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ECOLOGICAL LOGISTICS: PROBLEMS OF FORMATIONS OF GREEN SUPPLY CHAIN

s. 103-118

ABSTRACT

The article discusses the key aspects of the concept of environmental logistics and its difference from "green logistics". It is proposed to consider green logistics for the logistic distribution and distribution function. The problems of the formation of green supply chains in logistics are considered. The environmental factors of influence on the formation of logistics routes are analyzed using the example of calculating carbon dioxide emissions by different modes of transport. The analysis of statistical material on carbon dioxide emissions into the atmosphere is carried out on the example of a comparison between Ukraine and Hungary (EU). The factors influencing the formation of green supply chains are substantiated

KEYWORDS

green logistics, ecological logistics, green supply chains, transport routes, the impact of carbon emissions on the choice of transport

Introduction

In recent years, the concept of ecological logistics has become widespread; this concept has gained particular popularity in the practice of enterprises the European Union. One of the stimulating factors for its development was the environmental legislation of the countries of the European Union. Ecological logistics involves the use of eco-technologies in functional areas of logistics aimed at overcoming or reducing the destructive impact of the results of logistics activities on the environment. The goal of ecological logistics is to harmonize the interests of the social and humanitarian, environmental, economic spheres and logistics activities. At the same time, the introduction of the concept of ecological logistics into the practical work of logistics enterprises should be accompanied by the development of comprehensive measures to minimize the damage to the environmental sphere in conjunction with a strategy to reduce logistics costs. In this context, the leading role is given to state regulation of the issues of integrated interaction and stimulation of eco-oriented logistics activities. As the experience of the European Union shows, in order to stimulate the implementation and development of the ecologic concept of logistics in the logistics of enterprises, the following tools are usually envisaged: improving ecological legislation; introduction of ecological standards; introduction of a system of penalties applicable to emitters of

harmful emissions; setting emission limits; introduction of a emissions trading system; encouraging the use of green technologies; efficient use of transport tax; restrictions on access to certain geographical areas for certain categories of transport; investing in the creation of an environmentally friendly transport and logistics infrastructure. When planning transport corridors passing through European countries, the requirements of ecological logistics are taken into account in international supply chains. These requirements become especially relevant when planning supply chains for multimodal transportation.

The aim of the study is to analyze the implementation of the concept of environmental („green”) logistics in the practice of enterprises of Ukraine in comparison with the EU. It should analyze to evaluation of transportation alternatives in planning routes in green supply chains.

It was used in the article a set of mutually complementary research methods, which include the following:

- a) theoretical: analysis, comparison, comparison, generalization, systematization; study and analysis of scientific literature on the research problem;
- b) empirical: experiment, economic analysis, methods of mathematical statistics.

The methodological basis of the research is mainly composed of the works of foreign and domestic researchers in this field, the main of which are the following: D. Rogers [12], R. Tibben-Lembke [12], J.-P. Rodrigue [11], L. Janbo [8], P. Murphy [9], P. Byrne [6], A. Deeb [6], M. Oklander [10], I. Koblyanskaya [3], etc.

D. Rogers and R. Tibben-Lembke understand green logistics as a set of actions to assess and minimize the environmental consequences of logistics activities [12]. In turn, J.-P. Rodrigue [11] gives the following interpretation of green logistics: „Environmentally sound and efficient transport distribution system.” In his interpretation, the concept of green logistics applies only to the transport distribution system.

L. Janbo in his scientific works already introduces the concept of ecological logistics and expands its scope, considering it as a process of integrated planning and management using innovative eco-design technologies substantiates in his works. He reveals the content of ecological logistics as follows: “A system of planning, design and management using advanced logistics technologies and ecological design methods in the field of pollution reduction and resource consumption, dictated by ecological principles. The main goal is the coordination of logistics activities and the socio-environmental effect” [8].

A. MacKion is a supporter of the study of an integrated approach and interprets ecological logistics as follows: “Science and a set of measures that ensure the movement of material during any production process, up to its transformation into goods and production waste, with subsequent bringing the waste to disposal or to safe storage in the environment, as well as the collection and sorting of consumption wastes, their transportation, disposal or safe storage in the environment”.

