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GREEN LOGISTICS IN SUPPLY CHAINS

E. VERETENNIKOVA
Polotsk State University, Belarus

The necessity of considering the impact of the requirements and principles of green logistics in supply chains is considered. A scheme has been developed for the effective functioning of supply chains, taking into account the principles of green logistics.

Introduction. The progressive development of the world economy is inextricably linked with technological progress and the negative impact it has on the environment. Every day more and more irreplaceable resources are used, the results of enterprises affect the environmental situation of entire regions and countries. At the same time, the level of awareness of environmental responsibility of people is growing, which is expressed in the creation and widespread use of technologies aimed at preserving the environment and reducing the negative impact on it. In this regard, the problem of the use of "green" or environmental technologies in supply chain management is being updated. The activities of participants in the supply chain contribute to environmental degradation; therefore, it is important to take into account environmental aspects and factors of negative environmental impact at all stages of supply chain management: from the purchase of raw materials to the sale of finished products.

The main part. The concept of "green" logistics began to take shape in the world since the mid-1980s with the advent of the concept of "social responsibility of business". After the introduction of the European Union Packaging Directive, companies increased the use of reusable containers, waste processing equipment for production and logistics activities, and introduced packaging management systems. The principles of green logistics are also promoted by the European Logistics Association, which annually holds a European rating of logistics projects. In 2012, the Green Freight Europe project was launched, which was initiated by shippers and logistics companies with the aim of developing common approaches to determining factors of harmful emissions, comparing environmental parameters of different transport operators, etc. [1].

Today, the term "green" logistics refers to a combination of innovative approaches and methods, advanced technologies and equipment, using which it is possible to minimize damage to the environment during the movement of material flows. Green logistics is a scientific and practical activity, involving the formation of an effective mechanism for integrating environmental and socio-economic aspects at all stages of planning, design and management of the supply chain of goods in order to minimize environmental and economic damage and increase the consumer value of products through the use of energy and resource saving logistics technology.

The main goal of green logistics is to coordinate supply chain activities in such a way that the needs are met at the lowest environmental costs, taking into account factors such as climate change, air pollution, waste dumping (including packaging waste), soil pollution, noise and vibration (figure 1).

Figure 1. – Environmental Impact of Supply Chain Activities

Source: [2]

As it can be seen from Figure 1, green logistics operates in three main areas: economy, society and the environment. The economic component ensures the achievement of quantitative economic indicators of the functioning of market entities through the optimization of logistics costs. The social component forms the conditions for the safe production, distribution and use of manufactured products. The environmental component contributes to the improvement of the ecological climate and the reduction of the anthropogenic impact of logistics activities in environmental processes.

The objectives of green logistics are:

1) the use in the production of environmentally friendly and safe materials, as well as minimizing the use of non-recyclable raw materials and packaging;

2) the use of natural energy in the production process in order to minimize environmental pollution;

3) the maximum use of production waste as secondary raw materials, return and disposal of waste;

4) the use of new technologies for the use of recycled materials;

5) the providing of environmentally friendly technologies for storage and transportation of products.

The main principles of green logistics include: rationalizing the use of natural resources and enterprise resources; the maximum use of production waste, containers and packaging; reduced consumption of raw materials with a low possibility of processing or safe disposal; the application of modern high technology and recycling technologies; increasing the level of environmental orientation and responsibility of logistics personnel [3].

Environmental supply chain management is a set of actions in the process of creating added value, covering all the links of the supply chain from raw material procurement to final consumption, ensuring the implementation of the 3R principle (Reduce, Reuse, Recycle). The goal of environmental supply chain management can be considered the creation of competitive products based on resource-saving technologies, while minimizing environmental risks and reducing the negative impact of all parts of the supply chain on the environment [4].

There are three interconnected elements that reflect the essence of the functioning of the supply chain. These include the network structure of the supply chain, business processes in the supply chain, and supply chain management components.

The network structure of the supply chain includes three interdependent components:

1. The boundaries and structural dimensions of the network;

2. Participants in the supply chain;

3. Types of relationships between participants in the supply chain.

The main goal of effective construction of the network structure of supply chains is to achieve the focus company, as well as the rest of its participants, maximum productivity, profitability, efficiency, and therefore competitiveness. For this, specific participants in the supply chain and business processes are determined between which relationships are established, the level of interaction between them, their location relative to the focal company, as well as the structural dimensions of the network and its borders [5].

Business processes are activities that provide consumers with a certain value.

There are eight main processes that form the core of the supply chain:

- Customer Relationship Management;
- Service management for consumers;
- Demand management;
- Implementation of orders;
- Production flow management;
- Purchase;
- Development and commercialization of products;
- Return [6].

Management components include managerial variables, through which business processes interact and are managed within all supply chains. These are planning and control methods; the infrastructure of flows and activities related to work; the organizational structure; information flow infrastructure; material flow infrastructure; management methods; the structure of distribution of powers and leadership; the distribution of risks and rewards; culture and relationships [7].

It must be pointed out that with effective supply chain management, sales revenues increase and costs decrease from 15 to 30%. In addition, reserves are reduced, the accuracy of supply planning is increased, reliability and level of service are increased, transaction costs are reduced from 15 to 60%. These results can be achieved through the integration and coordination of business processes to maintain a constant balance between needs and supply along the entire length of the value chain [8].

