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Reversible Supply Chain in function of competitiveness

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Abstract

Supply Chain makes the flow of goods, services and information from suppliers, through transport, producers, distributors, retailers to end customers. Big producers opt for a strategy of outsourcing logistic services, especially storage, delivery, and distribution services to end-customers. Commitment to the strategy of outsourcing, at the same time, is the strategy of focus on the core business. Small producers, especially manufacturers of agricultural food products, have recently opted to avoid intermediaries in the transport and distribution of the product to the end customer. All in order to increase the quality of their own products and increase the competitiveness by eliminating the costs of intermediaries in transport and distribution. This is achieved by merging and shortening the supply chain. The EU has established an institutional framework regulating the operations of producers through a short supply chain. The market situation requires further optimization by producers due to lack of labour and the need to increase competitiveness and leads to the emergence of a reversible supply chain phenomenon. In the paper, the author, by applying general and special scientific methods of cognition, explores the advantages and shortcomings of the short and reversible supply chain, derived from the traditional and modern supply chain model.

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1. Introduction

Supply Chain (SC) is essentially a phenomenon that has a complex definition. SC has the focus on the flow of goods. Apart from the flow of goods, SC also means the flow of services and information. It is a phenomenon characterized by dynamics (flow) and information. While traditional logistics is primarily based on warehousing and transport activities, SC also implies the flow of information between the numerous SC participants. Therefore, when it comes to SC, there is a need to talk about the flow of goods and information among the SC participants, namely suppliers of raw materials, transport organizations, producers or service providers, product distributors, retail chains that allow the product to reach the customer and become a subject of consumption. SC is also present in the area of providing customer service.

For the purpose of delivering the product without losing its characteristics, which would mean a fall in quality for the customer, producers, in particular small producers of agricultural food products, will restructure the SC by shortening methods, in order to avoid intermediaries on the way from production to customer and that is, increasing the price of their products and other, reducing the time of SC cycle. The shortening the SC maintains the steady quality of agricultural

food products from the moment of production until delivery to the customer, reduces SC cycle costs and increases product competitiveness on the market.

In the circumstances of lack of labour and the efforts of producers to sell goods while maintaining competitiveness, there is a reversible SC phenomenon established, especially in smaller farms producing fruit, vegetables and other domestic products.

This is a phenomenon when the producer does not distribute the products through the distributor or directly, but the customer comes to the producer and picks up the products (fruit, vegetables, etc.).

The Act on the prohibition of unfair trading practices in the business-to-business food supply chain (Official Gazette 117/17) states that the SC „... encompasses all participants in production, processing and trade..., as follows: producers, ..., wholesalers and retailers.” Further on, „... the SC can be defined as a type of a dynamic system in which information, money and products are constantly exchanged among the chain participants.“ (Pupavac, 2013).

„The supply chain can be considered a network of structures, distribution, transformation of procured materials into semi-products or final products for buyers“ (Satyendra et al., 2014).

The SC can also be described as “... a series of activities and organizations through which materials pass during their journey from initial suppliers to end customer.” (Monczka et al. 2010).

There are many definitions of the SC, however, it may be concluded that the SC is a flow of goods, services and information from suppliers, through transport, producers, distributors, and retailers to the final customer. It can also be concluded that the SC is a complex system of integration of suppliers, producers, distributors and traders for the purpose of production and distribution of goods/services in the right quantities, in the right place and at the right time, all with the aim to balance supply and demand.

2. Experimental

Researching the traditional SC concept has been established, the conclusion is that it does not present a realistic situation with regard to the requirements of the present as well as the future. Businesses need to be implemented today by applying certain principles: quality, sustainable development, social responsibility, process optimization, cost optimization, competitiveness, product lifecycle review. In this respect, it should be noted that the traditional SC approach does not present realistic needs for business at present and in the future.

There was a need for a transition from traditional to modern SC approach, respecting the above mentioned principles of modern business and the requirements and respect of the principle of the circular economy. In the literature, the traditional approach to SC as a one-way direction process is still massively illustrated, which certainly needs to be changed as it does not meet the needs of modern business and the world.