Ukrainian scientist I. Koblyanskaya gives the following definition of ecological logistics: «a type of logistics, the scientific and practical activity of which is aimed at taking into account environmental aspects at all stages of the movement of material and other associated flows in order to optimize resource consumption and minimize destructive ecological impacts» [3, c. 95].

Thus, in the existing scientific approaches, "green logistics" is interpreted in a narrow sense, in the context of the implementation of the marketing function of logistics. The concept of ecological logistics includes, in turn, all logistics functions and involves a through material flow. The authors of this study adhere to the broadest interpretation of ecological logistics, which includes taking into account the environmental factor at all stages of the logistics flow, subject to the basic rules of logistics and optimization of logistics costs.

At the same time, the term "green logistics" has a substantive use in the implementation of the marketing function of logistics, specifically for the sphere of transport logistics, since it considers and regulates the compliance of the process of transportation and distribution of goods with ecological aspects. Considering that the transportation process itself involves the involvement of such logical processes as the management of warehouse operations and the use of freight packaging, there is a need to expand the sphere of influence of "green logistics". In this regard, we mean green logistics as a scientific area that involves the use of advanced logistics technologies and modern equipment in order to minimize pollution and increase the efficiency of the use of logistics resources in the distribution of goods. The elements green logistics include: management of the transportation system (combined transport, 3PL-Logistics); management of freight packaging (packaging) in order to reduce the environmental impact of packaging materials; organization of green communications; storage and waste management. Therefore, in this study, aspects related to "green logistics" were analyzed, such as the management of the transportation system in terms of the effect of carbon dioxide emissions when choosing transport on the route and in the supply chain, and the issues of green communications in the supply chain were raised. These two areas of research play, in our opinion, a key role in the formation of green supply chains.

Result of the study. Green logistics - refers to all attempts to measure and minimize the environmental impact of logistics activities. In this work, will be describe and show the activity of green logistics, which it implies by practical examples. An analysis will be made of existing logistics, its "standard concepts" and green logistics. Also, all this will be described on the examples of Odessa city and Ukraine. The paper consist an analysis of the data associated with the release of carbon dioxide into the atmosphere. The concept of the "Green Supply Chain", factors affecting the use of green logistics in Ukraine will be disclosed. Also, the analysis of „green" projects in Ukraine will be made, and in practice, the concept of „Carbon footprint" will be considered.

Of course, when planning supply chains, the main role is played by the choice of transport and the availability of logistics infrastructure. At the same time, an analysis of the impact of various activities on the environment showed that it is transport that is the main pollutant of the atmosphere. Its share in the total volume of pollutant emissions into the atmosphere from stationary and mobile sources in Ukraine is about 40%, which is higher than the share of any of the industries. By type of transport, pollutant emissions are distributed as follows: 87% of the total emissions are from road transport, about 8% from the railway, 2% from the road complex, just over 1% from air transport and 2% from river and sea.

The impact of transport on ecosystems is expressed in the following areas:

- pollution of the atmosphere, water bodies and lands, changes in the chemical composition of soils and microflora, generation of industrial wastes, including toxic and

- radioactive, sludge, oil contaminated soil, boiler slag, ash and garbage;
- in the consumption of natural resources - atmospheric air, necessary for the flow of working processes in internal combustion engines (ICE) of vehicles;
- petroleum products and natural gas, which are the fuel for ICE;
- water for ICE cooling systems and vehicle washing, production and domestic needs of transport enterprises;
- land resources alienated for the construction of roads and railways, airports, pipelines, river and sea ports and other transport infrastructure facilities;
- in the release of heat into the environment during the operation of ICE and the fuel of combustion plants in transport industries;
- in creating high levels of noise and vibration;
- the possibility of intensifying adverse natural processes such as water erosion, waterlogging, the formation of mudflows, landslides, landslides;
- in injuries and deaths of people, animals, causing great material damage in accidents and disasters;
- in the destruction of soil and vegetation cover and a decrease in crop yields.

