation. The share of road vehicle transportation with relation to the total transportation

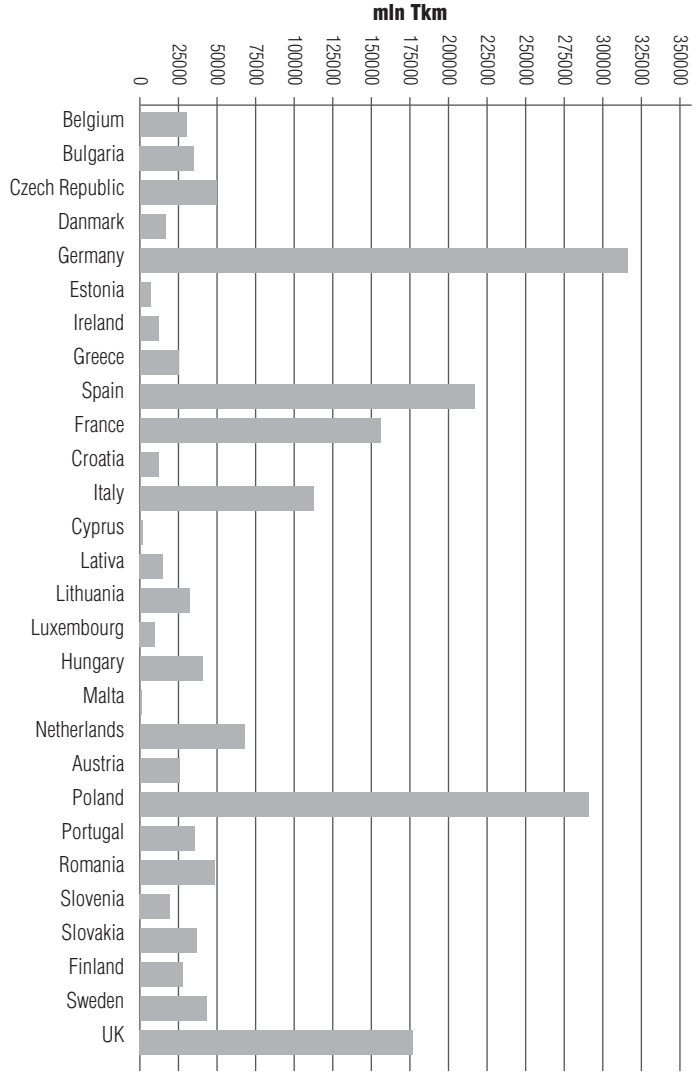
5 *J.J. Cole, E.J. Bardi, C.J. Langley Jr:* Zarządzanie logistyczne. *Polskie Wydawnictwo Ekonomiczne. Warszawa 2010, s. 419.*

6 *J. Neider: T*ransport międzynarodowy. *Polskie Wydawnictwo Ekonomiczne. Warszawa 2008, s. 55.*

executed amounts to 45%. According to the data of Eurostat, Poland is one of the leaders in road transportation. It is stipulated in the report of Eurostat dated 2016 that Poland is ranked in 4th place in terms of the quantities of goods transported (1,313,657 tons). The afore-mentioned result is only surpassed by the following: Germany, France and Great Britain. In all the EU countries in 2016, road transportation was responsible for the transportation of 14.6 bn tons of loads. A similar picture is presented of transportation in tkm. A total of 1,851, 271 m tkm is executed by road transportation in the EU. Fig. 1 presents the number of tons and kilometers of transportation work executed in the particular countries of the EU[7].

7 *http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t-tr00005&plugin=1(odczyt 04.09.2017r.)*

Fig. 1 — Transportation work executed by road transport in 2016 (EU 28).



Source: Self-analysis on the basis of data from Eurostat.

The criteria of choosing this branch of transportation does not take the costs into account initially. Nevertheless, it is necessary to remember that road transport is costly and only air transport generates greater costs. The setting of prices for such services involves a multitude of factors. In road transport, every forwarder sets the prices on an individual basis. There are no fixed price levels as used in airport terminals. The price levels are influenced by direct costs, indirect costs and the assumed profit[8]. The level of competition in road transport is very high, which does not have a positive impact on prices and it is necessary to remember that the price levels are only conjectural, which constitute the start of negotiations with the client[9].

3. Transport of oversize loads – essence, principles of organization and planning

Oversize loads are referred to when even one of the dimensions of the whole load is exceeded. Standard dimensions within this normative are as follows:

– length of road vehicle with semi-trailer – 16.5 metres,
– length of road vehicle with trailer – 18.75 metres,
– width of vehicle – 2.55 metres,
– height of vehicle – 4 metres.

By taking account of the mass and axle load, an oversize load may be termed a vehicle that exceeds the permissible total mass of 40 tons and

8 *J. Neider:* Transport międzynarodowy. *Polskie Wydawnictwo Ekonomiczne. Warszawa 2008, s. 60.*

9 *J. Krzywda, W. Skibińska, A. Wiśniewska-Sałek, Oczekiwania polskich firm transportowych względem działań podejmowanych przez rząd i sektor transportowy, Logistyka, Nr 1/2016., p. 279.*

permissible axle load of 10 tons or 11.5 tons depending on the road that the given vehicle has to travel on[10].

Standard semi-trailers do not have sufficient durability or capacity to transport goods of unconventional dimensions. Specialized semi-trailers and trailers are applied for such loads. The fleet utilized for the transportation of oversize loads is equipped with a large number of axles in order to reduce the weight of the concentrated mass on the road surface. Additionally, in terms of an oversize load semi-trailers are used that facilitate the transportation of loads of large sizes, such as for example flatbed semi-trailers, providing the possibility of loading higher commodities.

In Poland there are several legislative acts that define an oversize load transport and its characteristics. There are no international laws relating to the transportation of oversize loads, thus the principles of organizing and executing this type of transportation are defined within the internal regulations of a particular country.

The most significant document specifying road vehicle transport in a strict sense is the Act dated 20 June 1997, known as the Law of Road Traffic, in which the principles of permitting vehicles to be driven on public roads are stipulated in terms of exceeding dimensions or weight together with the load, while also the conditions of acquiring permits and the types of permits[11].

On the basis of the Act dated 20 June 1997, known as the Law of Road Traffic, the Minister of Infrastructure issued two decrees as follows:

– Decree dated 16 December 2004 relating to the case of detailed conditions and the mode of issuing permits for vehicles with oversize loads[12].

---

10 R. Rudziński. M. Kowalczyk Istota i charakterystyka ładunków ponadnormatywnych, Essence and characteristics of oversize loads, Zeszyty Naukowe Uniwersytetu Przyrodniczo-Humanistycznego w Siedlcach. Seria: Administracja i Zarządzanie 22/2012 p. 342.

11 See further: Law Gazette dated 2005 no. 108 pos. 908.

12 See further: Law Gazette dated 2004 , no. 267, pos. 2660.

– Decree dated 26 April 2004 relating to vehicles executing navigation, whereby the conditions and manner of navigating vehicles with oversize loads is defined, while also the equipment and marking of these vehicles[13].

A further significant regulation with regard to the transportation of oversize loads is the Act dated 21 March 1985 relating to public roads. This describes the costs associated with driving vehicles with oversize loads. In art. 41 of the aforesaid Act, there is information about the costs associated with specifying the route of the vehicle and adjusting the sections of the roads to the transportation of loads of a mass or dimensions exceeding the permissible norms[14]. Many more documents regulating the transportation of oversize loads exist. Only the basic legislative acts have been presented above which should be known by anyone organizing such transportation.

4. Organization and planning of process of oversize cargo transport. Analysis of case of transportation firm.

4.1 Structure of activities in organization and planning of transportation process.

By undertaking the subject matter of the problematic issues of the organization of the processes of transportation, it is necessary to first and foremost order the structure of the process itself. In the case under analysis, the course of the transportation process is preceded by a range of organizational and decision-making activities whose effect is the initiation of

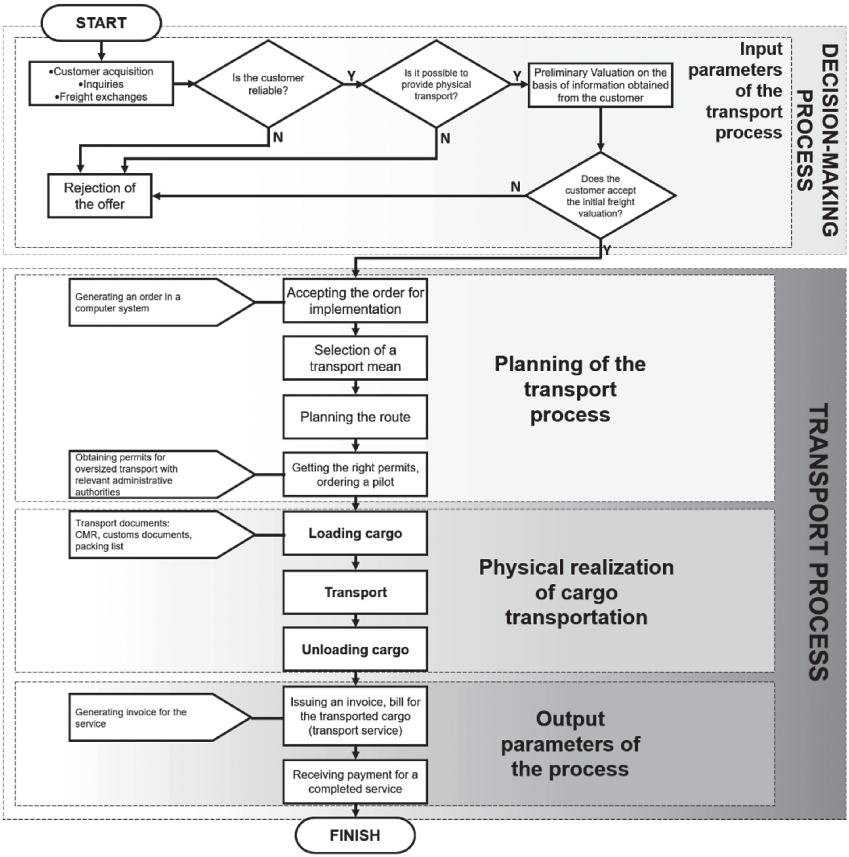
13 *See further Law Gazette dated 2004, no. 110, pos. 1165.*

14 *See further: Law Gazette dated 2004, no. 204, pos. 2086.*

the process of transporting the load. Hence, the first stage may be defined as the shaping of the starting parameters of the process. Subsequently, we are dealing with the appropriate transportation process during which the execution of the transportation services takes place. The transportation process, in this case the transportation of oversize loads commences at the moment of submitting an order and commissioning a particular delivery. Following the receipt of such an order and its signing by both parties (the ordering party and the contractor), a range of actions takes place that lead to the final delivery of the goods to their target destination. However, this does not signify the end of the process. Officially, the transportation process may be deemed to be concluded at the moment of issuing the invoice for services rendered and receipt of payment. These conditions must be fulfilled in order to refer to the transportation process.

Each process may be divided into 3 basic elements. These elements are the parameters of "entry", the parameters of "the process" and the parameters of "exit". A detailed notion of the organizational activities and planning of the process in the transportation of oversize loads has been constructed in Fig 2.

Fig. 2 — Structure of analysed transportation process.



Source: Self-analysis.

The afore-mentioned diagram illustrates the two principal areas in the structure of the transportation process. The decision-making process which constitutes the first stage of undertaking activities with the aim of leading to the acceptance of the order for a delivery by both parties involved. Due to this fact, its detailed analysis was for the most

part omitted. By assuming the fact of acceptance of the order for the execution of the transportation services, the subsequent stage is the planning of the appropriate process, commencing from the selection of the means of transport, planning the route and acquiring the appropriate permits right up to executing the transportation and receiving payment.

4.2 Definition of transportation capacity and selection of means of transport.

The subject matter of research constitutes a transportation enterprise located in the administrative district of Częstochowa, Poland which provides services within the framework of national and international specialized branch of road transportation. The transportation of oversize loads and overgauge loads are termed as specialized transport. The enterprise also renders such services as navigating oversize loads in the territory of Poland. The transportation units (truck and trailer) are adjusted for the transportation of construction machines, agricultural and industrial machines, combines, transportation of tanks, elements of industrial installations and constructions, or even elements of wind power stations. Taking account of the transportation profile of the company, the course of the transportation process is overseen by qualified forwarding agents who are responsible for entering contracts with clients, the choice of the appropriate means of transport, organizing the transportation from the place of loading to the place of unloading together with the appropriate permits, navigation or police escort (if this is necessary), completion of the necessary documents for transportation, inspection of the whole course of the process.

The company is in possession of 25 specialized road transportation units adjusted to the execution of the transportation of oversize loads. The enterprise under analysis while conducting its business in the sphere of road transportation pays particular attention to their fleet (truck unit), their possibilities and technical parameters. Only vehicles that fulfil the

requirements of fuel emissions are taken into consideration. In Table 1, the current state of the fleet is presented with relation to "Certyfikatem Zgodności z Wymogami Technicznymi i Bezpieczeństwa dla Pojazdu Silnikowego" (Certificate of Conformance with the Technical Conditions and Safety for a Motor Vehicle - ECMT/CEMT). Only 2 out of 25 vehicles, or 8% are of class IV. In the majority of cases (52%) the vehicles are of class V and an increasing number of the aforesaid trucks are of class VI (40%). The vehicles that belong to the highest class should be produced from 2014 and generate 80% less emissions of nitric oxides than in the case of class V.

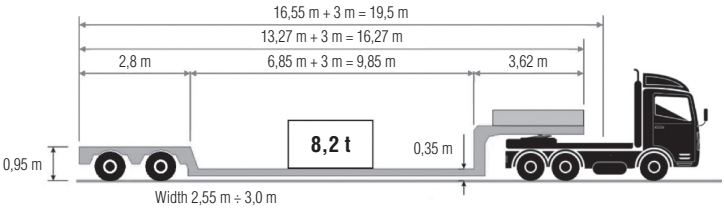
Table 1 — Trucks in fleet of specified class standards of fuel emissions

Amount of fleet	Class of fuel emissions	Share %
2	Euro 4	8
13	Euro 5	52
10	Euro 6	40

Source: Self-analysis on the basis of data from firm

The load defined by the client does not exceed the weight dimensions (8.2 tons), however, it significantly exceeds the dimensions of width and height. Goods of such dimensions such be placed on a trailer of the "tiefbett" type with a height of the deck over the ground of 0.35 m. The firm has two of this type of trailer with the amount of axles 3+2 (3-xle tractor set with 2-axle flatbed semi-trailers).