Optimization of logistic costs is actually a simultaneous optimization of SC. It is imperative that small producers, shortening SC and taking SC parts on their own, shortened the way of procurement and production to the final customers and thus optimized their logistical costs.

However, there is no end to the process of optimizing logistical costs and the SC, too.

Due to the lack of labour force and the inability to increase wages, and the need for agricultural and fruit products to be delivered to final consumers in a short time, there is a reversible supply chain (RSC) phenomenon that is characterized by the fact that the customer comes to the manufacturer and collects the products themselves. This concept is upgraded to Short Supply Chain (SSC) and allows producers to place product placement and maintain competitiveness.

In the paper, the author, using the method of analysis, comparisons, generalizations and specializations and system approaches, explores the SC phenomenon from the traditional approach, through the SSC to the RSC, exploring their advantages and disadvantages and the transition from traditional to modern approaches.

In doing so, the RSC phenomenon is the original name the author of this work came up for the first time in world literature.

3. Results and discussion

The SC is integral part of the economy and, therefore, its characteristics and its effects should be considered and researched in the context of a country's economy. Interactions of the SC and the economy of a country are intensive and run continuously. Due to such relations and connections, the transition of understanding the SC from the traditional to the modern one should also be researched.

The SSC phenomenon will also be researched through traditional and modern approach to provide a RSC that is also being researched through traditional approach to the transition to modern approach.

3.1. Traditional approach to the Supply Chain

Traditional approach to the SC begins with procurement of raw materials needed for production of products or ensuring prerequisites for provision of services. Finished products are stored until the time of distribution, and then distributed, most often through a widespread retail network, to a big number of customers. Customers are usually end users or consumers of these products. Products are in most cases placed in packaging made of various materials: cardboard or paper, glass, plastics, metal and the like. This packaging has traditionally been transformed to waste and disposed of after consumption, most often in the environment.

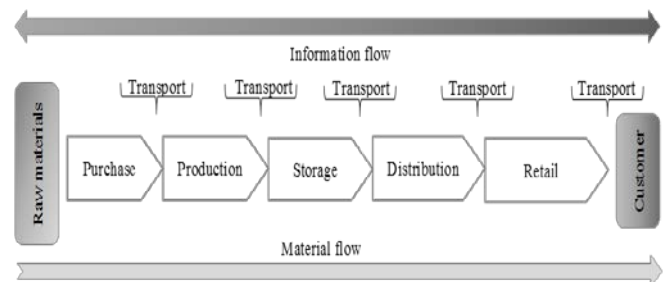


Fig. 1. Traditional approach to the Supply Chain

Traditional approach to the SC is obviously one-way movement (Fig. 1) of materials and goods, from raw materials required for production, through production of final products, storage, distribution, delivery to customers and consumption and disposal of waste in the environment.

3.2. Modern approach to the Supply Chain

The traditional SC approach does not take into account the life cycle (LC) of the product.

The acceptance of the concept of the product LC is now also necessary with the optimization of cost considerations and involves abandoning the traditional SC approach and accepting the modern concept of SC in keeping with circular economy principles.

Modern approach to SC is not a one-way phenomenon. It doesn't end with waste disposal in the environment after each SC cycle. What distinguishes it from the traditional approach (Fig. 1) is a feedback (Fig. 2).

Waste is no more disposed of uncontrolled in the environment but is recycled. Part of waste that can no longer be recycled is disposed of permanently in a non-hazardous manner, in accordance with the regulations.

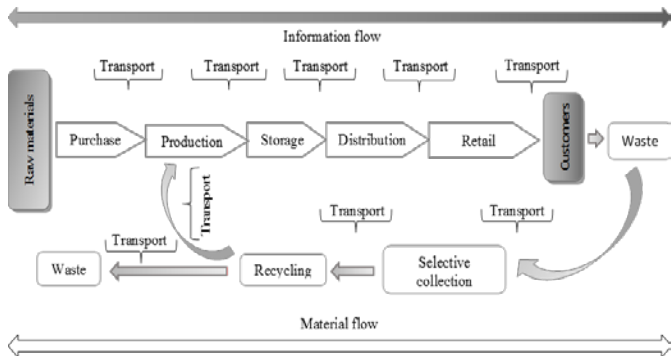


Fig. 2. Modern approach to the Supply Chain

Usually several SC members participate in the recycling system. The recycling-supply chain is a process that has four stages: (Kopicki, R. J. et al., 1993).