If we look at the dynamics, then in recent years in Ukraine there has been a tendency to reduce carbon dioxide emissions, both from stationary installations and from the transport side. As can be seen from Fig. 1., from 2000 to 2019, in Ukraine, carbon dioxide emissions decreased by 72.8%. This indicates a gradual transition to environmentally friendly sources of resources, including for vehicles. Another positive trend in Ukraine is the increase in capital investment in environmental protection, which has risen sharply since 2014, in the context of the ratification of the association agreement with the EU (Fig. 2.). Of course, these trends are positive, however, the question arises of how they are reflected in the practical work of transport enterprises in the planning of „green supply chains“. How are the technologies of „green logistics“ reflected in the economy of transport enterprises and the industry as a whole. It is also necessary to understand what economic effect will be observed from the introduction of green logistics technologies. Therefore, at the first stage of our study, we assessed the environmental friendliness of different modes of transport that are involved in supply chains in Ukraine.

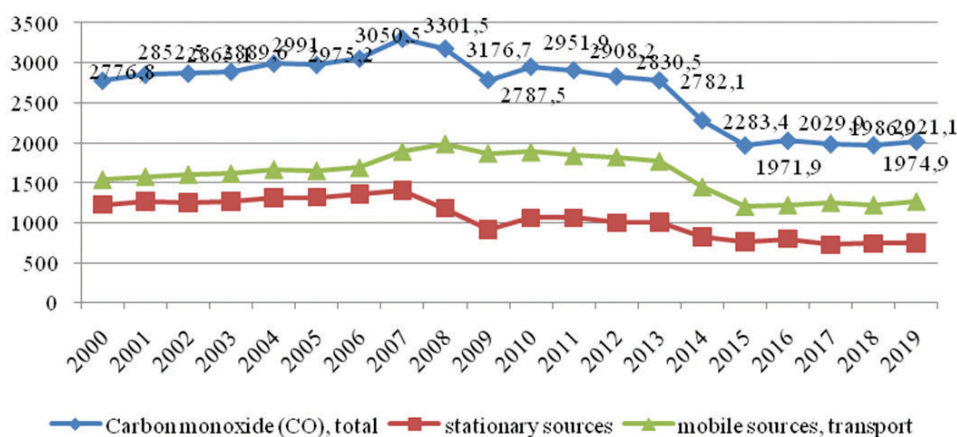


Fig. 1. The dynamics of the indicator of carbon dioxide emissions into the atmosphere in Ukraine for 2000-2019. [2]

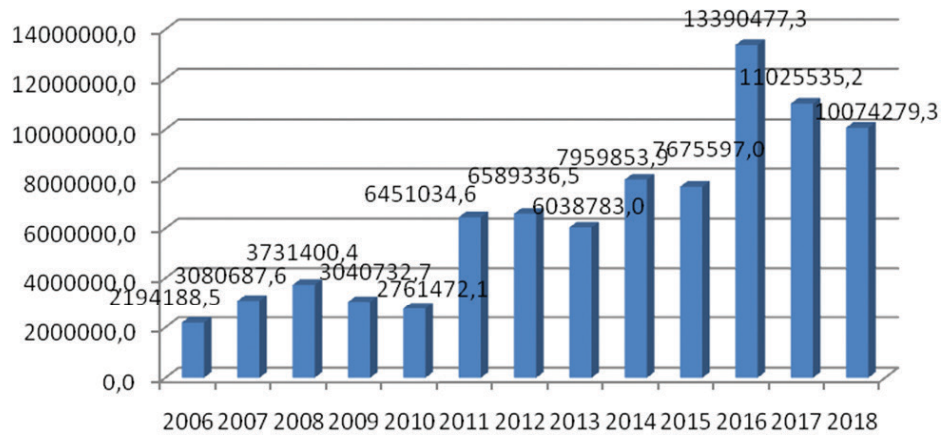


Fig.2. Capital investments for environmental protection in Ukraine for the period from 2006 to 2018 (tys. UAH.) [2]

The key elements of green logistics for supply chains are presented at Fig.3.



Fig.3. Green logistics elements for supply chains [by development of authors]

These most common five modes of transport are: railways, roadways, airways, waterways and pipelines.