Fig. 3 — Dimensions of semi-trailer chosen for execution of transportation.



Source: Self-analysis on the basis of data from firm

Prior to the cost valuation of the transportation, it is necessary to calculate what dimensions the unit shall have after loading the trailer. An empty unit is 16.5 m long. The inside of the trailer where the load shall be placed is 6.85 m long, while the load is 9.7 m long, which in turn means that the trailer must be extended by 3 m in order for the load to lie on the floor. The length of the unit will be extended by 3 m and shall total 19.5 m. The width of the load amounts to 3.8 m. The standard width of the trailer amounts to 2.55 m with the possibility of applying expansion up to 3 m long. The load shall protrude by approximately 0.65 cm out of the contours of the trailer. The height of the unit with the load amounts to 4.15m, while the weight of the unit amounts to 21,613 kg according to the specifications of the registration book. It is necessary to add approximately 2,000 kg for the additional rig applied during loading and transportation. We assume that an empty unit weighs 23.6 tons. Hence, the final unit shall have the following dimensions: 19.5 metres of length, 3.8 metres of width, 4.15 metres in height and a total weight amounting to 31.8 tons. Having the precise dimensions facilitates the application of the necessary permit for the transportation of oversize loads.

4.3 Acquisition of permits and navigation

With the aim of acquiring the permit for transportation, it is necessary to define the route of the transportation, namely the starting point

and finishing point of the journey in the territory of a given country. In the case of greater loads, the route is precisely marked out in the permit by the issuing authority. The route of the transportation in the analysed transportation process goes through three states as follows: Poland, Germany and France. In applying for a permit for transportation on the roads of these countries, it is necessary to take this matter to the appropriate administrative authorities.

After calculating the costs of the transportation, all the permits, civil navigation and the costs of travelling, the price is given to the client. Acceptance of the price and the conditions of the transportation leads to the order being placed. The exact address of loading and unloading, as well as the date of execution, the net price, the date of payment and other details are all stipulated in the order for the transportation. The order must be accepted for realization by means of signing the order on the part of both parties to the agreement. The order is kept in paper version.

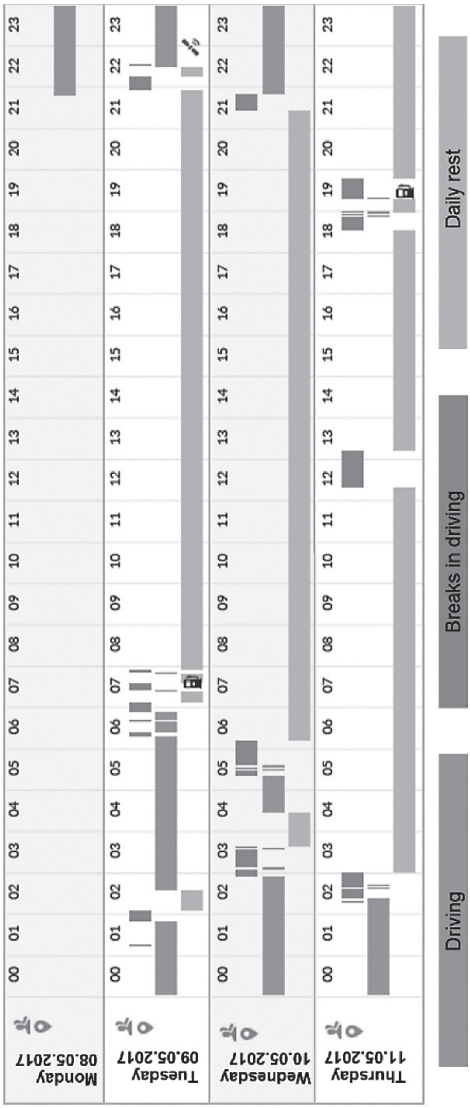
By possessing the document confirming the agreement on the transportation services, it is necessary to submit the afore-mentioned applications for a permit. It is necessary to remember that the waiting period for such a permit may take up to even 14 days. Further planning of activities associated with the transportation should be taken into account no sooner than 14 days after submitting the application. Following the submission of the applications for the necessary permit, it is necessary to contact a firm that deals with oversize loads in the territory of Poland, Germany and France. Likewise, it is required to contact a firm that deals with navigation services with information about the dimensions of the load, as well as the planned route of the vehicle if it is not required in the permit. The costs of navigation services in the territory of Poland is calculated on an individual basis in accordance with the dimensions provided. According to the law on units of dimensions of 19.5 m x 3.8 x 4.15 m, 31.8 tons, two navigation teams are required, one in front and one behind the unit with the oversize load. This is due to the transgression of the width for one navigation vehicle, namely 3.6 metres.

The costs of navigation services in the territories of Germany and France are first and foremost dependent on the length of the route. The price of navigation services amounts to approximately 1 euro per 1 km of navigation. Considerable transgression of the normative dimensions may have a strong impact on the price of the services rendered.

4.4 Planning and organization of transportation of load

The loaded vehicle may set out on the road at 9pm, together with the navigation unit. The route of the transportation in Poland has been illustrated in Fig. 4. Such a distance that is to be executed by a driver from Puław to the French town of Mazan amounts to 2,150 km. The route was marked out by means of analysing the restrictions of the road infrastructure. This report bypasses bridges, viaducts and tunnels of dimensions less than the unit in question. The night trip has a decisive effect on the speed of travelling. A distance of 590 km is overcome by the driver in a time of 8 hours and 20 minutes with one 45 minute break. After this time, a driver is entitled to a day's rest of a minimum of 11 hours. After the rest, the subsequent section of the route from the border at Zgorzelec - Gorlitz shall be navigated by the German unit of BF3. The route between the Polish and German borders and the German and French borders was marked out for two day cycles. The driver may commerce the journey at 10pm on Tuesday and his working time schedule up to the German-French border has been presented in the following diagram.

Fig.4 — Time Schedule of work of driver in program of frameLOGIC



Source: Report on vehicle in monitoring program of frameLOGIC

Such a vehicle may travel on motorways in Germany, thanks to which the whole distance was overcome in a time of 10 hours. The driver stopped on Thursday 11.05.2017 at 2am and waited for the French navigation team at the border in Neuenburg amRhein - Chalampe.

Transportation in France with a permit of II category requires travelling on specified roads. Original maps of Setra must be attached to the permit. These maps are issued in two copies: one that is relevant for the permit of I category and the second for the permit of II category. Navigation vehicles, together with vehicles transporting goods of dimensions matching II category must not travel on motorways. An illustration of the road may be found on the maps of Setra, for which updating is provided every year. This list encompasses national roads marked by the letter N, departmental roads marked by the letter D and communal (local) roads marked by the letter C. On the maps of Setra there is also a list of cities and towns in which it could turn out that a police escort is necessary to pass through. The requirement of a police escort (police navigation) is dependent on the prevailing conditions of a given day along the route. The route through France illustrated in Fig.5 displays the town of Orange marked in red colour, which is located 33 km from the destination point. The journey through the city could only take place during evening hours with a police escort which closed the national road N7 for non-authorized vehicles.

Fig 5 — Route of transit in territory of France.

Source: Self-analysis on the basis of data from firm

The unloading of the goods took place in accordance with the planned deadline of Monday 15.05.2017. The transportation of the load from Puław (PL) to Mazan (FR) took 7 days (from the day of loading to the day of unloading). During the course of executing the transportation, the driver must remember to confirm the documents of CMR. The completed document, together with the appropriate stamp is attached to the invoice. The document confirms the execution of the service and is the basis for receiving payment.

Conclusions

The transportation of oversize loads requires the coordination of a large number of processes. The loads whose dimensions exceed the standard ones require a specific approach and intricate organization. People working in an enterprise dealing with the transportation of oversize loads must have organizational abilities, legislative knowledge on the issue of organizing the transportation of goods in a particular country, technical knowledge of, and familiarity with the area where the transportation of the particular load is to take place. The organization and the course of the process of the road transportation of the oversize load is first and foremost demanding due to the road infrastructure that very often constitutes a decisive factor in the efficiency of the services rendered. By operating in accordance with the law, it is necessary to remember the appropriate permits, the loading possibilities of the vehicle and the appropriate planning of the route. Likewise, all the preparatory activities such as the whole process of decision-making, acquiring clients and preparing the valuation for the services rendered are significant.

BIBLIOGRAPHY

Act dated 6 September 2001 relating to *road transport* (Law Gazette. no 125, pos. 1371), p. 9765.

Cole J.J., Bardi E.J., Langley Jr C.J.: *Zarządzanie logistyczne*. Polskie Wydawnictwo Ekonomiczne. Warszawa 2010.

Krzywda J., Skibińska W., Wiśniewska-Sałek A., *Oczekiwania polskich firm transportowych względem działań podejmowanych przez rząd i sektor transportowy*, Logistyka, Nr 1/2016.

Law Gazette dated 2004 , no. 267, pos. 2660.

Law Gazette dated 2004, no. 110, pos. 1165.

Law Gazette dated 2004, no. 204, pos. 2086.

Law Gazette dated 2005 no. 108 pos. 908.

Leończuk D., *Transport drogowy towarów w Polsce*. W: *Ekonomia i Zarządzanie*. Politechnika Białostocka, Wydział Zarządzania, Katedra Informatyki Gospodarczej i Logistyki, 2011.

Neider J., *Transport międzynarodowy*. Polskie Wydawnictwo Ekonomiczne. Warszawa 2008.

Nowakowska-Grunt J., Strzelczyk M., *Influence of Road Transport on the Environment - Poland Against the European Union*. The Publications of the MultiScience - XXVIII. microCAD International Multidisciplinary Scientific Conference. Miskolc, 10-11 April 2014.

R. Rudziński. M. Kowalczyk *Istota i charakterystyka ładunków ponadnormatywnych, Essence and characteristics of oversize loads*, Zeszyty Naukowe Uniwersytetu Przyrodniczo-Humanistycznego w Siedlcach. Seria: Administracja i Zarządzanie 22/2012.

www.ec.europa.eu/eurostat

LEAN GREEN IN ORGANIZATIONS: A BIBLIOMETRIC ANALYSIS

Fabrício José Piacente, Manoel Gonçales Filho, Vanessa de Cillos Silva

Abstract: This article carried out a bibliometric study on scientific development about the use of "Lean" and "Green" (LGn) by organizations. In regards to the methodological approach, this study is exploratory and descriptive in such a way that it uses the deductive method. In relation to the procedure, bibliographic research and sample collection is used. The main results show LGn methodology highlighted in 11 databases in the past 14 years. It was researched in international articles and the total number of peer reviewed articles, year of publication, industry sector, contributions and their relevant aspects, were sought. Thus, this research found that the LGn approach promotes synergy in such a way that reduces environmental impact for organizations, resulting in waste reduction of natural resources in the supply chain.

Keywords: Lean Manufacturing; Green Manufacturing; Lean Green

Introduction

The current global economic context requires organizations, to have in their daily functioning, continuous process improvement to eliminate resource waste, decrease residue generation in order to maintain their production processes sustainable and clean.

Performing research that identifies the use of scientific work in industry sectors referred to Lean Green (LGn) is necessary since diagnosing which shortcomings need attention and the development of future research can contribute in the integration between lean manufacturing and sustainable development at the organization level in several production sectors, in other words, identify which industry sectors are still underexplored by LGn.

In recent decades, there has been growing interest in relation to companies' sustainable practices. Concepts of corporate citizenship, corporate social responsibility and environmental management are quickly gaining popularity by stakeholders (consumers, clients, shareholders, workers, governments, etc.) which started demanding greater company involvement in subjects related to the environment and society by applying socio-environmental responsibility in business practices. Therefore, this shift towards more sustainable business practices aims for the preservation of natural resources and the use of the organization's public image for competitive advantage (DESPEISSE, 2012).

In this manner, Lean Manufacturing (LM) clearly has an important role that can contribute to the sustainable development of organizations by focusing on waste reduction and become the basis for green practices within the organization (DÜES et al, 2013).

Meanwhile, according to Johannson & Sundin (2014), despite growing attention on the concepts Lean and green as essential ingredients in successful business operations, relatively few attempts were made to analyze the manner in which the two concepts are interrelated in a corporate environment.

Therefore, this article has the objective of performing a bibliometric analysis relating the concepts LM (Lean) and sustainability (Green) in international periodicals, seeking scientific research tendencies in the application of LGn method-

ology. Finally, there was also content analysis in function of time (from January 2000 to June 2014) highlighting research related to the purpose of this article.

1. Theoretical Background

Initially, Lean methodology was researched for greater understanding of Lean Thinking (LT) and its origins. Next, the question of sustainability and its relation with LM (LGn) was posed.

1.1 Lean Thinking

According to Womack and Jones (1998), LT and/or LM are considered lean because it's a methodology applied to the production process which increasingly seeks to do more with fewer resources, in other words, less human force, less equipment, less time, less movement and less space, thus eliminating waste, decreasing waste generation and increasing the benefits to the corporation through activities with value added to the final product focusing on clients in order to offer them exactly what they want.