- the first stage consists of selective collecting waste material from recyclable bases and delivering that material to the parties responsible for its recycling,
- the second stage is the processing of recycled material into secondary raw materials,
- the third step is the use of secondary raw materials for the production of new products,
- the fourth stage is the return of the product to the market.

3.3. Short Supply Chain – traditional approach

Despite the traditional approach to the SC, which is characterized by a one-way flow material, given the number of participants, some of whom are in the role of intermediaries that charge their services, the SC also implies certain logistic costs.

The total logistical costs consist of the costs of all the activities carried out in order to model, direct, control and control the flow of materials and goods, energy and information. These costs are: manipulation, transportation, warehousing, inventory management and associated management costs of SC. They are used as an indicator of SC's performance, but also of the entire logistic systems.

The share of logistical costs in total costs differs from company to company, depending on the underlying activity, with a larger share in retail organizations than in manufacturing. This was due to the development of logistics.

"In the structure of the company's total cost of business, logistics costs account for 15% to 25%, while on average they account for about 8% of total corporate income." (Martinović, 2014).

"The share of logistics services in Gross Domestic Product (GDP) in heavily developed countries (Germany, France), has increased by about 10-15% over the last twenty years" (Wifi Croatia, 2009). The structure of total logistical costs is presented in Table 1.

Table 1. Structure of total logistics cost in the company

Type of costs	Share (%)
Transport	45
Storage	25
Inventory	20
Administrative costs	10
Total:	100

The structure of total logistics costs is as follows: transport 45%, storage 25%, inventory 20% and administrative costs 10%, which does not have to be a rule for every company.

SC is an integral part of the economy and, therefore, its characteristics and its effects should be looked at and researched in the context of a country's economy. The mutual interaction between SC and the economy of a country is intense and ongoing. Due to such relationship and connectivity, the transition from traditional SC to modern should be explored.

"Logistics represents the flow management of goods and raw materials, the processes of making final products and associated information from source point to point of final use according to customer needs. In the broader sense of logistics, it involves the return and disposal of waste materials." (The European Council).

"Logistics is the process of planning, implementing and controlling the efficient and effective flow and storage of materials (raw materials, semi-products and finished products), services and related information from a source point to a point from the source point to consumption and to meet customer requirements." (The Council of Logistic Management).

Strategic determinants of modern logistics are:

- understanding and meeting customer requirements (quality),
- logistic chain optimization,
- cost optimization,
- product life cycle,
- sustainability of the concept.

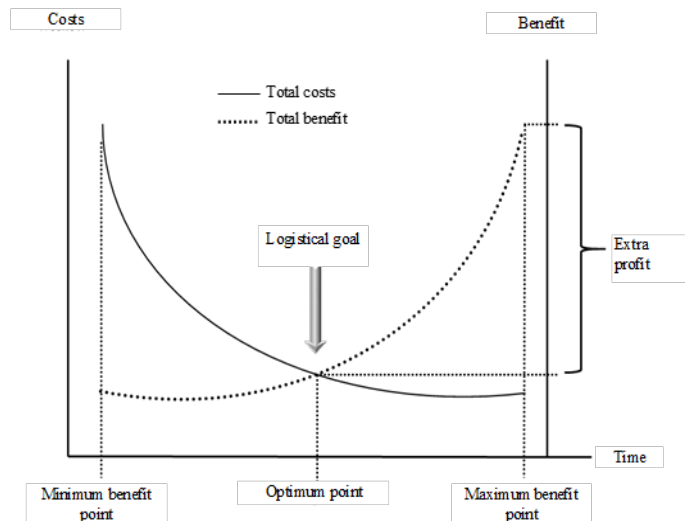


Fig. 3. Logistical costs optimum

Fig. 3 shows logistical costs optimum. At the minimum level of use, the overall SC costs are high because strategic defenses of modern logistics are not applied and the cost optimization process, or SC optimization, has not started. By implementing the strategic determinants of modern logistics, the benefit that is generated is increased through the time dynamics, and the overall SC costs fall for the implementation of rationalization. In the optimum of total cost and benefits within SC, there is an extra profit that can be used to improve the quality of SC in subsequent cycles. This is actually the goal of logistics.