I. Railways:

Merits:

1. Large carrying capacity;
2. It is economical;
3. It is all weather modes;
4. It has containerisation;
5. It links international markets;

Demerits:

1. Costlier over short distances;
2. Slower movement;
3. Inordinate delays;

II. Roadways:

Merits:

1. Economical over short distances;
2. Speedier movement;
3. Touching for-flung markets;
4. Lesser conditions of service;

Demerits:

1. Uneconomical over long distances;
2. It is fair weather friend;
3. Not suitable for bulk transport;

III. Airways:

Merits:

1. Fastest means of transport;
2. All weather friend;
3. Consumer satisfaction;
4. Reduced inventory holdings;

Demerits:

1. It is costlier means of transport;
2. Limited coverage;
3. Limited cargo capacity;

IV. Waterways:

Merits:

1. It is cheaper means of transport;
2. Most suitable for heavy and fragile products;
3. Loading and unloading facilities;
4. No problem of congestion;

Demerits:

1. Slow speed;
2. Unreliable;
3. Limited service;

V. Pipe-Lines:

Merits:

1. Economical;
2. Uninterrupted service;
3. No danger of wastage;
4. Underground;

Demerits:

1. Initial heavy investment;
2. Danger of enemy attacks:»

Summing up the results of all types of transportation, one common negative, serious line can be drawn. They are all **non-environmental**.

• Is it profitable for the supplier?

Probably yes. After all, as I wrote earlier, the goal of logistics is to choose the most optimal transport, and as little as possible the cost of resources for transportation.

• Is it profitable for the buyer?

Of course, yes. Indeed, probably each of us ordering goods on Alixpress or in another country, or even just on the Jofogas website (in another city) is waiting for him as quickly as possible and does not at all think about how much harm he does to the environment by his actions.

• Is it beneficial for humanity, the environment, our future and present? **No and one more time NO.**

If you take apart any of the modes of transport that we have provided on page 1, you can arrange them in type from the least ecological to the most ecological, but there is not one that would be safe for the environment. One could say that one of the most ecological transports is the train, because it travels due to electricity, but actually not. Trains that are used in Ukraine use electricity, but the sections along which they travel are classified according to several types, namely, electrified and non-electrified. The first trains carry electric locomotives using electricity, but the second (mainly long-distance trains) use diesel locomotives, and in some areas they even use coal.

As for the type of transport that causes enormous damage to the environment with CO₂ emissions - this is air transport. Just think, if there are about 100 people on board and 100 liters of kerosene are loaded on this plane, how much harm will it cause during its flight? We made calculations and calculated how many kilograms and what damage my flight inflicts from my city (Odessa) to Budapest, the so-called "Carbon footprint".

Based on this, we can say that the flight from Odessa to Budapest with an economy class passenger plane will cost the environment **0.12T of CO₂**. That is, a flight from Odessa to Budapest and back will cost us all **0.24T of CO₂** emissions. And if you think that this is not a big figure, then remember one more fact that flights take place dozens, hundreds of times a day. At different distances, with different passenger capacities, to different parts of the world. Thus, all this leads to global and irreversible changes in climate and the environment.

Another example - a flight from Odessa (Ukraine) to Washington (USA) will cost us **1.13T of CO₂**! In this case, we are not even talking about a kilogram but tons of carbon dioxide emissions into the atmosphere! And now we are not even talking about air transportation of goods that carry tons, but the usual flights of passenger airliners.

As for cars: Have you ever wondered how much harm your trip to work or to another city does? Consider this situation on a practical example, based on EU statistics:

1. The car 2018-2019 BMW M4 Series Coupe F82, for 1000 km of its work will cost **0.24T of CO₂**.
2. The car Alfa Romeo 159 series 2.2 JTS M6 2009, for 1000 km of its work will cost **0.2T of CO₂**.

An interesting fact - later in this work we will also offer alternative transportation options, but now more and more there are electric cars that do not use an internal combustion engine at all. Based on research by a group of scientists from the CESifo Institute for Economic Research in Munich: a Tesla Model 3, compared to a Mercedes C 220 d, emits 25% more CO₂. Tesla emits 159 grams of carbon dioxide per kilometer, and Mercedes in turn 117.

As for motorcycles:

1. A light motorcycle with an engine capacity of up to 125 cm³ per 1000 km will leave **0.08T of CO₂**.
2. An average motorcycle with an engine capacity of 125 to 500 cm³ per 1000 km will leave **0.10T of CO₂**.
3. A heavy motorcycle with an engine capacity of 500 cm³ per 1000 km will leave a trail weighing **0.10T of CO₂**.