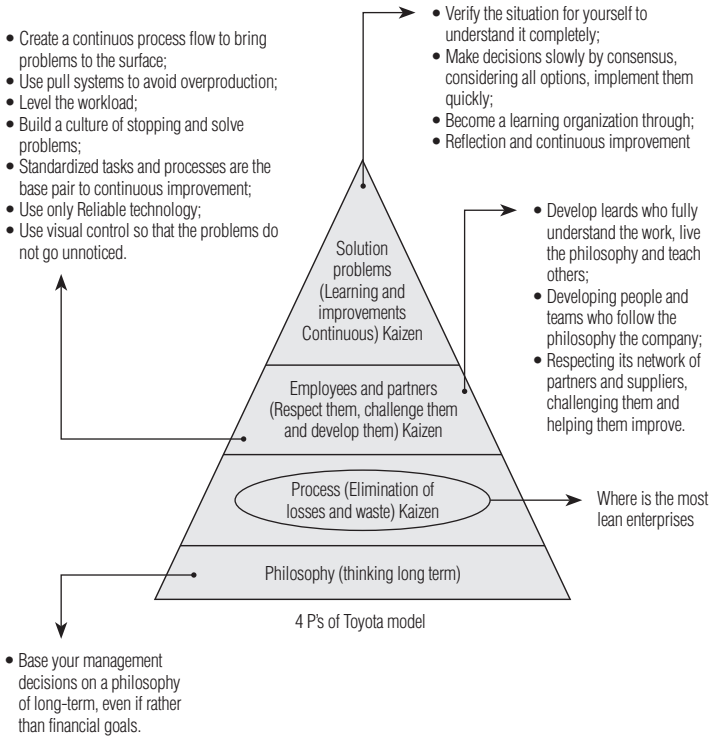
Thereby, the key to LM, whose origin lies in the Toyota Production System (TPS) Model, is having all elements combined as a system making it excel as a set and not in relation to its individual elements. They should be systematically put into practice every day. So, success derives from people's roles in an organizational culture which seeks their continuous improvement, using a system focused on high valued added flow as a base (LIKER, 2004).

There are four sections that represent TPS: (i) Long-term philosophy which deals with the importance of continual planning, of which organizations, in order to be successful, should become constant learning companies, (ii) The right process will produce the right results where the company is advised for the process while the flow is the key to better quality with a lower price and taking into consideration the safety and disposition in the corporate environment. In Toyota, the focus on processes is part of

the company's DNA, (iii) Add value to the organization by developing the internal team as well as partners. The vision is that people are constructed, not just products (automobiles), and (iv) The continuous solution to basic problems drives organizational learning where it is possible to identify the causes of the problems and stop them from happening again.

In the way, the four sections presented in Figure 1, synthesized by the 4Ps of LM based in TPS whose objective is to make work more satisfactory by creating continuous production flow enabling immediate feedback about the effort to transform was into for the product.

Figure 1 — 4P's of the Toyota model



Source: Adapter from Liker (2004).

Thereby, the key to TPS isn't just in the tools and techniques like just in time (JIT), *Kanban*, etc, but in a company's administrative commitment by permanently investing in its personnel training and promoting a culture of continuous improvement.

Thereby, LT can be defined as a philosophy or a strategy that depends on a set of practices with the objective of minimizing defects such as extra stock, waste, reworking among others in order to improve organizations' performance (NASAB, 2012).

According to Brunilde (2013), to become and remain competitive, organizations should adopt evolution strategies and LM is the strategy used in various industrial companies that are based on identification and elimination of residues (waste) in various stages of production processes.

1.2 Green Product Development

LM application brings several results to the company in terms of productivity, optimization in available resource use, among other factors. Among these factors, it's suitable to highlight the relation of LM with the environment and product and process development which looks for low environmental impact.

According to Porter and Van Der Linde (1995) inefficiencies in the production process analysis in relation to its inherent resources cause waste, defects and unnecessary material storage which increases final product costs. These inefficiencies often happen in supply chain management, incomplete material use or deficient process control. So, from the *Lean* point of view, such resource inefficiencies should be minimized because they don't contribute to the add value of a product or service. Similarly, reduction or elimination of these waste inefficiencies is also a trend in the sustainability perspective since these inefficiencies can lead to an increase in environmental burden generated by the company.

Dues *et al* (2013) argue that the application of the LM acts as a catalyst for Green Manufacturing (GM), which simplifies the process of the

companies' transformation process in favor sustainable development. Boks and McAloone (2009) argue that the Green Product Development (GPD) has become an area of significant research in relation to the volume of studies developed in the early 1990s.

Yet, according to the authors, GPD research, over time, underwent four transition periods: (i) from opportunistic to realistic research; (ii) from single product to a system perspective; (iii) from a corporate environment to a sustainability context; (iv) from concept application forms to boost technology.

Thus, one can define green practices in (GM) as a set of techniques that may limit or reduce potential adverse impacts due to the production and consumption of products and services on the environment system seeking to improve organizational environmental performance (RAO, 2005).

In this respect, some studies even claim that green practice actions can contribute to the company adopting LM. Bergmiller and McCright (2009) identified the correlation between green operations and lean results. The authors found that companies seeking Lean operations achieve better results when they include green practices in relation to companies that do not.

Dues et al (2013) claim that it is still possible to identify evidence to suggest that Lean benefits the implementation of green practices that, in turn, also has a positive influence on the existing Lean business practices. Addressing that companies seeking to develop green practices in a production system that has a philosophy of continuous improvement processes, will eventually result in LGn practices

According to Klassen and Whybark (1999) there are two types of environmental practices in a production system geared to pollution: technologies that seek to prevent pollution and technologies that try to control it. The first involves all activities that alter the structure of the manufacturing process to adopt renewable, or better yet, adequate resources, in relation to their impacts on the natural environment. The second involves all devices

that seek to identify, capture and control the emissions caused by the production process without any structural intervention.

So, it follows that green practices are directly or indirectly related to Lean practices in an environment of continuous improvement, and the development of LM will lead the company to adopt these practices in an organizational context.

1.3 Lean Green (LGn)

According to Zhou (2012), GM has been recognized worldwide as a key strategy for sustainable development. The concept incorporates the principles of environmental protection and energy conservation in production and service activities to reduce industrial waste, natural resources and economy of scarce resources, as well as minimizing contamination of the natural environment, while economizing on production.

Dues et al. (2013) reports that there is an LGn connection beyond waste reduction and that several authors have investigated aspects and paradigms involving the LM with GM in the management of organizations.

Synergies may arise with LGn practice in organizations that cultivate LT corroborating emphasizing the integration of departments with hierarchical levels of company, inventory levels, production lead time, transportation time, among others, for the elimination or minimization pollution, residue and waste generation can improve the productivity of an organization.

According to Thoumy (2012), several studies have empirically linked organizational performance for environmental management and ecological activities that reduce pollution at the source, also known as pollution and wasteful consumption prevention activities.

Lee (2012) contributes in this sense mentioning that sustainability should be considered as a combination of environmental, economic and social factors providing a comprehensive definition of the term coined by John Elkington, defined as the *Triple Bottom Line* (TBL) which consists of economic prosperity in combination with environmental quality and social justice.

Thus, as presented, the business operation should cause minimal harm to the environment and be self-sustainable with the integration of environmental, social and economic i criteria. Thus, in relation to corporate performance against these pillars, the company needs financial return, but must pay attention to the relationship of the stakeholders with the environment. Thus, one should seek to maintain a balance between these three aspects so that the organization can be sustainable long-term.

Accordingly, Ting (2013) emphasizes that sustainability, which encompasses the ideas of lean production, environmental management and quality is at the heart of most manufacturing companies' strategy. Furthermore, the development of sustainability provides new ideas to reduce costs since management of organizations considers the product from initial processing of raw materials to delivery to the customer. So, every operation, at different levels, has the potential to be developed to reduce the uncertainty of the quality, waste of resources and operational costs in order to minimize waste and pollution. Thus, ensuring environmental quality of organizations is an ongoing challenge for managers of manufacturing companies.

In order to understand this relationship, Sundin and Johansson (2014) analyzed the relationship between these concepts based on six general questions:

– *Motivating factors:* Efforts to achieve competitive advantage through the development process more efficient and effective products is a key factor for LM. Competitive advantage is also a main goal of GM, but is usually guided by compliance with regulations and legislation.
– *Goals:* The overall goal of LM is to create value for customers by eliminating waste and unnecessary actions in the product development process. The fundamental purpose of GM is to ensure the development of products that have minimal negative impacts on the natural environment.

– *Structuring:* The LM value is created from information during product development, aiming to drive the process toward more attractive products for consumers. GM in the creation of value commonly refers to the fulfillment of requirements leading to environmentally safe products.
– *Waste construction:* In LM, residues are strongly associated with the development process of the product itself and refer to non-value added activities. GM generally considers waste from its physical nature, relating it to the product. The main idea is to minimize the amount of waste sent for recycling, incineration and/or landfill.
– *Industrial application:* Examples of LM applications mainly originate from the automotive and aerospace sectors, but it follows that LM can now be applied in various industries. GM is considered relevant to all industries, but especially those industries that have strict legislation for the usage of materials and/or high recovery rates.
– *Implementation issues:* LM implementation should be seen as a process of gradual long-term change involving personnel changes throughout the organization, processes and technical tool use. GM in various areas of concern should be considered and integrated with other sectors of the company such as the environmental management system.

2. Methodological Approach

This article, descriptive in nature, seeks to report the research, referencing the methodology (LGn) as the resolution of a problem, in which researchers are involved in a cooperative and participatory manner.

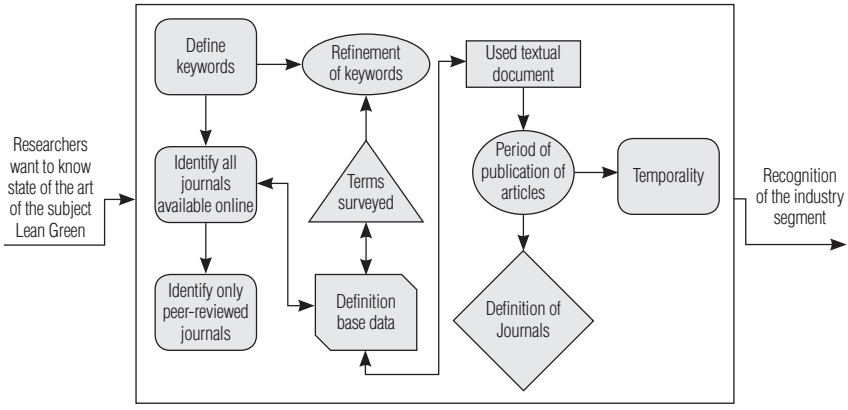
This paper presents a systematic review of quantitative and qualitative nature which was used for bibliographic and bibliometric research. The methodological approach of this research is characterized as exploratory, descriptive and documentary (BROOKES, 1969), which uses the deductive method (Chen, 1994). As for design, it draws on literary research and

survey sampling, using technological search resources as a tool to perform the research (PRITCHARD, 1969).

2.1. Research process

Once the knowledge area was determined, the keywords were used in reference search and data collection. Envisioning research whose concentration is reducing environmental impact by using lean philosophy, the key words "lean green" were searched over the past 14 years, using other terms to bring content to the main objective of the article. Figure 2 illustrates this dynamic.

Figure 2 — Article database selection procedure for bibliometrics



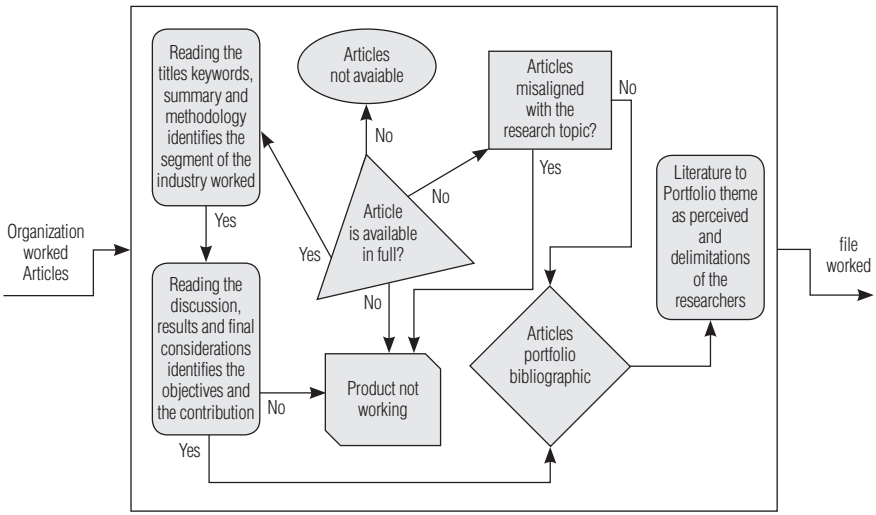
Source: Own study.

For the collection and analysis conducted in this study ,the following steps were taken: i) identification of available international journals, ii) selection of peer-reviewed journals, iii) refinement of keywords through the definition of terms, in other words, made a list of search terms to bring article content closer to the main theme being developed, iv) apply database selection, v) resource used and focus given to the type of document applied, vi) the temporality of article production and finally vii) Journals that were participating in article production.

After the initial stages of the article database definition for bibliometrics came, the procedure of reading articles which is represented by Figure 3.

Thus, there was reading of the titles, keywords, summary and methodology to identify the sector of the industry worked by the authors, the last step of screening, then followed until the last phase: tabulation and evaluation of its characteristics, objectives, relevant aspects and the contribution of articles to scientific knowledge. The results are presented and discussed below.

Figure 3 — Final definition of bibliographic portfolio procedure

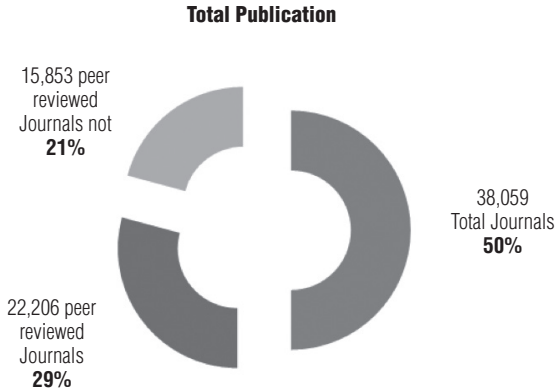


Source: Own study.

3. Bibliometric Analysis and discussion

This research started from data generated in the consultation process and the first data to be computed was the total number of international articles available in the database and are detailed in Figure 4.