Each of these strategic determinants has an impact on SC optimization. SC optimization can be achieved, on the one hand, by quality and on the other, by optimizing costs. SC optimization is actually a function of cost optimization.

There is no clear and simple definition of "local food products" or "short supply chains" (SSC) that could be applied to a variety of production, processing, distribution and distribution systems associated with local food production systems in the EU Member States. More important than a single definition is that these terms are interpreted in accordance with the area and context in which they are developed.

The definition of SSC can also be derived from SC definitions. Accepting this approach may be defined as a flow of goods, services and information from the supplier, through the transporter, the manufacturer, the distributor, the retailer to the final customer, whereby the manufacturer independently carries out the transport and distribution, very often storage, too, of the product to the final customer and at the distribution and delivery stage sales) realizes immediate contact with the customer (Fig. 4). In the EU, SSC is mainly used in the production of agricultural food products on small and medium-sized farms. The main goal is logistic costs optimization.

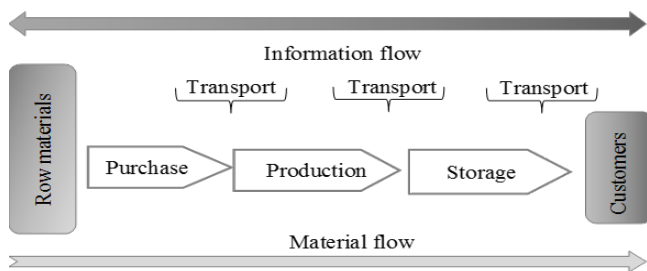


Fig. 4. Traditional approach to the Short Supply Chain

SC is shorter, it is easier to keep and emphasize the authenticity and genuineness of food products. Despite the broad understanding of local food networks and SSC, there is no single definition applicable in all Member States.

3.4. Short Supply Chain – modern approach

Local food production systems and SSCs are continuously developing without too much impacts in the EU for many years now - most are locally driven as a result of the immediate needs of an individual farm, place or community. The

manufacturer is seeking to improve its competitiveness through optimization of logistics. But, in these circumstances they should apply the strategy of modern approach to the SSC (Fig. 5).

"Approximately 4% of Flanders producers work in SSC. About 1% of all food products in Finland are delivered through short supply chains. In 2005 more than 16% of French peasants made direct sales of their products. Almost 3% of Denmark's producers have more than 1,200 people, dealing with direct sales." (EU, 2012).

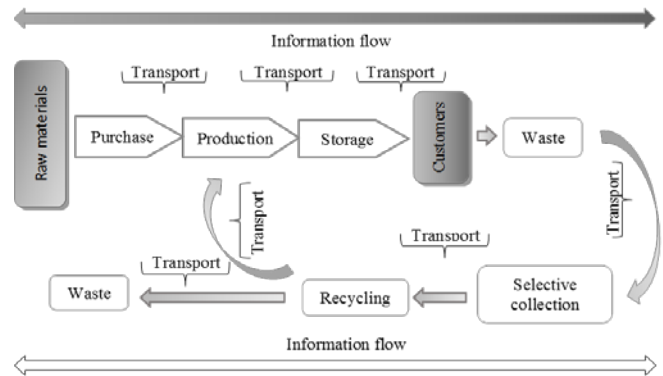


Fig. 5. Modern approach to the Short Supply Chain

This concept is also applied in other EU countries, very successfully. "About 46,000 or a third of the total number of Austrian small agriculture companies deals with direct sales. Their 11,000 direct sales outstrip more than half of their annual income. Fruit, wine, pork meat and eggs are the most commonly used for SSCs. They are less used for placement and distribution of milk and meat products from dairy and livestock farms. 5% of the money spent in Spain for food was spent on products from the SSC. There are more and more SSCs in Italy. In 2009, 63,000 producers were included, an increase of 4.7% over 2008, with a total value of EUR 3 billion, an increase of 11%. Of this, 40% refers to the wine sector and 20% to fruits and vegetables." (EU, 2012).