As for the buses:

If you want to choose a trip to another country and do the least harm to nature, then of course it is worth choosing either a train or buses

1. If we calculate, then the distance on the bus is 1366 KM, namely such a distance from Odessa to Budapest, then we will leave a trace of **0.04T of CO₂**.
2. At the same time, if we drive the same distance inside the city, on an intra-city bus, we will get a track of **0.14T of CO₂**.

As for water transport:

1. Environmental pollution under the influence of water transport occurs through two main channels: this is pollution of the hydrosphere and atmosphere by operational waste and pollution (usually accidental) by toxic cargo.
2. Water transport is a powerful source of not only chemical pollution, but also physical impact on the environment. Including ships are a source of noise, various vibrations, the equipment located on them forms electromagnetic fields.

The main sources of pollution are marine engines and water used to wash cargo tanks, as well as ballast water. The engines of the ships emit the exhaust gases originally from the atmosphere, and from there toxic substances again fall into the waters of the hydrosphere. Most ships of the modern fleet are equipped with diesel engines. With the growth of transportation of oil products and bulk tonnage, more and more of these toxic substances began to fall into the ocean during accidents. The pollution appears to be maximum on the main sea routes of oil transportation, although accidents can occur in any water area. The waters of the Persian Gulf, the southern tip of Africa, the European seas, the North Atlantic, the coast of the USA and Japan are especially polluted. The situation in the Persian Gulf is particularly unfavorable, since almost two-thirds of the oil transported by sea begins here.

Summing up the section, based on our data, we can calculate what carbon footprint we reserve, these data will not be any exaggerated, I believe that many people live in such a rhythm and with such events in life. And so, imagine the situation:

1. We made two flights from Odessa to Budapest and back.
2. We drove 1000 km on a car brand BMW, M4 Series, Coupe F82, Automatic, 2014.
3. We drove 500 km on a motorcycle, with an average engine capacity of 125 to 500 cm³. And also, we left Odessa to Budapest by bus.
4. From Budapest we traveled 500 km by train within the country and then returned back to Odessa by train, while traveling a distance of 1855 km.

After our journey, we have the following results (It also includes the results of CO₂ emissions in Europe and the world, from 2018 to 2019):

1. My carbon footprint is **0.60 tons** per year
2. The average carbon footprint for residents of Ukraine is **5.020 tons** (from 2018.12.01-2019.12.01)
3. European Union average carbon footprint of around **6.4 tons**
4. The global carbon footprint is around **5 tons**

Visual illustration of the Carbon Footprint by the Fig.4.



Fig.4. Visual illustration of the Carbon Footprint

Based on the indicators, it can be noted that Ukraine is not in the best environmental situation and is rather damaging to the environment. But since the 1990s, CO₂ emissions in Ukraine (GREEN) have fallen to 800,000T to 196,000T, this can be seen on the graph, which will be shown below (Fig.5.). Also, Hungary (RED) will be added to the comparison.

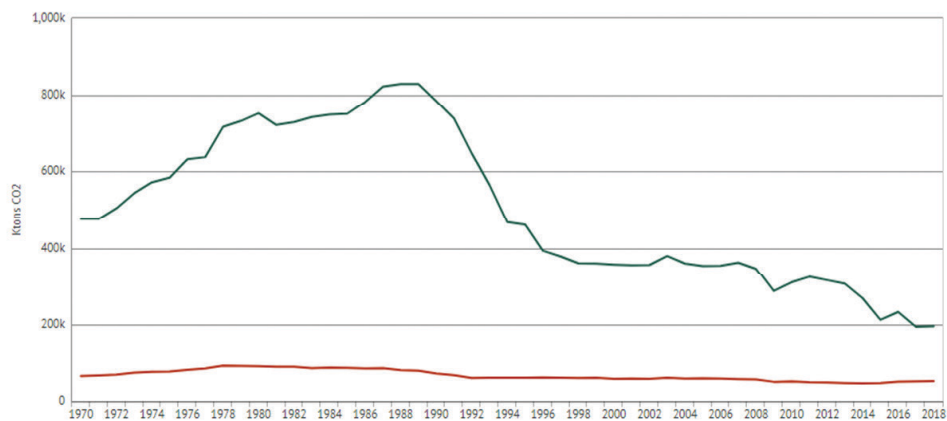


Fig. 5. Dynamics of CO₂ emissions in Ukraine (GREEN) and Hungary (RED) [2]

What alternative delivery option would we like to see in Ukraine? Moving away from the basics of standard “Logistics” and standard shipments, which are based only on profit. And this option is the green supply chain.