Figure 4 — Number of articles published in this period (adapted from Portal Capes)

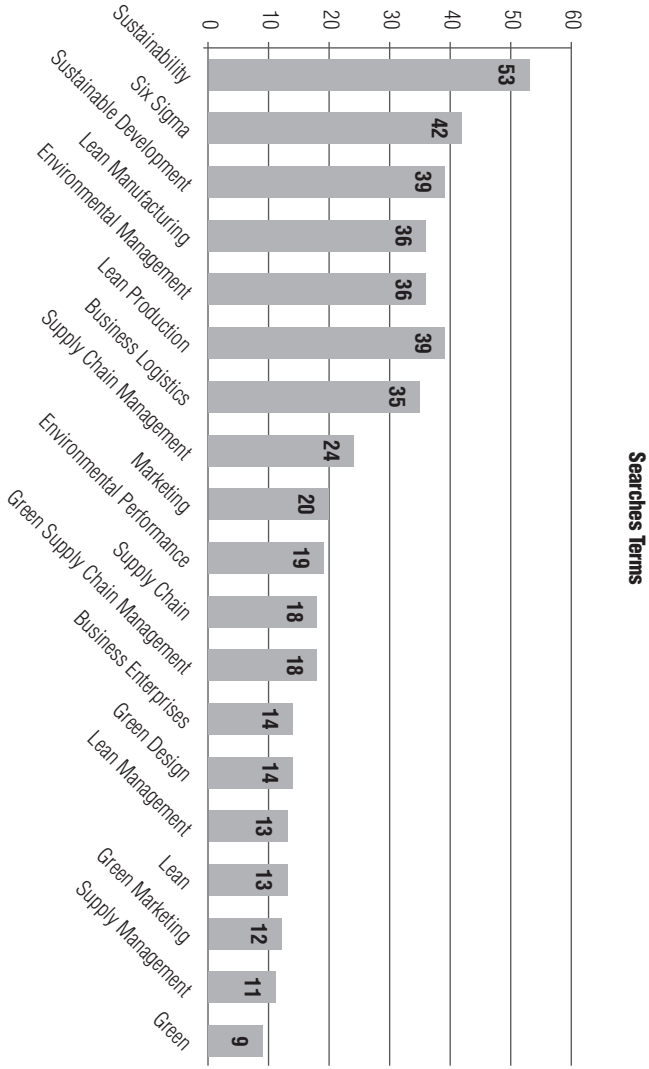


Source: Own study.

It can be observed that, using the keywords lean green, 38,059 available articles were found and of these articles, those reviewed by peers totaled 22,206 units, and this was the initial base worked.

Continuing the selection, search terms were added to bring the contents of the articles closer to the topic to be developed as shown in Figure 5.

Figure 5 — Quantity of terms selected for the area to be studied

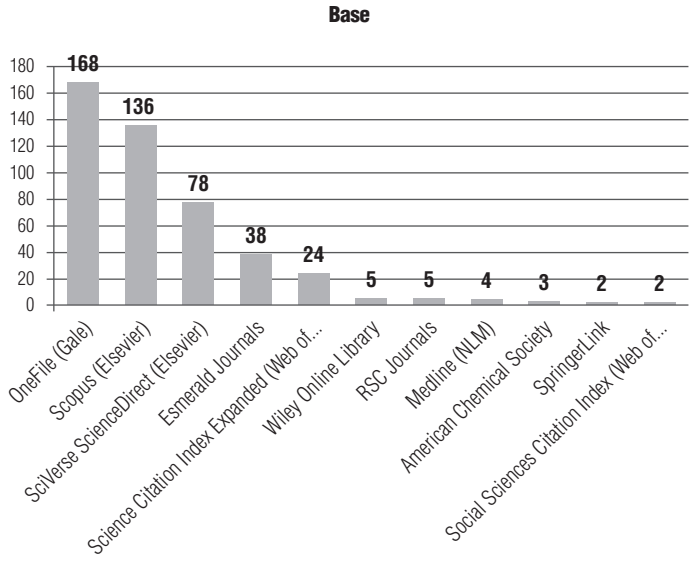


Source: Own study.

Fifty-three articles were found under "sustainability" which represents the largest share with 11.4% of the 465 total works selected here. For the term "six sigma" and "lean production" found 42 articles each (9%), for "sustainable development" 39 (8%) and "lean manufacturing" and "environmental management" each with 36 (7%), and all other terms have a recorded average of 17 (4%).

Later, tabulation was made with the objective of identifying collections that published the most articles in the study area. Thus, in Figure 6, the databases which compose the publications are shown.

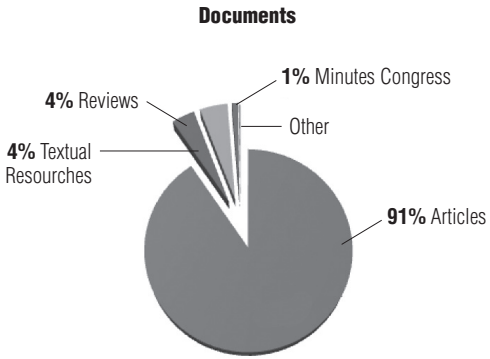
Figure 6 — Distribution, in quantitative terms, of articles by database



Source: Own study.

It can be observed that the greatest occurrence of publications mainly appears in the base "*OneFile (Gale)*" with 168 publications (36%), followed by the base "*Scopus (Elsevier)*" with 136 publications (29%), "*SciVerse ScienceDirect (Elsevier)*" with 78 publications (17%), "*Esmeral Journals*" with 38 publications (8%) and "*Science Citation Index Expanded*" with 24 publications (5%), all of the other databases found registered on the average less than one percent of the publications. Figure 7 shows the types of textual documents found in the research.

Figure 7 — Textual documents used in research

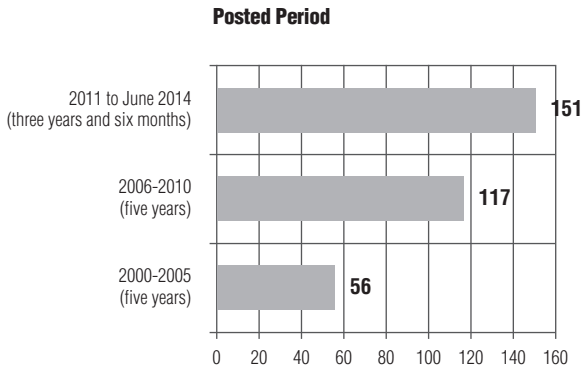


Source: Own study.

The predominant types of document are articles that sum up to be about 90% of the documents found in the search. Thus, for in-depth analysis, we selected only articles from international journals because of their representativeness in relation to document types, thus excluding the final analysis of all other types of documents, such as reviews, textual resources, and conferences minutes among others.

Then, a survey was carried out in relation to the quantity of articles from published international periodicals in function of time, seeking to understand the trend line with respect to LGn publications as shown in Figure 8.

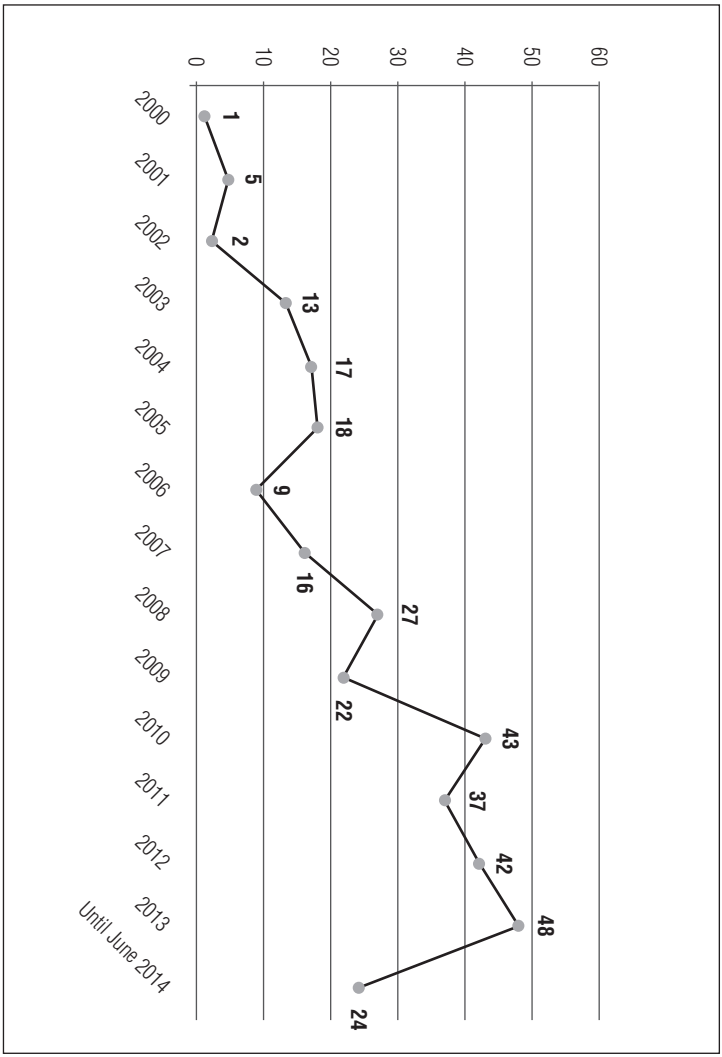
Figure 8 — Period of article publications



Source: Own study.

It is noteworthy that the temporal positioning considered only represented the period post-2000 to the present, read 2014, more precisely until 27 June 2014. Thus, it follows that 17% of articles were published between the period of 2000 and 2005 (five years), and between 2006 and 2010 (five years) the number of publications was 36% and this growth is also confirmed in the period 2011-2014 (three years and six months) as 47% of published articles were registered. Figure 9 stratifies growth by year of publication.

Figure 9 — Article production in the years

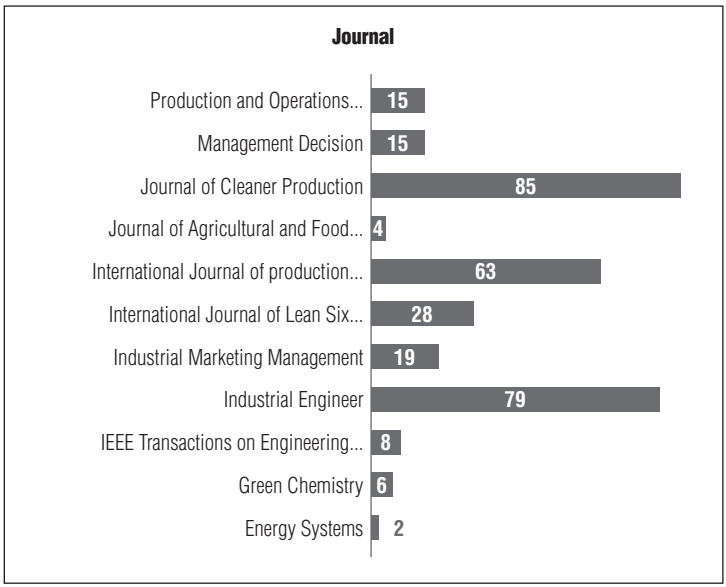


Source: Own study.

We note that, according to the selection parameters, the number of publications in the first three years of the period studied was low compared to other years. It is possible to observe that even until today. This share has gained importance because for 2005, 17 publications in the area were found, 43 in 2010, and by June 2014 a total of 24, which shows a steady growth in the number of publications and consequently the interest of the scientific community.

Next, which important periodicals about the topic was analyzed hat is represented by Figure 10.

Figure 10 — Publications by Journal (international periodical)



Source: Own study.

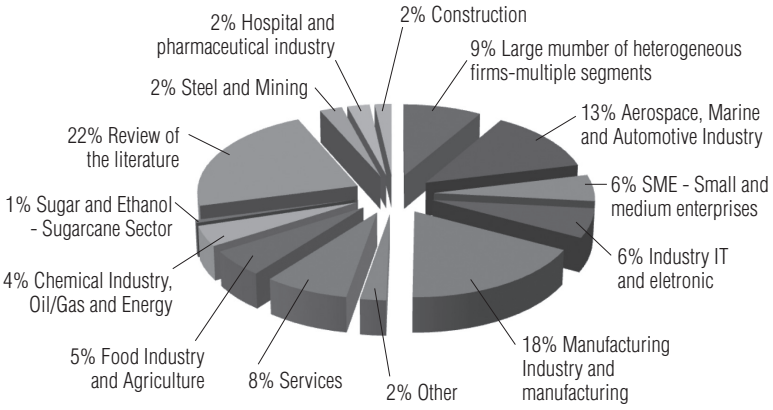
It was found that the "Journal of Cleaner Production" (Ranked A2 Engineering III) has 85 occurrences, in other words, 26% were found in the publications and "*Industrial Engineer*" has 79 publications and 24%

participation, followed by "*International Journal of Lean Six Sigma*" with 9%. However, the participation of journals (international periodicals), "*Energy Systems, Green Chemistry, IEEE Transactions on Engineering Management, Industrial Marketing Management, International Journal of Lean Six Sigma, International Journal of production economics, Journal of Agricultural and Food Chemistry, Management Decision and Production and Operations management* ", which together add up to 132 publications and 41% interest, showing the diversity of journals that have work related to the topic under study.

After filtrations performed to adapt the articles to the proposed theme were carried out in a total of 324 articles, in sequence, they were organized and classified with the aim of mapping the sector of industries worked in the context of the selected articles or their coverage.

Thus, for this achievement, it was necessary to put all of them in the same catalogued database in which it was possible to do an initial survey about their titles, abstracts, keywords, and research methodologies which are presented in Figure 11.

Figure 11 — Activity segment of industries researches in periodicals



Source: Own study.

It can be observed that the articles employed in the literary review (theoretical-conceptual) has the greatest participation at (19%) totaling 61 developed works, followed by the industry of transformation and manufacturing 49 works (15%), the automobile sector with 41 selected works (13%). Furthermore, there is a large number of heterogenous companies – multiple sectors, with 37 publications (11%), trailed by the service sector with 28 works (9%).

Meanwhile, at the other extreme, it follows that with only one scientific article registered, the sugar and alcohol industry of the sugar-energy sector, and the fact that this does not deal with the sugar-alcohol industry's productive process, it deals with Nepal's sugarcane culture, which shows the absence of work on LGn in this sector.

Therefore, the available articles don't touch much on the steel industry, mining hospitals and pharmaceutical industry, nor the productive process of the sugar and alcohol industry of the sugar-energy sector which is an opportunity identified in the research.

In this sense, there is a gap to be explored in such a way to contribute with knowledge within this sector registered with the greatest need for scientific production.

In the sequence, there was an attempt to find objectives, relevant aspects and contributions in the context of the selected articles.

