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SEGREGATING THE MAIN DIMENSIONS OF THE GREEN SUPPLY CHAIN

SEGREGIRANJE GLAVNIH DIMENZIJA ZELENOG LANCA SNABDEVANJA

JEL CLASSIFICATION: M21, M29, Q56, Q58.

ABSTRACT:

Within the majority of scientific studies, the supply chain is mostly treated as a unique, integral entity. That means that if we are talking about the green supply chain, the assumption is that all ecological initiatives have been applied in every segment, i.e. every dimension of that chain. Such a perception is not surprising since a great number of clients or other important strategic constituents also does not often make a difference be-

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tween the company and its main suppliers/distributors within the chain. While this kind of perspective is generally desirable, since it indicates the existence of close cooperation between supply chain participants, the situation is much different in case if a certain problem of ecological nature was to occur. Due to the appearance of such a problem, the mentioned strategic constituents could pass over the responsibility for its occurrence onto a certain, leading company in the chain, without it having basically any, or at least not a direct responsibility for the occurred situation. That is why it is important to consider the key dimensions of one supply chain, i.e. how to make each of them green and what are their particular specifics. That is precisely the basic subject of analysis within this paper. Besides the introduction and conclusion, the very paper is divided into four parts. Within them we analyse green procurement, green production, green distribution and marketing, as well as reverse logistics, respectively, as the main dimensions of the green supply chain. The aim of the paper is to point out the necessity of regarding the supply chain activities as segregated, since only if all activities within all dimensions are green and adequately coordinated upstream and downstream, only that can be the condition of creating the competitive advantage.

**KEY WORDS:**

GREEN PROCUREMENT, GREEN PRODUCTION, GREEN DISTRIBUTION AND MARKETING,
REVERSE LOGISTIC

APSTRAKT:

U većini naučnih studija, lanac snabdevanja se uglavnom tretira kao jedinstvena, integralna celina. To znači da ako govorimo o zelenom lancu snabdevanja, podrazumeva se da su ekološke inicijative primenjene u svakom segmentu, tj. dimenziji tog lanca. Ovakva percepcija ne čudi, budući da veliki broj klijenata ili drugih bitnih strateških konstituentata takođe često ne pravi razliku između preduzeća i njegovih dobavljača/distributera u lancu. I dok je ovakva perspektiva posmatranja načelno poželjna, jer sugeriše postojanje bliske saradnje među učesnicima lanca, situacija je znatno drugačija u slučaju da se javi određeni problem ekološke prirode. Usled pojave takvog problema, pomenuti strateški konstituenti odgovornost za njegov nastanak mogu prebaciti na određeno, vodeće preduzeće u nekom lancu snabdevanja, a da ono nema suštinski nikakvu ili bar ne direktnu odgovornost za nastalu situaciju. Zato je važno razmotriti koje su ključne dimenzije jednog lanca snabdevanja, te kako svaku od tih dimenzija učiniti zelenom i koje su njene specifičnosti. To je upravo i osnovni predmet analize u ovom radu. Pored uvoda i zaključka, sam rad podeljen je u 4 dela. U okviru njih, analiziraju se redom zelena nabavka, zelena proizvodnja, zelena distribucija i marketing, kao i povratna logistika, u smislu glavnih dimenzija zelenog lanca snabdevanja. Cilj rada jeste da se ukaže na neophodnost segregatnog posmatranja aktivnosti u lancu, jer samo ako su sve aktivnosti u okviru svih dimenzija zelene i adekvatno koordinirane uzvodno i nizvodno, jedino to može biti osnov nastanka konkurentске prednosti.

**KLJUČNE REČI:**

ZELENA NABAVKA, ZELENA PROIZVODNJA, ZELENA DISTRIBUCIJA I MARKETING,
POVRATNA LOGISTIKA

1. INTRODUCTION

The implementation and development of the green supply chain concept by companies all around the world is gaining more and more importance. The regulatory framework and economic initiatives are only some of the ways which can be used for the wider usage of this concept. The essence of the popularity of this concept, however, can not be attributed only to such measures, but more dominantly to the fact that it is being used as a tool in the market competitive struggle. Namely, some authors suggest that particular companies improve their competitiveness through ecological advancements, successfully responding to green demands of their customers, balancing the ecological influence onto production and services, thereby saving finance due to fulfillment of ecological demands.⁴