It is worth noting that if a participant in the supply chain works profitably, this does not mean that he works efficiently. Sources of effective management growth are contained in the assessment of profitability and improving the effectiveness of individual business processes. Profitability evaluation is the degree of use of resources necessary to perform certain tasks. Profitability determines the effectiveness of the logistics system in terms of costs. It can be expressed through the ratio of resources to be consumed in solving this problem, and resources actually consumed. Efficiency is a measure of the completeness and quality of solving a task posed to a logistic system, fulfilling its purpose by the system (providing a consumer with goods of the right quality at the right time, in the right place and at the lowest cost). Efficiency is an indicator (or a system of indicators) that characterizes the level of quality of the functioning of the supply chain at a given level of total logistics costs [9]. Therefore, effective supply chain management should be aimed at achieving two main effects:

- Logistic costs should be minimal;
- After-sales service should satisfy the needs of customers.

Finding the best balance between these two effects allows supply chains to operate profitably, efficiently and effectively.

Thus, based on the foregoing, we have developed a scheme for the effective functioning of supply chains, taking into account the principles of green logistics, which is presented in Figure 2.

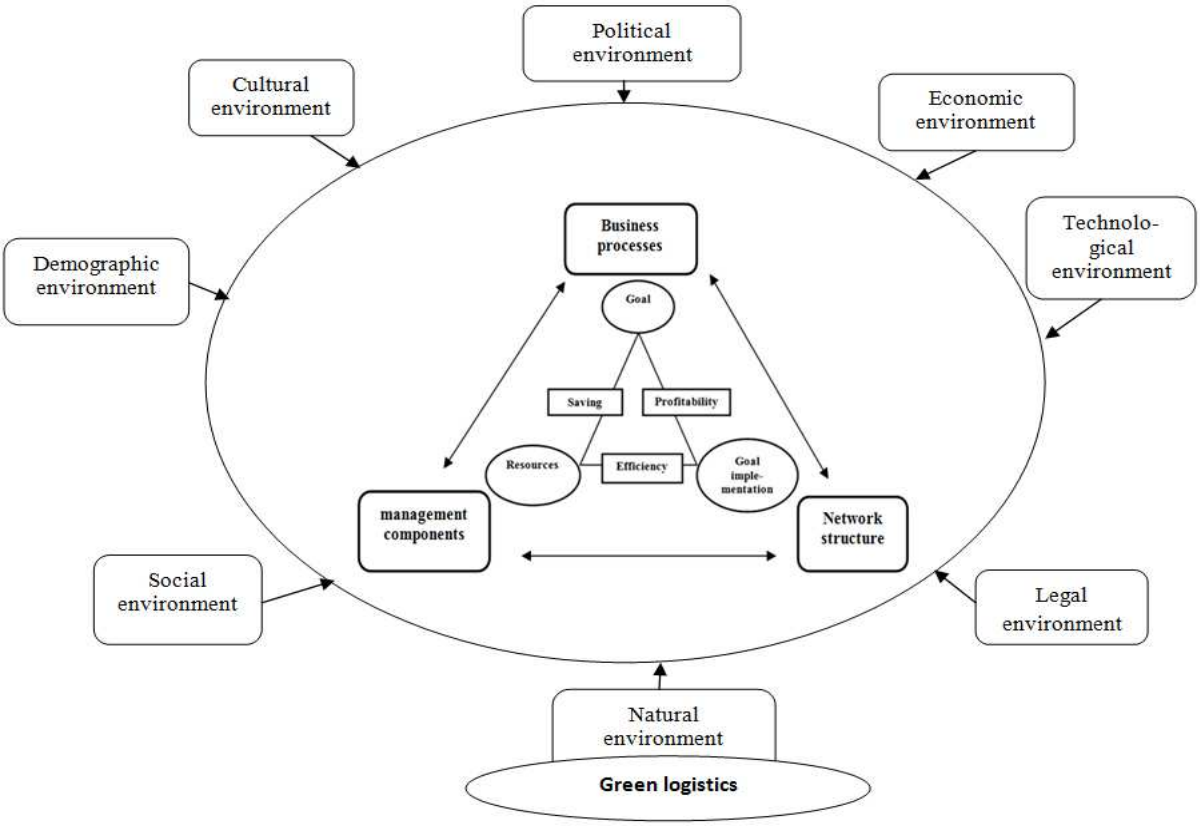

Figure 2. – Supply Chain Performance Based on Green Logistics

Source: own development based on [6.9]

Conclusion. The essence of efficient functioning of the supply chain conveys the interconnection of the main three elements – the structure of the supply chain, business processes occurring in the supply chain, and components of supply chain management. When determining and evaluating the effectiveness of supply chain management, it is necessary to consider such concepts as the efficiency and effectiveness of supply chains, and also take into account the influence of environmental factors on the external environment. An analysis of domestic and foreign literature shows that in the Republic of Belarus, as well as throughout the world, there is a steady tendency to increase interest in the application and development of "green" technologies. This confirms that "green logistics" as a scientific area is relevant in the modern world. It has both an environmental beneficial effect,

and both economic and social. Green logistics helps to identify and minimize the negative impact of logistics activities on the environment and increases the consumer value of products through the use of energy and resource-saving technologies in the implementation of logistics operations. This necessitates a detailed study and further development of the theoretical and practical provisions of supply chain management based on the principles of green logistics.

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