For this, a second collection was performed on the articles catalogued in the database, taking into consideration the rest of their information (titles, discussions, results and final considerations). Table 1 displays the study by period of publication and its authors.

Table 1 — Year and title of publication of authors' works

Year	Author	Title
2000 a 2005	Sharratt e Choong	A picture of the life cycle to analyze business risk in process industry projects
	Gutowski, T. et al	Environmentally benign manufacturing: Observations from Japan, Europe and the United States
	Lee e Whang	Greater security of the supply chain with lower cost: Lessons from total quality management
	Pheng e Fang	Modern-day lean construction principles: Some questions on Their origin and similarities with Sun Tzu's Art of War
2006 a 2010	Kainuma e Tawara	A multiple attribute utility theory approach to Lean and Green Supply Chain management
	Vachon e Klassen	Environmental management and manufacturing performance: The role of collaboration in the supply chain
	Awasthi, A. et al	A fuzzy multicriteria approach for Evaluating environmental performance of suppliers
	Vinodh, S.	Improvement of agility and sustainabitity: A case study in an Indian rotary switches manufacturing organization
	Yang, C. L. et al	Mediated effect of environmental management on manufacturing competitiveness: An empirical study
2011 a 2014	Verrier, B. et al	Combining organizational performance with sustainable development issues: the Lean and Green project benchmarking repository
	Gremyr, I. e Fouquet, J. B.	Design for Six Sigma and lean product development
	Dües, C.M et al	Green as the new Lean: how to use Lean practices as a catalyst to greening your supply chain
	Yang, M. G. et al	Impact of lean manufacturing and environmental management on business performance: An empirical study of manufacturing Firms
	Mélanie, D.	Sustainable manufacturing tactis and cross-functional factory modeling

Source: Own study.

Starting from the analysis of 324 filtered articles, some information concerning their topic in the titles' structure regarding the presence of the researched terms. In relation to the articles' topics, it follows that 29% are related with the production area and lean processes, 21% with the environmental area and 20% related both areas. The rest of the article associated correlated areas but directly in relation to the focus of this research, LGn.

In relation to the works' titles, the word "Lean" was present in 17% of the articles' titles, "Green" was present in 11% of the articles' titles and both "Lean" and "Green" were present in 9% of the articles. The difference between the topic and presence of words in the title refers to the method applied in their section.

Table 2 shows the researched authors and evolution of the LGn in function of time for the sample based on the databases used. In order to define the sample, the articles were separated by year and their structures were identified aiming present articles that would refer to the concepts in the study.

Let it be noted that the focus of the objectives in what is referred to by the words "*Lean*" and "*Green*", as well as other environmental aspects and manufacturing are present all of the periods researched with special attention on the term "Lean" being found applied in the research of Pheng and Fang (2005) which approaches lean practices and showing an interesting analogy by comparing them with Sun Tzu's war strategies. It is even possible that the wore that referenced LM boarded different business realities and other tools which strengthen the application of the tool as done in the work of Fouquet (2012) which relates LM with the tool "*Design for Six Sigma*" that seeks to improve the appearance or functionality for Six Sigma.

Table 2 — Consolidation of authors' objectives

Year	Author	Title
2000 a 2005	Sharratt e Choong	Environmental risk assessment during the design of new processes seeking an interaction between the lean supply chain and the environment
	Gutowski, T. et al	Examine environmentally beniginas Lean practices in leading companies to evaluate competitiveness in relation to the environment, the three regions studied
	Lee e Whang	As the principles of total quality management can be used to design and operate processes to ensure the security of the supply chain
	Pheng e Fang	The hypothesis is: "lean principles are operationalized under current industry practices and are consistent with the strategic principles of Sun Tzu"
2006 a 2010	Kainuma e Tawara	Proposed a theory of multiple method use to evaluate a supply chain from the point of environmental and managerial
	Vachon e Klassen	Analyzes the impact of collaborative environmental activities, inter-organizational interactions, on the perfornamce of manufacturing processes
	Awasthi, A. et al	Seeks to identify the criteria for assessing the environmental performance of suppliers in the supply chain
	Vinodh, S.	Applying the paradigm of manufacturing agility and the concept of sustainability as performance measures in a case study in contemporary organizations
	Yang, C. L. et al	This study investigates the interrelationships of continuos improvement (CI) supplier management (SM), environmental management (EM) and industrial competitiveness
2011 a 2014	Verrier, B. et al	Propose an approach that adds social and environmental dimensions to the consideration of economic gains received through Lean actions
	Gremyr, I. e Fouquet, J. B.	Explore the industrial practices of Design for Six Sigma (DFSS) and Lean Product Development (LPD), seeking to identify thea differences and similarities between the two concepts
	Dües, C.M et al	Explore and evaluate previous results focusing on the relationship and links between the management practices of supply chain Lean and Green
	Yang, M. G. et al	Explores the realationships between the practices of Lean Manufacturing, environmental management and outcomes of organizational performance
	Mélanie, D.	Provide guidelines for the industries to realize the sustainability journey, guiding them through the manufacturing practices (Lean), analysis of the flow of resources and practices for continuous improvement

Source: Own study.

In relation to the term "Green", research can be found from the beginning of 2000 such as the work of Gutowski et al (2005) which examines LM green practices in three characteristically different regions seeking to identify their relation with the environment. However the major evolution starts in 2008 with the publication of abundant research correlated to waste, search for superior performance (Klassen et al. 2008), relations with suppliers (Yang et al, 2010), world class organization, industrial process development (Vinodh, 2010), understand the environmental impacts in organizations (Dües et al, 2013), implementation of "*Lean*" as a feasible strategy for organizations among others..

Approaching the integrated concepts "*Lean*" and "*Green*", there has also been an evolution in recent years with little research found related to the beginning of the period studied. Within this research, it was Despeisse's (2013) study that stood out with the objective of guiding the industries in Lean practice application with a sustainable point of view seeking continued improved and reduction of resource use.

Table 3 shows the relevant aspects and the contribution of this work over the years.

Table 3 — Relevant aspects and contribution of the work

Year	Author	Relevant aspect	Contribution
2000 a 2005	Sharratt e Choong	Methodology (PERA) developed aims to help in the collection, processing and communication of information required to have a proper understanding of all the environmental context of a decision	Development of a methodology that prioritizes the development of vleaner and safer lean processes not only as a logical result of the analysis of the environment, but.
	Gutowski, T. et al	Found evidence that American firms may be disadvantaged due in part to the lack of coherent national goasl in areas such as waste management, global warming, energy efficiency and return of products	1) Evolution of EBM as a competitive strategy for businesses and governments, 2) the need for strategic planning and new business practices systems to capture these potential benefits, and 3) Alignment of goals with the public good with the public good
	Lee e Whang	The quality movement emphasizes prevention, namely through the source inspection control process in a continuous cycle of improvement	Taking strategies and preparation in the right place, we can make great strides toward the security of the supply chain to lower costs
	Pheng e Fang	It is recommended that the strategic principles formulated by Sun Tzu can be availed in relation to a larger extent of lean principles in construction	Sought to better understand the possible origin of the current Lean principles and their strategic applications and practices relating to the strategics purest strains of Sun Tzu

Year	Author	Relevant aspect	Contribution
2006 a 2010	Kainuma e Tawara	The benefits of the information that can reduce the average level of inventory in the supply chain were quantified sharing lean and green	New ways of managing the supply chain that can interactively evaluate the supply chain lean (lean) and green were defined
	Vachon e Klassen	Environmental practices, suchs as reducing environmental impacts, either upstream or downstream can be directed, from suppliers to customers	Evidence has emerged that thea upstream practices were more closely linked to the performance-based processes, while downstream collaboration was associated witch performance-based product
	Awasthi, A. et al	The criteria for evaluating environmental performance of suppliers in a supply chain were identified, relating variations of these criteria with the number of suppliers in the chain	The proposed approach can be applied to assess the environmental performance of suppliers in a qualiative way, in the absence of quantitative data
	Vinodh, S.	The manufacturing organizations must seek a transition to the application of agile processes. Regarding sustainability, it has that new models are found to have a minimal environmental impact	Thus, the combination of agility and sustainability is much needed in toda's competitive market, so companies are able to keep working
	Yang, C. L. et al	EM programs shall not operate as a separate, SM and IC organizational unit must integrate green practices to create synergistic effects or enhance its effect on competitiveness	Business partnerships with suppliers and IC sound practices are more likely to develop a proactive EM program, which improves industrial competitiveness in terms of cost, delivery and quality

Year	Author	Relevant aspect	Contribution
2011 a 2014	Verrier, B. et al	A qualitative questionnaire derived from the Lean philosophy and a questionnaire and a quantiative indicator was developed in order to capture the actual consumption and the environmental impact of the companies studied	A framework with indicators for Lean and Green management was proposed. This structure allows companies to benchmark their Lean and green practices in order to achieve best practices associated
	Gremyr, I. e Fouquet, J. B.	Became apparent differences in industrial practices that should be considered in future applications of an initiative resulting from the fusion of these concepts	Thus, differences in industrial practices should be considered the result of an initiative by the merger in reltion cost reduction versus waste reduction applications as well as the emphasis on what to do or how to do it, and the documentation required
	Dües, C.M et al	The analysis shows the areas in which the lean and green practices are not connected yet. However, it is not impossible to combine Lean and green practice in these areas, thereby indicating a lean atmosphere serves as a catalyst to facilitate the implementation Green	You can identify evidence to suggest that the benefits Lean deployments of green practices that, in turn, also has a positive influence on the practices of existing lean business. Thus, it is quite undeniable that the final will be the Lean Green
	Yang, M. G. et al	Past experiences of lean manufacturing are positively related to environmental management practices	Thus, are has to lean manufacturing functions as an important antecedent for the environmental management practices in an organization
	Mélanie, D.	Makes an approach, by means of prototype modeling factory to support the use of tactics, combining process analysis witch the use of resources and their flows in the manufacturing processes	Demonstrates how plants can be improved in a sustainable manner, structured, systematic and functional, contributing to the need to expand the scope of analysis beyond functional boundaries, applying the sustainability level of factory

Source: Own study.

The contributions shown permit the exposure of possible gaps in the chronological analyses that were carried out such as how to present some areas where the thematic is being worked. As trend lines have it: the relation between the LM application and the business management planning, their internal relations and the validation of the gains stemming from this practice, the benefits that LM can bring to the supply chain in relation to optimization considering some environmental aspects, mainly with regards to obtaining raw material; and the benefits that LGn application can bring to companies in a competitive environment such as in relation to optimization of resources and economic aspects.

However, some areas that can be found in this relation are not very well defined like the application of these tools in an integrated way in order to find continuous improvement of the processes; the difference between the concepts *Lean* and *Green* regarding the practical application of each one of them; and the concretization of the LGn methodology and the financial benefits of this type of strategy.

Finally, it's possible to point out the contribution of work regarding the LGn approach, especially in the last period researched which presents relevant information about the interaction of studied concepts and the synergy which can be constructed beginning at these relations. As presented by Dües et al (2013) which relate the concepts and affirm that the tendency is that companies will end up adopting LM and GM practices.

In general, studies that point out that the integration of LM with GM is a successful way for companies to add value in waste reduction of resources inherent to the production process, pollution reduction and in relations with the *stakeholders*. However, research development that shows results that demonstrate economic gain stemming from application of LGn methodology because it is one of the best incentives for the application.

4. Final considerations

The initial objective of the article was achieved because information regarding LGn was gathered, permitting an analytical panorama of scientific production about LGn to be traced in the set of periodicals.

The results found showed that the theme is growing worldwide and is a methodology mentioned in the main periodicals. Scientific production around them is mainly done by just one magazine or industry sector, as well as by the same author, thus leaving gaps in some sectors, especially in relation to that of sugar and alcohol with a productive process being one of the greatest development opportunities for future work and scientific research.

It can be noticed that research development has been increasing over the years with the first peak in relation to the number of publications for the term "*Lean*" in 2010, in relation to "*Green*" in 2011 and the integration of both concepts in 2012 in direct relation of these terms in the title of the research.

The initial contribution of this research is nothing the opportunities referring to the continuity of work, scientific research and productive process development of the industry by way of LGn methodology in rarely explored sectors.

Therefore, as future research seeks to increase the set of databases to be researched in order for greater clarity, the aspects of knowledge gaps and opportunities to contribute involving LGn projects and the sugar and alcohol sector.

The second objective, driven by current discussions regarding climatic change, many organizations find themselves under increasing pressure by *stakeholders* carry out business in a responsible manner. "*Lean*" offers this and serves as a catalyst for "*Green*" implementation because both methodologies point to reduction in production excesses and consumption as a necessary and vital aspect for environmental protection.

It was observed that integrating "*Lean*" and "*Green*" (LGn) practices leads the company to sustainable growth and development bring syner-

gy and benefits to the organizations. This document provides evidence that suggest that "*Lean*" is a benefit and in many cases the starting point for green practices. It was observed that organizations that adopt LM have a natural tendency to promote green practices because of the constant search to eliminate waste and therefore pollution. It was generally noted that the majority of work connected to LGn about efficient use of resources along with waste and pollution reduction, are approaching sustainability of their business.

In evidenced synergy the *stakeholders* play the part of positively influencing each other to increase the benefits of corporate relations, as well as partner relations focused on client satisfaction. In this way, synergy, once achieved, means that such practices provide better results than the sum of separate performances.

Thus, LGn synergy drives environmental improvement with LM application. In other words *Lean* organizations which include green practices become LGn and achieve better results than companies which don't do the same. In short, literature indicates that only when both paradigms are simultaneously implemented, can LGn unfold its full potential and bring more benefits than when done separately.

REFERENCES

Bergmiller, G.G., Mccright, P.R. – 2009. Are lean and green programs synergistic? Proceedings of the Industrial Engineering Research Conference. Disponível em: http://zworc.com/site/publications_assets/AreLeanAndGreenProgramsSynergistic.pdf; Acesso em: 14/07/2014.

Boks, C., Mcaloone, T.C. - 2009. Transitions in sustainable product design research. Int. J. Prod. Dev., 9, 4, 429 – 449.

Brookes, B. C. – 1969. Bradford's law and the bibliography of science. Nature, v.24, p.953-956.