It is important to point out that usually within scientific studies, the supply chain is mainly treated as a unique, integral entity. That means that if we are talking about the green supply chain, the assumption is that all ecological initiatives have been applied in every segment, i.e. every dimension of that chain. Such a perception is not surprising since a great number of clients or other important strategic constituents also does not often make a difference between the company and its main suppliers/distributors within the chain.⁵

While this kind of perspective is generally desirable, since it indicates the existence of close cooperation between supply chain participants, the situation is much different in case if a certain problem of ecological nature was to occur. Due to the appearance of such a problem, the mentioned strategic constituents could pass over the responsibility for its occurrence onto a certain, leading company in the chain, without it having basically any, or at least not a direct responsibility for the occurred situation. For example, a producer of children toys, which uses all the principles of ecological operations within its production facilities, can provide the raw material from its supplier, and that raw material might contain overdosed quantities of certain dangerous substance, since the supplier either does not implement the green initiatives or due to a bad control system, it does not do it continuously. In case that a product containing such a raw material should pass into the hands of the final supplier and that a certain problem were to arise (poisoning, allergic reaction or similar) all the responsibility would be in the hands of the producer, since it is considered the leading link in the chain, although it is not essentially directly responsible for the shortcoming.

Therefore, in order for a certain chain to be considered green, all its phases or dimensions must fully implement or control the green initiatives within their operations. Although a greater number of research concerning the usage of the ecological principles in every of the more important phases within the chain has been carried out, *Sarkis* states that given research mainly concentrate on one functional area⁶.

Regardless of the mentioned shortcoming, it is however important to reconsider how each of the key phases should be made green and which are its specifics, since only the chain where all the dimensions are green and adequately coordinated upstream and downstream, can be the basis for the creation of the competitive advantage.

4 Bacallan, (2000), pp. 11-12.

5 Rao & Holt, (2005), pp. 898-916.

6 Sarkis, (1999). pp. 23-29.

With that aim in mind, within this paper we analyse the specifics of four key identified phases or dimensions of the green supply chain:

- green procurement
- green production
- green distribution and marketing
- reverse logistics

2. GREEN PROCUREMENT

Greening the procurement activities represents the first phase or dimension while establishing the ecologically-oriented supply chain. The green procurement is also known under the name ecological procurement. Its task is to compare the price, technology and quality of a product, service or contract with the supplier, on one hand and their ecological influence, on the other. The aim is to perform a selection of unharmful products or services, as well as suppliers which can deliver these inputs, which a certain company further processes and sends downstream through the chain.⁷

Green procurement is based on principles and activities of prevention of pollution and waste creation. Namely, using its negotiation strength, the companies-buyers can establish clear and comprehensive criteria at the very beginning of the chain, which can result in its sequent greening, regarding all activities which are performed downwards, i.e. as the end of the life cycle of some product approaches.⁸

As can be seen from the previous analysis, the subject of the green procurement are the so-called green inputs by which we assume any product, service or contract with an adequate supplier. If we are talking about products/services, these are the ones which use less resources compared to conventional products/services, which are designed to last longer and which have a minimum negative effect on the environment. Also, the majority of products/services from this category is less harmful for human health. Although these products/services initially usually cost more, the price difference is paid off during the lifespan of the product/service⁹. The other, maybe an even more important input of the green procurement is the selection of adequate suppliers, which support is crucial in achieving the green goals. Therefore, the companies-buyers first intend to find suppliers which are ecologically oriented by their nature and which use non-harmful ecological processes, and therefore to help them to manage their own performance, in order to secure long-lasting quality and safety of the supply sources.¹⁰ At the most advanced instance of this relationship, there is a noticeable trend in the supply chain which indicates the integration of suppliers and companies-buyers in order to insure total control, reduce operative costs and unify the customer service.¹¹ The greening of the procurement brings along numerous advantages, however it can be concluded that it is also exposed to a

7 Green procurement, (2018)

8 Dheeraj & Vishal, (2012), pp. 77-82.

9 Green procurement, (2018)

10 Min & Galle, (1997), pp. 10-17.

11 Narasimhan & Carter, (1998), pp. 127.

great number of limitations. Talking about the advantages of green procurement, it can be concluded that it significantly contributes to the reduction of pollution sources by re-usage and recycling of certain materials, as well as by minimizing the produced waste, especially the one referring to dangerous substances and materials.¹² It has already been expressed that a special advantage of the green procurement is the enabling of all the other participants in the downward stream of the supply chain to continue using the green initiatives. Expressing the limitations for the usage of the green initiatives within procurement, continuing we present within Table 1 the key implementation barriers:

▶ **TABLE 1. THE KEY BARRIERS TO SUCCESSFUL IMPLEMENTATION OF GREEN PROCUREMENT**

High expenses of ecological programs
Non-economic recycling and product re-usage
The lack of dedication of company management to procurement activities
The lack of buyer awareness on the importance of green initiatives
The lack of supplier awareness on the importance of green initiatives
The lack of broader ecological standards adopted on the company level
The lack of state ecological regulation

Source: Min & Galle, (1997), pp. 10-17.

3. GREEN PRODUCTION

The introduction of ecological practice into the company production process is the next important dimension while greening the supply chain, which is even more important than the green procurement. The essence of the green production can be seen in the development of products which are fast, reliable and energetically efficient. A good example are the led bulbs. While these bulbs use half less electrical energy than the classic ones, they produce the same light effect.¹³ In order for the companies to implement the principles of green production, it is needed to own adequate production capacities, if the work activities are just starting or to adapt the existing capacities, if the company is already in business on the market.¹⁴ Revising the mentioned situation regarding the production capacities, it is clear that the introduction/cross over onto the green operations demands significant financial investment, which is a main limitation of usage of such operations. It is important to also mention the security preoccupations while implementing the green practice within this dimension of the chain, especially if the already used production facilities need to be redesigned. That means that it is sometimes needed to close a part of the factory in order to install the new equipment or to introduce an ecological energetic source¹⁵ Once the green production is established, it has a multiple role in the supply chain. Its key tasks are:

12 Rao, (2002), pp. 632-55.

13 Eartheasy- energy efficient lighting, (2018)

14 Vachon, (2007), pp. 4357-4379.

15 Ilgin & Gupta, (2010), pp. 563-591.

▶ **TABLE 2. THE KEY TASKS OF GREEN PRODUCTION**

Creating ecologically tolerant products and services
Pollution prevention „within the origin” through adaptation of the production process
Adopting the practice of cleaner production
Connecting with the dimension of reverse logistics
Maximum re-usage and material recycling
The reduction of material usage
The increase of recycled components within products
Production process optimization through waste reduction
Product redesign in order to minimize the negative ecological effect

Source: Rao, (2004), pp. 289-320.

If multiple tasks of green production were to be fulfilled, the benefits which would be achieved by its realization surpass by far the initially stated limitations. The benefits are aimed at the three main groups of actors: a) the very company, since in the long run significant financial savings are achieved, image is improved and competitiveness is maintained; b) the local community, since the general quality of life is improved within it and c) towards the wider environment, since the negative influence expressed towards it is reduced.¹⁶

4. GREEN DISTRIBUTION AND MARKETING

The implementation of green initiatives has an equal importance not only for the input and process elements of one supply chain, but equally for the so-called output segment, which is dominantly expressed in the distribution and marketing activities. The term green or sustainable distribution is connected to such an organization of physical and manipulative flows of goods between the suppliers and the buyer, which causes the smallest possible ecological influence onto the participants, but also the wider surroundings. By managing distribution, we assume a great range of activities including transport, warehousing, order processing, package, system of cargo loading, the delivery of goods to the client, package return and similar.¹⁷

Referring to green marketing, it can be interpreted as the respect of demands of the ethic and social responsibility in the realization of marketing activities. It assumes the dedication of the company to the ecologically tolerant products, as well as performing those activities which lead to the preservation of the environment. Pride & Ferrell define the green marketing as product development, the determination of its price, the way of promotion and distribution, which does not cause any damage and/or causes minimum damage to the environment.¹⁸ Adopting the philosophy of green marketing, the company

16 Rao, (2004), pp. 289-320.

17 Chron- Distribution within sustainable business practices, (2018)

18 Pride & Ferrell, (2003), pp.100.

and its clients are bonded closer together, especially the ones which have special ecological concerns, such as the reduction of negative influence onto the environment or a rational usage of the natural resources.