Green supply chain

The term sustainable or green supply chain refers to the idea of integrating sustainable environmental processes into the traditional supply chain. This can include processes such as supplier selection and purchasing material, product design, product manufacturing and assembling, distribution and end-of-life management. Instead of mitigating harmful impact of business and supply chain operations, green supply chain involves value addition and/or value creation through the operations of whole chain. Undeniably, reducing air, water and waste pollution is the main goal of green supply chain, while green operations also enhance firms' performance in terms of less waste manufacturing, reuse and recycling of products, reduction in manufacturing costs, greater efficiency of assets, positive image building, and greater customer satisfaction. Figure 6 displays a green supply chain of child's crib manufacturer as an example.

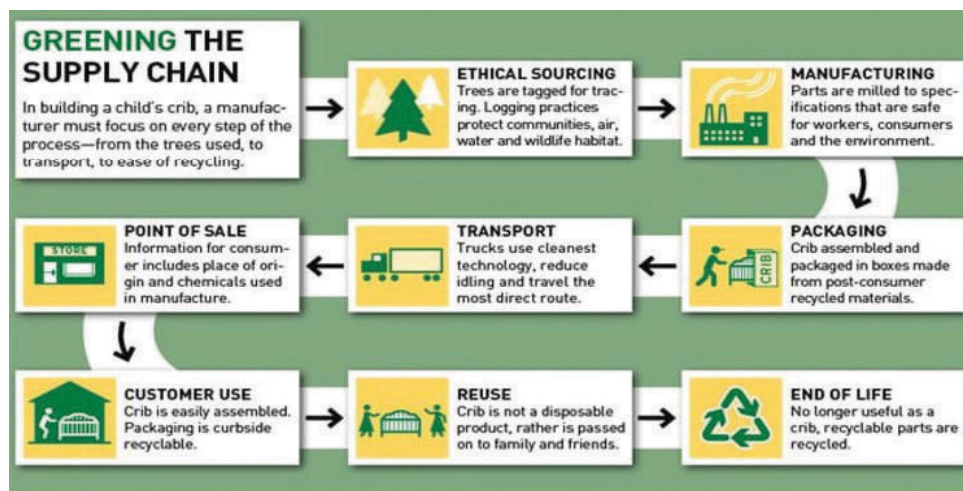


Fig. 6. Green supply chain of child's crib manufacturer.

The environmental principle means that green companies ensure that they do not harm the environment. from their activities, and that they actively support the implementation and use of environmentally friendly technologies.

It is important not only that the main company follows these principles; all their subcontractors and partners must also follow them so that the main company fulfills its goal of becoming a successful green enterprise.

The role of critical success factors in gscm

There is no doubt that green supply chain is a relatively new idea, which is gaining popularity so as to improve environmental performance in the whole chain. We have identified the following six key critical success factors for putting green supply chain management into practice to attain better environmental sustainability:

- Ethical leadership/internal management
- Customer management
- Supplier management
- Competitiveness
- Societal
- Regulatory

But speaking of GSCM, do not forget such a factor as, material, products that will be delivered in this chain.

Green material sourcing.

Green sourcing means sourcing or purchasing materials and components which have such enviable ecofriendly characteristics as reusability, recyclability and nonuse of hazardous/dangerous chemicals. With more and more concerns on environmental protection, procurement professionals have been motivated to reconsider their existing sourcing, purchasing strategy and their impact on environmental sustainability. The role of ecofriendly purchasing is the involvement of recycling and remanufacturing. Min and Galle further emphasized green sourcing supporting waste reduction enhances recycling and remanufacturing and other activities in supply chain. Carter and Rogers did a research to explore the impact of green sourcing on firms' environmental and financial performance. They concluded that owing to the successful adoption of green purchasing strategy, products' cost is reduced and environmental performance and financial performance of firms is increased with positive reputation obtained in the market. Zailani et al. Highlighted that ecofriendly purchasing has positive relationship with firms' operational and environmental performance. Yang et al. green purchasing was categorized into five main facets: design operation management, supply chain management, environmental authentication, ecological, and external environmental management. They confirmed that green purchasing improved to the overall firms' performance. The adoption of green purchasing in supply chain and business operations is a reliable tool in mitigating waste, air and water pollution.