Brunilde, V., - 2013. Combining organizational performance with sustainable development issues: the Lean and Green project benchmarking repository. Journal of Cleaner Production - DOI: 10.1016/j.jclepro.2013.12.023

Chen, Y.; Chong, P.P.; Tong, M.Y. – 1994. The Simon-Yule aproach to bibliometric modeling. Information Procesing & Management. v. 30, n. 4, p. 535-56. - DOI: 10.1016/0306-4573(94)90038-8

Despeisse, M., - 2012. Industrial ecology at factory level – a conceptual model, Journal of Cleaner Production. - DOI: 10.1016/j.jclepro.2012.02.027

Despeisse, Mélanie ; Oates, Michael R. ; Ball, Peter D. - 2013. Sustainable manufacturing tactics and cross-functional factory modelling, Journal of Cleaner Production, Vol.42, pp.31-41- DOI: 10.1016/j.jclepro.2012.11.008

Dües, C. M.; Tan, K. H.; Lim, M. – 2013. Green as the new Lean: how to use Lean practices as a catalyst to greening your supply chain. Journal of Cleaner Production, 40, 93 – 100 - DOI: 10.1016/j.jclepro.2011.12.023

Gutowski, Timothy ; Murphy, Cynthia ; Allen, David ; Bauer, Diana ; Bras, Bert ; Piwonka, Thomas ; Sheng, Paul ; Sutherland, John ; Thurston, Deborah ; Wolff, Egon - 2005. Environmentally benign manufacturing: Observations from Japan, Europe and the United States, Journal of Cleaner Production, Vol.13(1), pp.1-17- DOI: 10.1016/j.jclepro.2003.10.004

Jean-Baptiste Fouquet – 2012. Design for Six Sigma and lean product development, International Journal of Lean Six Sigma, 2012, Vol.3(1), p.45-58. - nt link to this document: DOI: 10.1108/20401461211223722

Johansson, G.; Sundin, E. – 2014. Lean and green product development: two sides of the same coin? Journal of Cleaner Production, in press, 1 – 18.- DOI: 10.1016/j.jclepro.2014.04.005

Klassen, R. D.; Whybark, C. D. – 1999. The impact of environmental technologies on manufacturing performance. Acad. Gerenciar. J., 42, 599 – 615.

Klassen, Robert D, Lee, Su – Yol – 2008. Drivers and enablers that foster environmental management capabilities in small-and medium-sized suppliers in supply chains, Production and Operations Management, Nov-Dec, Vol.17(6), p.573(14) - DOI: 10.3401/poms.1080.0063

Lee, C. K. M., - 2012. Managing reverse logistics to enhance sustainability of industrial marketing, Industrial Marketing Management.

Liker, Jeffrey, McGraw-Hill - 2004. The Toyota Way - 14 Management Principles from the World's GreatestManufacturer.

Low Sui Pheng ; Teo Hui Fang – 2005. Modern-day lean construction principles; Some questions on their origin and similarities with Sun Tzu's <IT>Art of War</IT> Management Decision, Vol.43(4), p.523-541- DOI: 10.1108/00251740510593530

Nasab, H. H., - 2012. Finding a probabilistic approach to analyze lean manufacturing, Journal of Cleaner Production.- DOI: 10.1016/j.jclepro.2012.02.017

Porter, M., Van Der Linde, C. 1995 - Green and Competitive, Harvard Business Review: September-October, 120 – 134.- DOI: 10.1016/0024-6301(95)99997-E

Pritchard, A. – 1969. Statistical bibliography or bibliometrics? Journal of Documentation, v. 25, n. 4, p. 348-349, dec. 1969.

Rao, P. – 2005. The greening of suppliers – in the South East Asian context. Journal of Cleaner Production, Volume 13, Issue 9, 935-945.- DOI: 10.1016/j.jclepro.2004.04.010

Thoumy, M., - 2012. Environmental projects and financial performance: Exploring the impact of project characteristics, International Journal of Production Economics. DOI: 10.1016/j.ijpe.2012.01.014

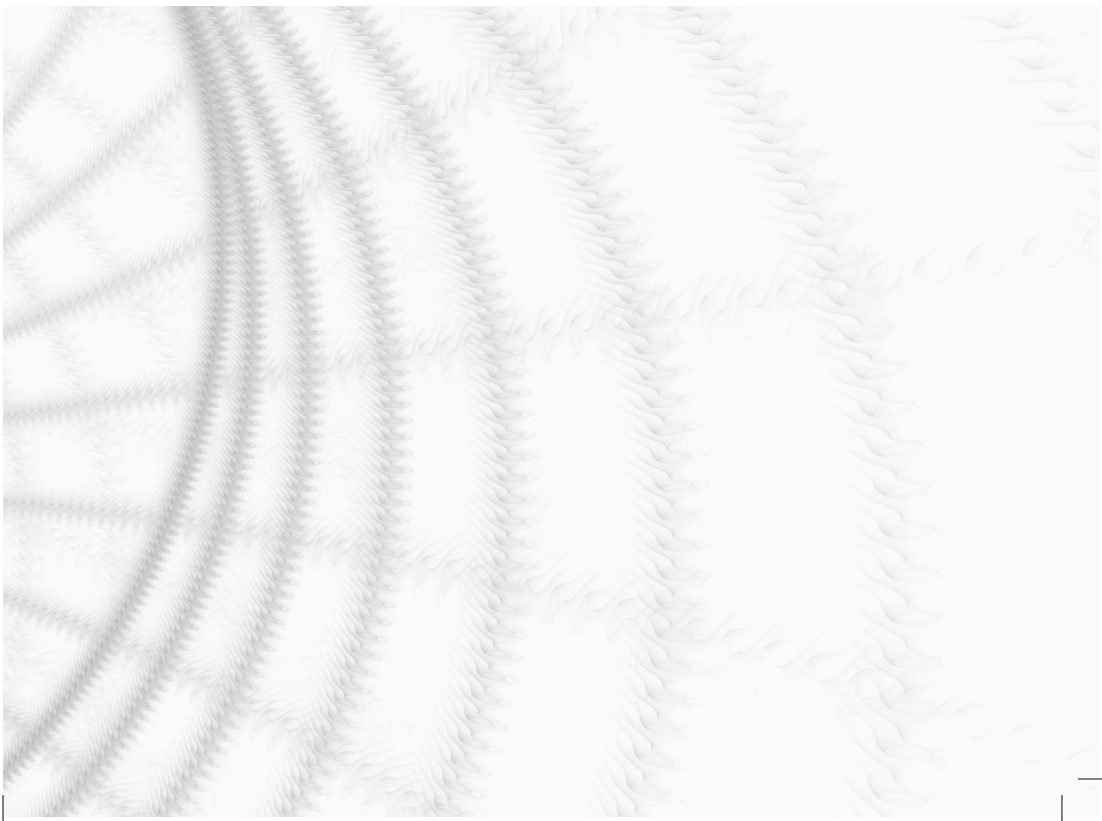
Ting, S. L., 2013. Mining logistics data to assure the quality in a sustainable food supply chain: A case in the red wine industry, International Journal of Production Economics. DOI: 10.1016/j.ijpe.2013.12.010

Verrier, Brunilde ; Rose, Bertrand ; Caillaud, Emmanuel ; Remita, Hakim – 2013. Combining organizational performance with sustainable development issues: the Lean and Green project benchmarking repository. Journal of Cleaner Production. DOI: 10.1016/j.jclepro.2013.12.023

Vinodh, S. – 2010. Improvement of agility and sustainability: A case study in an Indian rotary switches manufacturing organization, Journal of Cleaner Production, Vol.18(10), pp.1015-1020. DOI: 10.1016/j.jclepro.2010.02.018.

Womack, J. P.; Jones, D. T. – 1998. Lean Thinking: Banish Waste and Creat the Wealth in Your Corporation. New York: Simon and Schuster.

Zhou, M., - 2012. Selection and evaluation of green production strategies: analytic and simulation mode. DOI: 10.1016/j.jclepro.2011.12.014.



COORDINATION OF COOPERATION IN THE FIELD OF LOGISTICS IN THE AUTOMOTIVE INDUSTRY

Nicoletta Baskiewicz

Abstract: The subject of cooperation, coopetition, collaboration or networks is increasingly undertaken in the literature on the subject. What is more, the business practice also underlines the role and importance of the team's operation in achieving market success. The paper discusses the issue of broadly understood collaboration and cooperation, in the first part, the subject of cooperation in the general sense was shown, and then the factors determining the management principles of cooperating enterprises network were addressed. Next, examples of cooperation and networking in the area of logistics activities are presented, with particular emphasis on the automotive industry.

Key words: cooperation, network, network management, cooperation in logistics, cooperation in automotive business.

Introduction. Cooperation as an attribute of network connections

Inter-organizational networks take the form of complex, multi-entity structures with diverse levels of durability, consistency and openness. These structures include automatic (independent in the formal, organizational and financial sense) entities and intergroup ties that unite them. Multi-entity character, complexity and dynamics of the network, as well as the independence of its components, determine the difficulties in the sphere of management or, more broadly, the coordination of mutually implemented activities. In addition, these parameters are perceived by some specialists not only as complicating but even blocking network controls. Due to the independence of participants, decision-making independence and resource autonomy, the use of the concept of network management is not justified, at least at the modern level of knowledge development about inter-organizational networks in management.[Czakon, 2012, p.62] The idea of coordinating the network appears in this place (network governance to be precise[1]). Regardless of the current epistemological position in specialist literature, it is noted that the processes occurring inside the network related to undertaking coordinating, controlling, managerial or leadership operations constitute an attribute of a specific inter-organizational network and affect the course and effectiveness of cooperation within it.[Pachura, 2017, pp. 173-182] Collaboration is a multi-entity activity that aims to achieve mutually consistent goals. [Mesjasz-Lech, 2016, p.89] The multi-entity nature of this activity leads to the fact that individual parties can in various ways aim at realizing convergent intentions and priorities. In order to avoid discrepancies in this matter and to apply a uniform direction to the undertakings and actions, it is necessary to use certain coordination tools. In addition, the autonomy of the parties from the interaction relationship means that they are independent in the decision-making aspect, that is, they can, but do not have to comply with

1 www. environmentalpolicy.ucdavis.edu/node/378

the guidelines of other entities appearing on the network. The implementation of mutually acceptable coordination tools makes it possible to protect the network against loss of stability, in a sense encouraging other network participants to apply appropriate directives or carry out the tasks undertaken on the network. Summing up, it can be stated that coordinating tools, by giving a clearly defined framework and guidelines for the implemented activities, correlate the efforts of autonomous participants, fostering efficiency of cooperation. In addition, they induce entities to adopt specific attitudes and implement the intended priorities, while eliminating the risk of loss of network stability and chaotic implementation of convergent tasks. From the beginning, the networks were seen as hybrids, an indirect instrument for coordinating economic activity. But in the case of network functioning, social networks, observed values, social norms and trust play a special role. Social relations and processes are the object of the third coordination mechanism - social coordination. The coordination of multiple (network) nature is generated by the imposition of three spheres of coordination (market, hierarchical and social)[Czakon, 2011, p.5]. Network coordination can take various forms of multiple coordination depending on the level of displaying specific components of market coordination (based on price), hierarchical (command-based) or social (based on trust). From the point of view of the effectiveness of cooperation in the network, it is particularly important that the coordination includes all three elements, because only with proper determination of prices, instructions and trust it is possible to optimize the efficiency.[Czakon, 2008, pp.7-9]

Factors shaping the nature of network coordination

Coordination of a network is established to one of the overarching issues of the inter-organizational network. In its core meaning, network coordination is a specific form of inter-organizational dynamics

taking place in a network of diverse entities (public, private and physical entities) Network coordination is a quite complicated process in organization and implementation - it has the character of interaction between differentiated (in terms of form , goals, intentions, organization etc.) and independent parties. The complexity of the method of coordination is also influenced by the aspect that the parties cooperating in inter-organizational networks supervise and properly adapt activities taking place inside the network.[Łobos, 2000, pp.195-196] Network participants actually control co-implemented projects, tasks, activities or processes. Smooth coordination expects homogeneity and at least cohesion of positions presented by specific participants. The method of achieving a satisfactory level of homogeneity in the aspect of the functioning of individual network nodes is the widely understood communication processes. Participants from the network center: dominant, with a greater reputation and bargaining power, are able (depending on network asymmetry) to impose network coordination conditions (structure of three components: price - command - trust). In such a set-up, the method of coordination actually implemented in the network depends on such components as: internal structure, content and subject of transfer in the network, symmetry, institutional shape, dominant learning styles, type of activity carried out in the network. In the context of strongly asymmetric networks, ensuring coordination is the area of a central node of recognized reputation and position. [Czop, Leszczyńska, 20002, p.282] The function of the coordinator is played by entities which, depending on other tasks they carry out, and the type of inter-organizational network referred to as a broker, animator, leader, orchestrator, strategic center, integrator or anchor company. Identical criteria allow to classify diverse, innovative mechanisms for controlling inter-organizational networks, such as navigating, orchestrating, piloting, monitoring, which may result in deflection, narrowing, expansion, collapse, expansion of the network trajectory.[Perechuda, 2010, pp. 262]

The necessity of coordinating the network is determined mainly by its high level of complexity and uncertainty of decision-making situations occurring during its operation. The need for coordination will be the higher the more complicated the network is, it will include a larger number of different nodes and the conditions in which the network operates will be less permanent [Huiskonen, Pirttila, 2002,pp. 177-180]. Taking into account the features of today's economy, mainly the increasing number of mutual relations between entities, participation in an increasing number of inter-organizational networks and the impulsiveness of the environment, we can say that modern networks are increasingly looking for coordination. Incidentally, proper coordination becomes the overriding issue for the operation of inter-organizational networks in conditions of high market uncertainty. Coordination of the network manifests itself not only as one of the superior components of the success of the network, but also as a prerequisite for existence in a demanding and competitive market. It should be emphasized that proper coordination increases the effectiveness of cooperation within the network and stimulates the growth of the organization values of network participants. It is obvious that network operators will aim to improve coordination to guarantee network efficiency and to increase their own (individual) effectiveness and increase their value. Searching for conditions, factors or reasons for the effectiveness of cooperation results in generating questions about conditions, factors and conditions for effective coordination. The effectiveness of cooperation depends on two widely perceived categories of factors. First of all, it is important to maximize elements, conditions, parameters, phenomena conducive to cooperation efficiency. Secondly, it may be significant to mitigate potential threats (or to mitigate their consequences) resulting in the degradation of the network and incomplete (ineffective) implementation of its priorities.