Micro, small and medium-sized enterprises and private-sector production can play a significant role in the work and development of Clusters and can accelerate the transition from traditional (Fig. 1, Fig. 4) to the modern SC concept (Fig. 2, Fig. 5) and thus contribute to environmental conservation and contributions and development of the local economy. Over the past period, the EU has adopted more laws regulating public procurement and food safety.

The advantages of the SSC in the modern approach as shown in Fig. 5 are:

- the producer joins with other producers to be stronger in the market,
- joint promotion through social networks,
- the producer eliminates intermediaries such as warehousing, transportation from production to customer, distributor (wholesale, retail),
- the possibility of online sales,

- the producer can reduce logistical costs on stocks of finished goods, transport and distribution at around 60% of total logistical costs,
- the producer has immediate contact with the customer, giving him feedback on the level of his satisfaction with the quality of the product,
- the time from harvest to delivery to the customer is as short as possible,
- at the moment of delivery of the product to the customer, the product has retained all the characteristics and maintained the quality,
- greater competitiveness of producers,
- the producer closed the cycle from raw material procurement and production to delivery to the final buyer, customer satisfaction,
- self-employment.
- The disadvantages of the SSC in the modern approach as shown in Fig. 5 are:
- the producer is not only focused on the production process since it deals with transport and distribution (sales) and administration,
- individual producers do not realize enough production to supply systems such as schools, kindergartens, etc.,
- the necessary competencies for the organization and implementation of all SC stages,
- necessary superstructure (transport and transshipment and other equipment),
- local market orientation,
- production is not specialized

3.5. Reversible Supply Chain

The RSC stems from the later shortening of the SSC. This is due to the fact that there is insufficient labour force to harvest fruits and vegetables that matures in the short term and needs to be put to the final consumer in a time that guarantees high quality. In these circumstances, producers do not deliver the products themselves to customers as with the SSC but the customers come to the producer and on the spot pick up the products (Fig. 6). In this way the products are of high quality to the customer, and the producer optimizes their logistics costs and remains competitive.

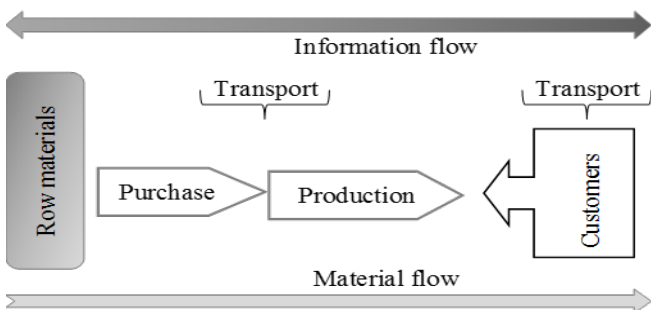


Fig. 6. Traditional approach to the Reversible Supply Chain

In RSC streams information and product flows are not changed. Information is also exchanged among all RSC par-

ticipants in both directions. The product flows from the supply of raw materials, through the producer, to the end customer, with the difference that the end customer comes to the products and often pick up them.

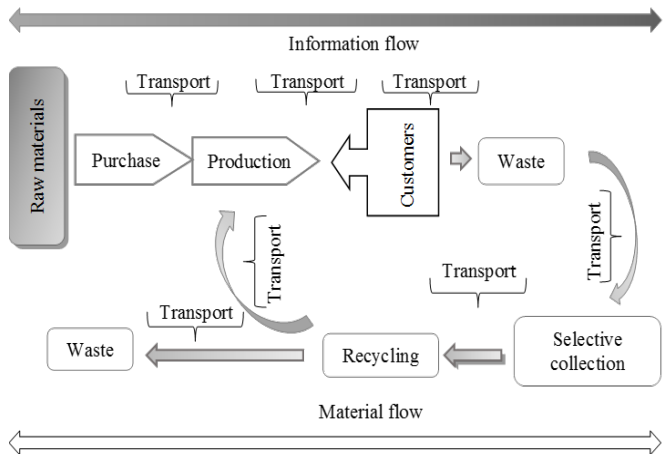


Fig. 7. Modern approach to the Reversible Supply Chain

RSC is also in transition to a modern approach (Fig. 7) since it is a requirement of modern business and modern times. The producer and the final consumer are involved, because the environmental problem is not an individual problem, but every individual (the producer, the consumer) has the responsibility for environmental protection and should make a contribution within the system that operates in a particular area.