But of course, the basis should be the essence of logistics, namely minimization of costs, as well as renewable energy and biofuels, which will not harm the environment.

Renewable energy and biofuels

Undeniably, global logistical and supply chain operations mainly depend on energy as well as fossil fuel, which are the main cause of climate change, global warming and pollution with greater carbon and greenhouse gas emissions. Renewable energy and biofuels are required in supply chain operations so as to obtain sustainable environmental and economic growth. Anable et al. highlight that logistics related activities consume greater energy to accomplish their task. Renewable energy and biofuels improve economic performance of firms and also reduce carbon emissions. In addition, fossil fuel is more expensive than biofuels and green energy sources. The strict governmental policies together with customer awareness build pressure on corporate sector to use biofuels and environmental friendly energy in their supply chain operations. The bioenergy mitigates the carbon emissions and also improves profitability of enterprises with better image and reputation building.

The cost minimization is considered as the most important factor for firms to implement green practices in their supply chain operations. The implementation of green supply chain initiatives would help to cut down the costs of packaging, components and materials due to use of reused, recycled and remanufactured products. Khan et al. highlighted that green practices provide opportunity to capture new markets and export to pro-environmental countries, while polluted firms are unable to export their products in pro-environmental countries such as USA, Germany, UK and Poland. Undeniably, green supply chain management practices have been a tool for firms

to decrease their products' cost, enhance profitability and increase market share. On the other hand, to improve social performance, firms also adopt green practices in their business activities. Social performance indicates improvement of people's quality life standard without compromising on environmental beauty. In addition, social performance includes the enhancement of firm image and the improvement of environmental sustainability, as well as reduction in environmental risks.

By adopting GSCM practices, firms may enhance their operational performance through improving products quality and improving delivery service. Green supply chain management initiatives also help organizations to improve their environmental performance such as reduction in carbon emissions, elimination of waste from end-to-end supply chain, effective and strong collaboration with suppliers would decrease their communication costs and easily promote reuse, recycling and remanufacturing. Environment management system (EMS) integrated into firms' manufacturing strategy will assist the firms to enhance its ecological performance.

As for my city and my country, I would like the authorities to pay attention to ecological transport, the environmental damage of which will be reduced to 0.

More and more in my city I see a large number of people using a bicycle, scooter, segway or electric scooters. Such modes of transport do not harm the environment, but for my city, roads are a big problem. We have very few streets with a separate lane for cycling. On the main roads, there are no such lanes at all, so this type of transport can be considered unsafe for life in my country, because the necessary conditions have not been created for it. Also do not forget about electric vehicles.

ELECTRIC VEHICLES

These environmentally friendly modes of transport have undeniable advantages:

1. Economical fuel consumption.
2. Minimizing air pollution.
3. Virtually silent operation.
4. Smooth acceleration with rapid acceleration.
5. High level of security, proven by numerous tests.
6. Loyal price tags. Their appearance was promoted by mass circulations of cars.
7. High reliability. It is achieved by reducing the number of components and nodes.

But also, this type of transport has its drawbacks, namely:

1. In Ukraine, a network of points for recharging electric cars is poorly developed.
2. Limits on speed and mileage. Many models without recharge are able to cover 160-240 km.
3. Charging Duration: 8-10 hours.
4. The presence of only two seats in the cabin.
5. Need to replace the battery. The periods are different: from 3 to 10 years.
6. In cold weather, the battery sits faster. As a result, mileage is reduced by 30-50%.

THE SITUATION IN UKRAINE

In our country today is not the highest demand for electric cars. The picture can change dramatically in the following situations:

1. The price tag of gasoline will increase 10 times.
2. The total cost of electric models will decrease.

The second point is really possible subject to a technological revolution. And today, many world grandees do not cease to modernize their models. And in the question, which transport is environmentally friendly and the most advanced, they point to their «offspring».

And every self-respecting concern intends to be represented in the electric car market in the next decade. In this direction, unfortunately, in my country there are no analog firms that would produce electric cars.