Companies operating in the common market acting in their immediate environment influence each other, even if the relations that they ini-

tiate are unconscious. It comes from the concept of market coexistence. Entities operating in relative proximity often create between themselves unconscious relations that may have a very strong, lasting character. In the sphere of conscious cooperation, entities initiate actions aimed at achieving their own goals, with the support of the environment, or at preventing achieving the goals of competing companies. At this stage, you can distinguish between positive and negative cooperation [Pachciarek, 2011, p. 35]. At the moment when the community is aware of the issues of commonality of interest and the definition of the priorities connecting them, then there is cooperation between them. It is overwhelmingly positive, and projects are undertaken fully consciously and planned. Cooperation is characterized by relatively stable bonds and the desire to gradually strengthen mutual relations.[Niemczyk, 2013b, p. 115] When the initiated cooperation means the implementation of joint activities related to running economic processes, e.g. production, marketing, sales, it will transform into a cooperation that is characterized by the complexity of the exactness of mutual connections and a relatively high permanence of the relationship. The highest level of cooperation is, in turn, integration, meaning the grouping of market entities in the form of, for example, clusters or alliances, and even the creation of a new entity composed of cooperating parts. Integration means a very high degree of tightening the bonds, up to the merger and high durability of relations coming from the fact that the condition for survival on the market is to maintain common connections. [Tomski, 2008, pp. 35-38]

Areas of inter-organizational cooperation in Logistics

The value chain is an instrument that refers to the economic path, to the organizational concept of value analysis and the internal value chain

of the company, presenting the activities of the organization as a series of activities carried out during the production of the final product or service, combined in a logical whole in such a way as to lead to making profits. This method makes it possible to get to know and understand the whole range of relations between the system of available resources and the level of competitive advantage. [Jabłoński, 2015, pp 57-59] It gives the opportunity to state, to what extent the projects implemented by the organization support and contribute to the organization's undertakings and contribute to the competitive advantage. In its course there is an analysis of the efficiency of various actions undertaken by enterprises at several selected levels. These actions may be ties of partner cooperation, while there are two fundamental spheres for the effectiveness of the company's operations: the sphere of basic (operational) activities and supportive activities. The basic activities include: a range of projects aimed at providing energy resources, information materials and money necessary to implement the production process, the production processes as such, processes focused on the sale and distribution of products and after-sales processes focused on the service of the final product such as warranty and post-warranty service.[Ossowski, 2012, p.300] The most frequent supporting activities are, for example, deliveries, i.e. series of activities supporting basic activities, all auxiliary activities also include the maintenance of machinery and equipment or technological progress, but also management processes. The former, operational ones generate various types of values directly for the organization (innovative products and services, generate the necessary information, knowledge, reputation). The latter, supporting but not direct ones, have the task of performing and improving the implementation of operational activities. If each of these activities is implemented in the most efficient way, and additionally they are well standardized in the aspect of individual spheres and in the scale of the whole chain, with time they generate company's expected profits, high market position and even competitive advantage. The competitive advantage of an enterprise can only be

properly identified, perceived and developed if it is comprehensively addressed. Therefore, it is necessary to focus on the fact that individual activities of enterprises are closely related, and the value generated in the value chain is dependent not only on the quality of work carried out in specific links of the chain, but also on matching individual elements and quality between them. By combining the above characteristics with the processes of creating a competitive advantage on the basis of inter-organizational cooperation being one of its types of partnership, it can be noticed that in each of the presented levels of value chain cooperation, especially partnership, can be an important source of increasing both their quality and improving internal and external coordination. Partnership is, by its nature, "purposeful cooperation of two or more separate enterprises, based on relational standards, based on mutual exchange of" sharing "and development of resources or strategic abilities aimed at improving the competitiveness of the enterprises involved."[Światowiec-Szczepańska, 2012, p.43] Due to deliberately analyzed and strategically aligned co-operation constraints (number and quality of partners, area, form, principles, scope, time horizon, degree, symmetry and rate of engagement, relationship durability, etc.), resulting from the co-ordinated function as the co-ordinated management in the organization cooperation may also give increased economic results. [Adamik, Zakrzewska, 2013] Maximizing the value chain by deepening the inter-organizational partnership within it is one of the imperatives of modern management, because this type of approach eliminates problems related to vertical integration, minimizes costs and risks, and allows counterparties to learn from one another to consciously manage the transfer of necessary goods and services and more effectively reorganize their activities in the aspect of various forms of coalition and cooperation of companies. Significantly responsible for such results are the elements that accompany each cooperation, such as: material, monetary values, time and personal coordination. Effectively cooperating partners coordinate jointly undertaken projects, because they give people, things and matters the right

time, roles, space and sizes, thanks to which they are more able to adapt the resources available to them jointly for the tasks undertaken together. [Niemczyk, 2013a, pp. 125-137] Consequently, they contribute to leveling out expenses for implemented activities. It should be emphasized that mutual undertakings in individual areas can be implemented simultaneously as a result of the application of generally applicable, customary (non-formal) standards and rules of cooperation, the so-called routines as well as organizational procedures or formal contracts with very different specificities.[Rokita, 2005, p.197]

Identification of the nature of cooperation in the area of logistics in the automotive industry based on cases of good practice

Logistic service in the automotive industry has gone long beyond the framework of commonly perceived transport. Due to innovative logistics, the automotive industry can develop better, and logistics in turn implements newer solutions motivated by the requirements of automotive companies. [Baskiewicz, 2012, pp.223-226] Based on the report "The state of the automotive industry and its role in the Polish economy" prepared by the consulting company KPMG, in Poland the trade of automotive parts and accessories on the European and global markets is regularly increasing. The Association of Distributors and Manufacturers of Automotive Parts presents data that there are about 900 producers of car parts in Poland, which leads to the fact that our country is perceived as a center in the sub-supplier sector for the automotive industry. In order for the progress of export to be noticeable, systemic logistics solutions are needed that respond to the specific requirements of the automotive industry. The logistics operator must work permanently to optimize its processes and look for new solutions that allow to obtain added value for consumers.

supply chain service in the case of automotive can include several stages, eg Transport of products from suppliers or production logistics. There is also a situation where clients require special services, for example initial assembly. DB Schenker Logistics in cooperation with contractors has its own global network of offices and terminals, thanks to which the company may offer the same logistic standards throughout the world, despite the constantly changing legislative conditions or different cultures. For the automotive sector a wide range of systemic instruments is very important - starting from the simplest option of tracking and controlling the parcels to reporting the production process to the consumer's supplier. It is also necessary to know the specificity of the market, production in the automotive industry, to have the knowledge of processes and methodology of delivery in accordance with the Just in Time principle.[2]

Conclusions

Nowadays, it is more and more often stressed that one can rarely take advantage of opportunities and potential when acting alone. This truth refers to the individuals as well as the broadly understood organization, including the enterprises. What is more, it is emphasized that the attributes in shaping the competitive position of enterprises acquire attributes closely related to the human being. Both in the context of the human resource itself, which is recognized as a key resource of the enterprise, as well as man in the aspect of the carrier and certain desirable features for the enterprise, ie: creativity, ingenuity, innovation or cooperation and building a specific network of connections. Networking is currently necessary because it allows to use the synergy effect and focus on the most important competences of the company while reducing activities that do not fit into the processes recognized as fundamental ones.

2 www.autoevent.pl/pl/work/współpraca-logistyki-i-motoryzacji/

KOORDYNACJA WSPÓŁPRACY W OBSZARZE LOGISTYKI W BRANŻY AUTOMOTIVE

Streszczenie: Temat kooperacji, kooperencji, współpracy czy sieci jest coraz częściej podejmowany w literaturze przedmiotu. Co więcej praktyka gospodarcza również podkreśla rolę i znaczenie zespołowego działania przedsiębiorstw w odnoszeniu sukcesu na rynku. W artykule poruszono kwestię szeroko rozumianej współpracy oraz kooperacji. W pierwszej części podjęto temat kooperacji w znaczeniu ogólnym, po czym zajęto się identyfikacją czynników warunkujących zasady zarządzania siecią współpracujących przedsiębiorstw. Następnie przedstawiono przykłady współpracy oraz tworzenia sieci w obszarze działań logistycznych ze szczególnym uwzględnieniem branży automotiv.
Słowa kluczowe: współpraca, sieć, zarządzanie siecią, współpraca w logistyce, współpraca w automotive.

REFERENCES

Adamik A., Zakrzewska-Bielawska A. (2013) *Organizacja w sieciach współpracy –od prostych do złożonych form współpracy międzyorganizacyjnej*, w: Nauka w organizacji. Ujęcie dynamiczne. red. Adamik A, Wolters Kluwer, Warszawa.

Baskiewicz N. (2012) Kooperacja w przedsiębiorstwach zorientowanych procesowo, Zarządzanie i finanse, Vol. 10.

Czakon W. (2008) *Koordynacja sieci – wieloraka forma organizacji współdziałania*, Przegląd Organizacji, Vol. 9.

Czakon W. (2011) *Paradygmat sieciowy w naukach o zarzadzaniu*, Przegląd Organizacji, Vol. 11.

Czakon W. (2012) *Sieci w zarządzaniu strategicznym*, Wolters Kluwer, Warszawa.

Jabłoński A (2015) *Skalowalność modeli biznesu w środowisku sieciowym*, Wydawnictwo Difin, Warszawa;

Mesjasz Lech A. (2016) *Współdziałanie w sieciach logistycznych – szanse i zagrożenia*, Zeszyty Naukowe Politechniki Śląskiej, Gliwice.

Niemczyk J. (2013) *Strategia. Od planu do sieci*. Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław.

Niemczyk J. (2013) *Renta sieciowa* [w:] „Kooperencja przedsiębiorstw w gospodarce rynkowej. Konkurencja- kooperacja – rozwój", red. R.Borowiecki, T. Rojek Fundacja Uniwersytetu Ekonomicznego w Krakowie, Kraków.

Ossowski M. (2012) *Identyfikacja i klasyfikacja procesów w przedsiębiorstwie*, Zarzadzanie i Finanse Uniwersytet Gdański, Gdańsk.

Pachciarek H. (2011) *Czynniki sprzyjające i utrudniające współpracę pomiędzy organizacjami*, „Master of Business Administration", Vol. 1, Szczecin.

Pachura A. (2017) *Innowation and change in networked reality*, „Polish Journal of Management Studies", Vol 15, Częstochowa

Rokita J. (2005) *Zarządzanie strategiczne. Tworzenie i utrzymywanie przewagi konkurencyjnej*, PWE, Warszawa.

Światowiec – Szczepańska J. (2012) *Ryzyko partnerstwa strategicznego przedsiębiorstw. Ujęcie modelowe*. Wydawnictwo UE w Poznaniu, Poznań 2012.

Tomski P. (2008) *Stratyfikacja współdziałania gospodarczego przedsiębiorstw w ujęciu praktycznym*, w: Kopycińska D. Red. Konkurencyjnośc podmiotów rynkowych , Uniwersytet Szczeciński, Szczecin.

www. environmentalpolicy.ucdavis.edu/node/378

LOGISTICS SERVICES: A CASE STUDY OF A METAL MECHANICAL COMPANY

José Martino Neto, Getulio Akabane,
José Manoel Souza das Neves

Abstract: This case study research establishes comparison among tangible and intangible logistics in a metal mechanic industry located in Brazil. The results addressed advantages in a different business models in other to understand that some independent or combined actions should be taken to give value added effect to the company results.
Keywords: Logistics service, logistic channel, added value.

Introduction

According to Porter (1986), companies adopt different business strategies to position itself competitively in the market. They are defined as: cost leadership, differentiation and focus on the strategic positioning or usually a combined action among them.

A current view is shared by Kobayashi (2000), which points to other growing strategic differences, as for example, the logistics service, considered an activity that can establish differences between the competitors and support the generic strategy of differentiation.

Therefore, the objective of the research is to prove this assertion by a case study of a medium-sized metal mechanic Industry acting in the state of São Paulo. It focuses on the manufacturing of metal components. It will have the comparative approach of two models of service delivery according to customer needs by identifying the most cost effective option for the company's operations.

Indeed, the association of service logistics and costs was described by Kaplan and Cooper (2000) who claims to be essential to analyze and understand about the costs involved in customizing the service requires an adequate knowledge and understanding of its structure especially in meeting the requirements of customers through control mechanisms to analyze all the variables involved.

Another important insight into the services industry is in the affirmative of Lovelock (2001), who highlights the economic factor lies in profound changes and that innovation in services can achieve considerable differentiation before the market players. These innovative elements make it very conducive to growing market, since the barriers to entry are diminishing nowadays.

Theoretical Framework

Definition of Value

The economic value of a company is the result of the sum of its tangible and intangible assets. Intangible assets such as its brand, innovation, human assets in particular have grown in importance in the formation of this value (Kayo et al, 2006).

Porter (1985) states that there is a relationship between competitive advantage and value chain where business processes are a set of activities that are performed to design, produce, market, deliver and support their products and services. The differences between competing value chains constitute the basic form of competitive advantage and arises primarily from the value a company can create for its buyers above the manufacturing cost of the company.

This theoretical foundation strengthens the strategy implemented by the metal mechanic Industry concerned that visualized the opportunity to offer the market an adequate model to its customers' needs by adding value to their service delivery.

According to Cruz (2012), the value is what the customer perceives. In this way companies need to make the product attractive to the customer's eyes. Quality, ease of use, utility, maintenance and support, are items too important to be taken into consideration.

According to Vieira and Araujo (2014), value is the perception of the brand. The customer is willing to pay more for a product, according to the consideration offered, which can be according to the importance of service, product utility and personal value.

Tangible (goods) and intangible (services) logistics

According to Christopher (1997), the customer service is determined by the elements: availability, frequency and reliability of delivery, inventory levels and time spent in the cycle of applications.

