

THE PROCESS OF ECOLOGIZATION IN TRANSPORTATION SEGMENT OF LOGISTICS

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Abstract Principal prerequisites for an increased focus upon environment in logistics business singled out. The environmental impact of the transportation process of logistics and the need for ecologization thereof analyzed. Practical aspects of ecologization of the transportation segment of logistics in business outlined.

Paper type: Research Paper

Published online: 29 January 2016

Vol. 6, No. 1, pp. 39-46

ISSN 2083-4942 (Print)

ISSN 2083-4950 (Online)

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Keywords: *ecologization, intermodal transportation, environment, polluting emissions, logistics operators*

1. INTRODUCTION

The contemporary meaning of the term “ecology” has a broader interpretation now. Environmental issues have increasingly been understood as issues of carrying on business in an environment-friendly manner rather than protecting the environment as such. The shift has come about primarily due to an unprecedented increase in the environmental load resulting from the expanding globalization processes, anthropogenic effect, and an intensified utilization of natural resources, which leads to increasingly dire environmental consequences. The process of problems and ideas of ecology penetrating other business dimensions having received the name “ecologization” has equally affected company logistics.

Ecology begins every day and is more of a commitment rather than innovation. Caring for ecology is rooted in the human instinct of self-preservation because an aggravating impact upon the environment may lead to catastrophic repercussions for succeeding generations of the human kind. Furthermore, ecology emerges at the level of statutory requirements set forth by the European Parliament directive which puts demands towards EU companies operating in the marketplace in the process of their attainment of sustainable development objectives. That is why ecologistics infiltrates ever new dimensions of companies’ business (Mitura, 2014, pp. 26-27).

2. PREREQUISITES AND NEED FOR ECOLOGIZATION OF TRANSPORTATION

In logistics systems, transportation process plays a key role for it is one the main links of the logistics chain. It is the processes of transportation that ensure movement of cargo from the supplier to the producer and from the producer to the ultimate consumer. Transportation is estimated to comprise up to 80% of all the logistics operations in a company’s logistics processes. The matter of applying appropriate transportation techniques comes up as critical, which techniques would be least onerous for the environment while also retaining their integrity and functionality (Zielaskiewicz, 2009, pp. 8-31).

In this sense, the question arises as to whether business objectives should be brought in line with the environmental ones along with the capabilities already in place to eliminate the conflict of the same. Clearly, companies with an “in-house” logistics have fewer capacities caused by weaker responsiveness and elasticity with respect to technical and technological support to the organization of transportation processes. Conversely, specialized logistics companies having transportation activity as their primary business and key competence possess a much greater potential to have their business and environmental objectives harmonized since they have a bigger choice with respect to formation of transportation technologies, particularly by means of consolidation/deconsolidation both through multimodality and

by employing other logistics processes like warehousing. The positive is certainly enormously facilitated by the logistics outsourcing trend.

Largely every logistics operator deals to a certain extent with reducing of the negative environmental impact of transportation seeking to obtain additional long-term competitive advantages, which is also conditioned by the rising fuel and lubricants prices amounting to 30 to 50% of the transportation costs, and on the other hand by the enforcement of ever more stringent legal commitments for reduced pollutant and gas emissions (Mitura, 2014, pp. 26-27).

The share of motor transportation in environmental pollution accounts for over 70%, and motor vehicles are accountable for the following percentage of the cumulative polluting emissions (Table 1) (Клименко, 2010).

Table 1 Content of Harmful Substances in Motor Vehicle Emissions

Substance	Motor Vehicle Emissions, %		
	Lorries	Passenger Cars	Buses
CO _m	42	56.8	1.2
C _n H _m	52	46.2	1.8
NO _m	47	51.6	1.4

Most of the advantages to the logistics chain are linked to motor transport, which is exactly the reason for its growing share in the volume of transportations. However, this mode of transportation has the worst environmental performance indicator. Certain types of transport – given their technical and technological backgrounds – exert varying degrees of the negative environmental impact.

For this very reason the EU started elaborating the demanding standards towards ecologization of motor transportation which on one hand is the biggest pollutant of the environment (climate change, greenhouse effect, destruction of the ozone layer etc.), being on the other an integral part of the logistics system. The environmental standards and their development for the purpose of harmonizing the Ukrainian standards with the EU ones given the ten year lag are listed in Table 2 (Zielaskiewicz, 2009, pp. 8-31).