In the production of electric vehicles, our country loses to Japan, the UK, Sweden, the USA and other countries with powerful technical development.

As regards green logistics projects in Ukraine, today they practically do not exist. As an example from some projects, I can cite a call for cooperation between Meest and Ukraine. The international group of companies Meest offers Ukrainian companies to protect nature together, using the new additional service "4D: Environmentally Friendly Delivery". Delivery of items at the so-called "green tariff" will compensate for greenhouse gas emissions. Meest will send the money that comes from paying the "green tariff" to global environmental organizations to implement tree planting and ecosystem restoration projects in the Ukrainian Carpathians.

As part of the Green Logistics project, packages will be marked with the "4D: Environmentally Friendly Delivery" logo. When delivering a shipment marked in such a way, the Meest courier will definitely note that the sender is an environmentally responsible company. Information on the environmental focus of your company will also be reflected on Meest information resources, and the logos of the project partners will be posted on the information materials of the Green Logistics project events. We will certainly provide a report on the volume of CO₂ emissions that have arisen from your shipment. All funds raised for the Green Logistics service will be used for environmental projects through the Carbon Credit tool acquired on international special exchanges. These loans will be spent on projects selected by the company in Ukraine and the world, guaranteeing the most efficient absorption of carbon dioxide. Meest will direct these funds to forest restoration and protection programs in Ukraine and Canada.

Conclusions

It was considered the main aspects of ecological logistics and the problems of its application in green supply chains. It was assessed the environmental friendliness of various modes of transport to choose the type of transportation on the Odessa -Budapest route. It was estimated carbon dioxide emissions by each mode of transport on a given stretch of the route in the supply chain of goods from Ukraine to the European Union.

It was analyzed the factors influencing the choice of building a route in green supply chains, the main of which includes: high costs and low economic efficiency; inconsistency of the legislation of many countries with EU ecological standards; coordination of actions of all participants in the supply chain and transition to new environmentally friendly modes of transport and energy sources.

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ЭКОЛОГИЧЕСКАЯ ЛОГИСТИКА: ПРОБЛЕМЫ ФОРМИРОВАНИЯ ЗЕЛЕННЫХ ЦЕПЕЙ ПОСТАВОК

АННОТАЦИЯ

В статье рассмотрены ключевые аспекты концепции экологической логистики и ее отличие от «зеленой логистики». Предложено рассматривать зеленую логистику для логистической функции распределения и сбыта. Рассмотрены проблемы формирования зеленых цепей поставок в логистике. Проанализированы экологические факторы влияния на формирование логистических маршрутов на примере расчета выбросов углекислого газа разными видами транспорта. Проведен анализ статистического материала по выбросам углекислого газа в атмосферу на примере сравнения Украины и Венгрии (ЕС). Обоснованы факторы, влияющие на формирование зеленых цепей поставок.

КЛЮЧЕВЫЕ СЛОВА

зеленая логистика, экологическая логистика, зеленые цепи поставок, транспортные маршруты, влияние выбросов углекислого газа на выбор транспорта

LOGISTYKA EKOLOGICZNA: PROBLEMY Z TWORZENIEM ŁAŃCUCHÓW DOSTAW

STRESZCZENIE

Artykuł omawia kluczowe aspekty koncepcji logistyki środowiskowej i jej różnicę od „zielonej logistyki”. Proponuje się rozważenie zielonej logistyki dla funkcji logistycznej dystrybucji i dystrybucji. Uwzględniono problemy związane z tworzeniem zielonych łańcuchów dostaw w logistyce. Czynniki środowiskowe wpływające na tworzenie tras logistycznych są analizowane na przykładzie obliczania emisji dwutlenku węgla dla różnych środków transportu. Analiza materiału statystycznego dotyczącego emisji dwutlenku węgla do atmosfery jest przeprowadzana na przykładzie porównania między Ukrainą a Węgrami (UE). Czynniki wpływające na tworzenie zielonych łańcuchów dostaw są uzasadnione.

SŁOWA KLUCZOWE

zielona logistyka, logistyka środowiskowa, zielone łańcuchy dostaw, szlaki transportowe, wpływ emisji dwutlenku węgla na wybór transportu