The author complements that the critical elements of customer service are the order cycle, stock availability, restrictions on the size of the application (flexibility to meet delivery just in time), ease in placing the order, frequency and delivery reliability, quality documentation (invoices and other customer communications), procedures for complaints, requests submitted, complete technical support and information about the position of applications. The delivery reliability and complete applications are crucial elements to the achievement and maintenance and customer loyalty.

Another view of logistics services can be observed by Lambert (1998) by stating that the logistics is the process of planning, implementing and controlling the efficient and economical way, the flow of supplies and products, storage and flow of information corresponding to the entire system, from source to final destination, in order to meet the need of customers.

A variant was developed by Ballou (2001), where states that the logistic services have three basic elements: pre- transaction, transaction and post- transaction. In the pre- transaction, the elements are responsible for creating an enabling environment to carry out the transaction. The elements in the transaction occur during the course of the sale and are directly related to the delivery of products to customers. Concerning the elements in the post- transaction, are related to the monitoring of the product after transfer to the client.

Stank et al (2003) states that the logistics service within the supply chain has become an important tooling for building and maintaining close relationships with customers and suppliers, as it has a positive effect on customer satisfaction and, therefore, on established loyalty in the customer -supplier relationship.

To Parolini (2004), it can sort these elements into four components: tangibles, intangibles, services and economic elements. Tangible elements are intrinsic to the product, such as: the quality of the material used, durability, functional characteristics, appearance and finishing among others. The intangible elements are associated with the product brand.

Kayo et al (2006) classifies the logistics of goods (tangible) and ser-

vices (intangible). Tangible assets are machines, equipment and the conventional factories. However the author highlights how the brand of a company is being valued, the proper management of intangible assets pass to play a key role in sustainable performance and training of the economic value of a company. Therefore, the importance of the intangible aspect of an organization or service is what defines how the customer wants to pay for the product or service.

Thus, the provision of logistics services can be regarded as decisive in customer satisfaction, the pursuit of loyalty. Logistics processes undergo profound changes in function not only of globalization but also due to technological developments. The customer perception becomes a difference in order to achieve satisfaction and loyalty.

According to Martins et al (2011), the pursuit of logistics processes efficiency made that other aspects of service provided were incorporated and evaluated by customers as decision making factors for contracting transport service, such as meeting deadlines, transparency of costs and the development of appropriate and integrated with suppliers and customer services.

The role of logistics today, according to various literature is based on the attendance of the seven "R's" (seven right conditions for logistics services):

1. Have available the right product: It is important that our suppliers have to provide the ideal raw material for the production of products or the provision of services. This principle also applies in the logistics standpoint of marketing. It means to deliver the right product suitable for the market niche.
2. In the correct amount: Keep inventories with the right amounts ensure better use of resources and minimize deterioration of materials, raw materials and products.
3. In the right conditions: Be careful with transport and storage. It must ensure that the products and packaging materials are in appropriate conditions to its final destination.

4. In the right place: Correct storage in the most appropriate place possible in order to meet the need to produce or provide service.
5. In the right time: To ensure that materials, products or services are allocated at the right time and in the place where they should be.
6. For the correct client: Every effort will be in vain if it is not addressed the right target. It is ideal for a business model that can put the product in the customer's hands at the time and in the right place as planning.
7. In the correct cost: Cost efficiency is a determining factor. You should choose solutions that offer greater cost advantages without sacrificing the quality and the final product.

As highlighted by Porter (1986), among the competitive positioning strategies, besides differentiation, cost management plays a key role in maintaining your business, and in the case of this specific study will address the main concepts on logistics costs.

Logistic costs

In the scenario of the 2010's observed that the supply of goods and services up demand, is intensifying thus competition where efficient cost management is also a differential that should be explored.

A vision of logistics costs can be extracted from the Institute of Management Accountants - IMA (1992) that states " logistics costs are the costs to plan, deploy and manage all incoming inventory (inbound) in checkout process (outbound) from the point of origin to point of consumption. "

Lambert (1998) states that logistics activities are connected to the supply activities related to the plant and distribution organization. In the author's point of view there is a trade-off between Marketing, Logistics and Supply to correlate the marketing mix (product, price, promotion and customer location / service level) with logistics costs (transportation cost, inventory, order batch, warehousing, order processing and information) and distribution (localization of the product / service level, price, location and supplier of materials / purchased component).

According to Ballou (2003), logistics costs within the total costs of an organization, assume an important position in monetary value´s term and loses only to the cost of goods sold. It also states that most companies allocate all costs to products, and there isn´t separation, prior to this allocation, in terms of activities that were part of the process. In this way, identify these costs and measure them accurately becomes vital to the survival of businesses.

There are three others concepts within the logistics costs: compensation costs, total cost and overall system. The compensation cost is the relationship between inventory costs (warehousing) on the one hand and the cost of shipping and order processing from another hand, being inversely proportional. The total cost is the sum of all costs involved, individual or collective. The total system considers all affected factors including inter-organizational case of frontier expansion across organizational boundaries.

In this case study, the costs involved can be classified as cost of storage, cost inventories, packaging costs and shipping cost. And through the provision of the proposed service model, the cost breakdown can be full or partial.

Methodology

According to Yin (2005), a case study is used in situations where appears questions such as "how" and "why" and when the researcher has little control over events and when the focus is in embedded contemporary phenomena at some real-life context.

There are six sources of evidence that can be used in case study: interviews, archival records, documentary research, direct observation and participant. In this sense, considering what says Yin (2005), this research fits perfectly into a case study classified as research action that intends to

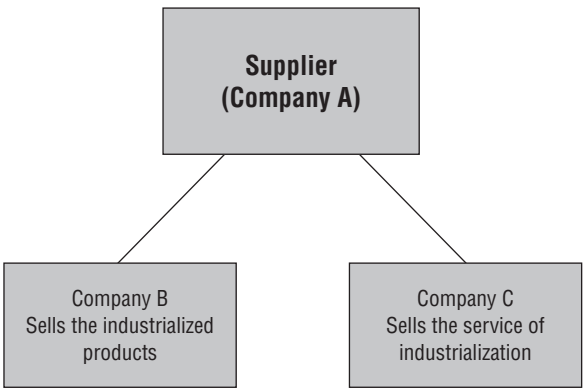
analyze the company hereinafter referred to as Company A or Supplier, and determine as the logistics service concepts are being used.

With the vision of creating a differential in the provision of logistics services in the market of a particular family of components, Company A offers two options to commercialize their products through the provision of services (considered intangible services) or through sale goods (tangible services), option that comes from the self-interest of the buyer.

The goal is to analyze with base in the Company A´s perspective, how it´s possible adds value in each one of these operations, assuming that the main premise is to meet the customer according to your needs, even aware that this easing market can bring some reduction in the operating margin as a whole.

Company B uses the option to purchase the industrialized product of Company A and Company C adopts the strategy of paying for service delivery of manufactured product by Company A as shown below . The incidence of the tax burden is different from the options, but will not be discussed this topic in this research.

Figure 1 — prepared by author.



Data collection will be made through desk research, log files, and how is considered a research action, will also be included comments and information generated by the researcher. The literature came from the analysis of previously published articles on the subject, in specialized magazines in the sector.

To identify and interpret the collected data was used the technique of content analysis, which, according to Bardin (1997), is the most appropriate technique for communication analysis, whether oral or written.

It is also proposed analyzing how this diversification of supply models options held by Company A, can be considered as a differential of competitiveness, discussing the costs and the risks involved in each model, and which option is more profitable.

Results and discussion

Company A)

According to Moura (2004), companies have three ways in which they can compete. Be a low cost provider in product differentiation or the offering of a differentiated customer service, expertise of Company A.

Your "core business" is manufacturing metal components made from aluminum profiles. The variables are the shape, thickness and size. The manufacturing of the components has the following stages: cutting, machining, surface finishing, drying, weighing and packing.

The Company A offers its customers two options of supplying products, in conditions and different prices: Sale of the industrial metal (considered tangible) or provide the industrialization of service of this same component (considered intangible).

The Company B prefers to buy the manufactured component and in the other hand, the Company C prefers to buy the industrialization of service of this same component.

In this way will be analyzed the advantages and disadvantages of each

model according to the Company A´s needs, emphasizing that the strategic decision comes from the preferred model that Companies B and C prefer adopt according to their purchasing needs.

Company B)

The Company A uses of the concept make to order to supply the company B. In this scenario, the lead time is around 30 days, according the following steps: purchase of raw materials, manufacture, finishing and packing. To ensure this lead time is necessary to send a preliminary schedule for the subsequent month.

It´s possible to observe strengths and weaknesses in this model:

The management of raw materials, purchase and storage is the Company A´s responsibility. The cost per unit is higher, because are included the cost of raw materials, indirect materials costs and inputs, processing cost (direct labor costs, as well as indirect labor and processes), cost of packing and shipping cost.

The risk in this operating model is referred purchasing raw material. It´s possible identify this risk in case of not reconcile the quantity purchased of raw materials according the purchasing order from Company B on the basis of minimum lots, generating the need to include financing costs in this operation. Another important point is regarding the lead time (30 days) demanding a financial analysis of receivables versus payables generating a portion of embedded value also in providing service.

Company C)

Company C is responsible to buy the raw materials and manage your inventory. According your necessity, Company C, sends to Company A, the raw material to carry out industrialization. The "lead time" is 10 days however you must also submit a preliminary schedule for the following month. In this scenario the Company A, after receiving the programming and the raw material, starts industrialization to complete the application when is then billed and delivered.

It is also possible to observe positive and negative aspects in this service delivery model. As the main feature of this model stands out:

It´s not need to have inventories of raw materials and manage the entire process involved. The cost per part is lower, and depending on the lead time, maximizes up the financial aspect related to the receivables. The focus is on efficiency of industrialization via service, main generator operating margin.

Comparative analyze between models according Company A´s vision.

It is possible to measure the results through the collected data, in order to assist in judging between the studied models and define important bullets to be analyzed.

Focusing on business model´s profitability, there are differences between the amounts charged for the services.

Regarding the logistics of goods, considered tangible, the elements that make up costs are defined as: raw material, storage costs, manufacturing costs, financial costs, packing and shipping cost for delivery. In the case of services (intangible model), the process is simplified and the risks are lower.

But the point is, regardless of the model, after all costs defined and controlled within the price for the service or the charged product ensuring profitability for the maintenance and support of the business, it is understood that the enterprise in question can meet the needs of their customers finding this service logistics model a strategic differentiator.

Concluding remarks

Assuming that production volumes are the same between the two models of service delivery, is evident that the most profitable model for Company A is to commercialize its products to Company B (tangible lo-

gistics) in function of a higher gross margin resulted of a sum of activities that make up the operating margin .

Thus, I believe that the proposed aim of studying the Metal Mechanic Company in question has been reached with their supply options according to the needs of those who purchase the product strategy that is considered a trend in terms of service and logistics based on value set which model is most advantageous.

However, beyond economic gain is important to highlight other actions that value the Company understand that you can make more effective the provision of logistics services offered to the market and be a strategic advantage:

The first: should be in relation to the delivery time. Deliver quickly and with extremely high quality according to customer's needs. The second action is related to offer a price compatible with market reality in order to ensure their profitability and also be pleased your customer, with the awareness that the product offered worth what is charged. The third action is to enhance your brand, in order to your work aggregate some differentiation to your customer and to the market itself to enhance its efforts to better care and their ability to adapt to emerging needs.

All Companies must continuously invest in improvements, improving its processes, products and services, creating the differential via an implanted culture in order to always be ahead of its competitors and close to its customers, who are the real partners in process.

This study is expected to have further fostered discussions on the subject, not only the service logistics activity, but of all the other activities that are part of a strategic differentiation of business in relation to service delivery, close the your customer's needs, innovation, costs involved and profitability analysis.

Finally, it´ll stimulate new research in the others companies that can do similar activity and compare results in order to be a greater breadth in a subject that tends to be increasingly strategic in the pursuit of market differentiation.

LITERATURE

Ballou, R. H. 2001. *Gerenciamento da Cadeia de Suprimentos: Planejamento, Organização e Logística Empresarial*. 4. ed. Bookman, Porto Alegre.

Bardin, L. 1997. *Análise de conteúdo*. Edições 70, Lisboa.

Christopher, M. 1997. *Logística e Gerenciamento da Cadeia de Suprimentos: estratégias para a redução de custos e melhoria dos serviços*. Pioneira, São Paulo.

Conselho dos Profissionais de Gestão da Cadeia de Suprimentos (Council of Supply Chain Management Professionals- CSCMP). *Supply chain management and logistics management definitions*. Disponível em:< http://cscmp.org/AboutCSCMP/Definitions/Definitions.asp> Acesso em 12 de outubro,2015

Fleury, P. F.; Wanke, P.; Figueiredo, K. F. 2000. *Logística Empresarial: a perspectiva brasileira*. Ed. Atlas, São Paulo.

Fragoso S. Conectibilidade e geografia em sites de rede social: um olhar sobre as relações entre território e identidade e a permeabilidade on-line/off-line a partir do Orkut. *Revista Galáxia*, São Paulo, n. 16, p. 109-121, dez. 2008.

Instituto dos Contadores Gerencias (IMA). 1992. *Cost Management for Logistics*. National Association Of Accountants. Statements on Management Accounting. 4-P, june 1992

Lambert, D.M. 1998. *Administração estratégica da logística*. Vantine Consultoria, São Paulo.

Lovelock,C . 2001. *Serviços: Marketing e Gestão* . Ed Saraiva, São Paulo.

Moura, R. 2004. *Atualidades da Logística*. Instituto IMAM, São Paulo.

Pimentel, M. O. M. T. 2006. "Gestão da Marca no Contexto da Experiência do Consumidor: O caso dep."

Porter, M. 1985. *Competitive Advantage - creating and sustaining superior performance*, Bookman, Porto Alegre.

Rafele, C. 2004. Logistic service measurement: a reference framework. Journal of Manufacturing Technology Management. Vol. 24, N. 3, p. 280-290.

Stank, T. et al. 2003. Logistics service performance: estimating its influence on market share. Journal of Business Logistics, v.24, n.1, p.27-55.

Yin, R.K. 2005. *Estudo de Caso: Planejamento e Métodos*. Bookman, Porto Alegre.