The key advantages of using ecological initiatives and their explanation in the outflow, i.e. distribution and marketing activities of the green supply chain, are given as follows:

► **TABLE 3. THE KEY ADVANTAGES OF GREENING THE OUTFLOW ACTIVITIES OF THE SUPPLY CHAIN**

ADVANTAGE	EXPLANATION
Achieving the competitive advantage	The green initiatives in distribution/marketing allow the companies to avoid the traditional competition and to achieve a special competitive advantage on the market. Such competitive advantage leads to the creation of higher profits, better reputation and consequently to higher owner satisfaction.
Achieving security of product placement onto the market	Sticking to the ecological principles in distribution/marketing enables the avoidance of legal sanctions, the obligations which are paid through compensation to the damaged parties, as well as the negative influence of ecological and societies for the protection of the consumers. With additional positive image obtained with the consumers, due to the usage of ecological principles, the product placement onto the market is more secure.
A good social position of a company	The existence of strong support of the wider community since the distribution/marketing actions of a company influence in a positive way that community.
Activity sustainability	With the previously mentioned factors, the companies can continue to use the green initiatives uninterruptedly also within future distribution/marketing activities.

Source: Dheeraj & Vishal, (2012), pp. 77-82.

5. REVERSE LOGISTICS

Managing the flows in a traditional supply chain and segregating its dimensions, as was mentioned earlier, as the end link has the final/business buyer to whom a certain good-product or service is delivered. Such a regard is determined by the fact that the product life cycle, according to the traditional interpretation, precisely ends with this link of the chain. However, a logical question can be posed: "Is the entire product value used once it has officially come to the end of its life span, and if it is, what to do with the generated waste?" In the perspective of the so-called traditional chain, such and similar questions have not been interpreted as the subject of preoccupation of the conventional participants, such as producers, distributors, retail and similar.

The popularisation of the concept of the green supply chain have changed completely such a view perspective. Namely, in order for the ecological initiatives to be fully integrated into the chain, we must also identify the so-called reverse set of activities, by which we would introduce the two-way low, thus closing the loop and making the chain sustainable. So, when analysing the dimensions of the green supply chain, besides procurement, production, distribution and marketing, we must also include the so-called reverse logistics activities.

The activism scope of the reverse logistics is extremely wide. Under that term we usually include activities such as: managing the products return, the reduction of sources, recycling, reuse of materials, waste removal and similar.¹⁹ Such a wide range of term meaning leads to the preoccupation of both academic and practical circles with the topic of reverse logistics.

Within the initial stances of valuation, the organization of reverse logistics flows is treated as any source of costs or fulfillment of regulatory demands which are posed by entities outside the chain scope. Such a treatment of reverse logistics omits to identify its value component, which is extremely important.²⁰ However, in time, the supply managers comprehend more and more that the reverse logistics channel is the way to achieve efficiency and cost reduction, so this set of activities is taken as the market differentiator and the potential source of profit.²¹ Porter & van der Linde go one step further, identifying the reverse logistics as one of the basic ways how a green supply chain can achieve the competitive advantage on the market.²² Today, the importance of this set of activities is so great that the majority of authors identifies it with the very concept of the green supply chain²³ or at least regards the reverse logistics as its main operationalization.²⁴

The strategic realization of reverse logistics activities can be performed in two matching and simultaneous ways: a) by the efficient design of reverse logistics flows (the organization of the process and management of specific entities which participate within it) and b) by adequate selection of modes of treating the returned product, as the key phase of the return logistics process (which includes the re-usage of products, their modification, recycling or waste management).

Concluding we can state that reverse logistics represents an extremely complex set of activities, of undoubted strategic importance, so it has a central place in the implementation of the concept of green supply chain.

6. CONCLUSION

Segregating and analysing the key dimensions of the green supply chain management, which was the preoccupation of this paper, we have pointed out the importance of the comprehensive and coordinated usage of ecological practices in all segments of the supply chain, as a precondition of the competitiveness generation within it.

The analysis has shown that every dimension has certain specifics and consequent peculiarities in the form of its realization, while the practical usage can be identifies in the further elaboration of the real time examples in everyday company business.

19 Stock, (1992), pp. 1-17.

20 Mollenkopf & Closs, (2005), pp. 34-43.

21 Stock, (1998), p. 18.

22 Porter & van der Linde, (1995), pp. 120-134.

23 Srivastava, (2007), pp. 53-80.

24 Roggers & Tibben-Lembke, (2001), pp. 129-148.

Finally, we have shown and confirmed that the practice of green actions within the supply chain, besides the dominant theoretical confirmation, can have a positive influence onto the improvement of the company competitiveness if applied properly in everyday company business.

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