4. Summary and conclusion

SC is one of the foundations of any economy and its contribution to economy is crucial.

SC is further defined in the literature as a one-way flow of goods from the supply of raw materials through production, storage and distribution to the final consumer. This traditional approach can't meet the needs of modern business and modern societies, both from the standpoint of profitability and from the standpoint of ecology, sustainable development and social responsibility. Therefore, the transition and transformation of traditional approach to the SC is a necessity in the modern approach, for which there is a characteristic retreat after product consumption. This transition and transformation are based on the principles of the circular economy.

SSC is the result of the need and effort of small producers, primarily agricultural food products, to be competitive on the market with large sales chains. In order to improve their competitiveness, they have to fill several conditions, including the association and implementation of the SSC strategy. This reduces up to 60% of total logistics costs since SC eliminates intermediaries in the storage, transportation, wholesale, retail and sales phases. The SSC is applied to the EU, which has made the institutional framework that has allowed them to develop many years ago. SSC has its advantages and disadvantages.

Over the last few years, many countries, particularly those in transition, face at least two problems: 1) emigration of young educated labour force into more developed countries and 2) the fact that small producers, especially agricultural products, can't compete with large shopping centres. This has resulted, on the one hand, by the lack of labour force for agricultural works especially in the period when fruit and vegetables mature and need to be harvested in the short term.

On the other hand, large shopping centres dominate the market. Small producers operate under their domination and their conditions. In those circumstances, they do not have possibility to increase wages to provide enough workers over the period when fruits and vegetables are mature.

To solve this problem, there was a need for innovation in SSC. Innovation is that the manufacturer does not distribute the products to the final customer, but the customer comes to the manufacturer, and on the spot he picks up and pays the products he wants to buy. Hence, it was in the segment of distribution to reverse movement (Fig. 6, Fig. 7). The producer no longer goes to the customer with his products, but the customer comes to the manufacturer's products.

The problem persists because in some regions no producer has the ability to produce a serious amount of agricultural food products to continuously supply nurseries, schools, homes for the elderly in some city or in some area.

The strategic guidelines underlying this concept are: quality, life cycle, process and cost optimization and competitiveness.

The problem researched in this paper is SC and the need for its transformation due to context change. By researching the SC in the context of market demands and modern societies, the SC transformation necessitated from the traditional to the modern approach. Also, as a result of changes in market circumstances, it has been demonstrated that small producers, especially of agricultural products, need to work on innovations of SC to remain competitive on the market. The result of these innovations is the SSC, as the first step in logistical cost optimization and SC, too. Due to the further streamlining of the market context, there was further innovation and the RSC model was established. This model enables

small manufacturers to remain competitive and continue to operate on the market.

The result of the research presented in this paper is the flexible SC model that adapts to the context, applicable in all economies to optimize logistical costs and SC cost, too and business based on the principles of quality, sustainable development, process and costs optimization, life cycle approach, social responsibility, circular economy, for the benefit of mankind.

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可逆供应链的竞争力

關鍵詞

供应链
供应链短缺
可逆供应链
竞争力
质量

摘要

供应链通过运输, 生产商, 分销商, 零售商向最终客户提供来自供应商的商品, 服务和信息流。大生产商选择将物流服务外包的策略, 特别是存储, 交付和分销服务, 以供最终客户使用。同时, 对外包战略的承诺是关注核心业务的战略。小型生产者, 特别是农业食品制造商, 最近选择避免中间商将产品运输和分销给最终客户。所有这些都是为了通过消除运输和配送中间商的成本来提高自身产品的质量并提高竞争力。这是通过合并和缩短供应链来实现的。欧盟已经建立了一个制度框架, 通过短供应链来管理生产者的运作。市场形势需要生产者进一步优化, 因为缺乏劳动力和提高竞争力的需要, 并导致可逆供应链现象的出现。在本文中, 作者运用一般和特殊的科学认知方法, 探讨了源于传统和现代供应链模型的短期和可逆供应链的优缺点。