It is traditionally believed that minimizing the negative environmental impact of the logistics process of transportation is feasible by means of the following types of solutions:

- based on tackling of the transportation tasks: choosing the best option for logistical movement of commodities between the destinations with all realistic capabilities in mind. Using the transportation tasks technique cuts transportation costs by 10 to 30%. To cut fuel costs and reduce polluting atmospheric emissions, it is advisable to use the task of minimizing the route length (Гридід, 2008);
- equipping motor vehicles with efficient emission control systems and devices (exhaust filters, catalyst reduction);

- designing new types of vehicle engines which would have an improved efficiency performance;
- designing new types of environmentally clean motor transport which would be powered by alternative energy sources (Білявський, 2005).

Table 2 Environmental Standards of EU and Ukraine in Motor Transportation Industry

Environmental Motor Standard	Introduction Date		Indicator, g/kW			
			CO _m	C _n H _m	NO _m	Particulate Matter
	in EU	in Ukraine				
1	2	3	4	5	6	7
Euro – 1	01.07.1992	-	4.5	1.1	8.0	0.36
Euro – 2	01.01.1995	01.01.2006	4.0	1.1	7.0	0.15
Euro – 3	01.10.2000	01.01.2012	2.1	0.66	5.0	0.1
Euro – 4	01.10.2005	01.01.2014	1.5	0.46	3.5	0.02
Euro – 5	2008	2016	1.5	0.46	2.0	0.02
Euro – 6	01.01.2014	2018	1.2	0.32	1.5	0.01
EEY			-	0.25	-	-

Note. EEY is the highest environmental standard applied in the EU, which is fully met by natural gas-powered light trucks. The scheduled introduction date for the standard is highlighted in bold.

The latter three kinds of solution are money- and time-consuming, which makes them problematic from the operational perspective. A more lenient kind of solutions are operational solutions associated with the application of the transportation task technique; however, the practical implementation of the same often faces considerable obstacles. A much greater potential lies with the use of “smart” – or intellectual – solutions at the strategic level. It is primarily about restructuring the transportation processes towards the use of multimodal transport technologies, and about restructuring logistics processes in favor of increasing the share of other logistics processes like warehousing.

For instance, even though the use of two types of transport instead of a mono-motor type may lead to hiking costs and an increased time consumption due to additional expenses for the loading/unloading, consolidation/deconsolidation etc., it will also lead to a reduced environmental load by virtue of the smaller share of motor transport, which will further ensure a balanced development of certain modes of transport. Should that involve not only restructuring in the transportation segment, but also restructuring of the entire segment of the logistics activity, then the solutions would refer to a full-fledged substitution of transportation processes with other logistics processes, particularly with those being the case in the scenario of intermediate warehousing as opposed to direct supplies. Notably, both the first and the second type of comprehensive solutions are accessible

to mostly major logistics operators whose businesses are not limited in space or time or volume or quality of logistics services.

3. PRACTICAL ASPECTS OF ECOLOGIZATION IN TRANSPORT SEGMENT

The issues of why be 'eco' and what has to be done to minimize the adverse environmental impact are being tackled on a daily basis by representatives of logistics companies by way of investing into pro-environmental projects.

Logistics operator Dachser has been investing into pro-environmental solutions even though doing so often takes extra financial costs. Nevertheless in the long run, alongside the attained benefits, this results in lower maintenance costs. Thanks to information technologies, the company's auto fleet is planned to be used in the way that the CO₂ emission footprint per single transportation is the lowest. Furthermore, the information technologies allow to efficiently combine transport so that a limited number of motor vehicles is used. Thanks to a far-reaching international branch network, transportations are combined at every stage of the supply chain (Jurchak, 2014, pp. 22-25).

In the logistics market, solutions emerge with ever increasing frequency, which solutions may not directly lower the polluting emission level but which solutions affect the people's environmental awareness. An example of the solution is the GoGreen project of logistics operator DHL, a system that controls CO₂ emissions and generates carbon reports reflecting comparisons of polluting emissions as the key element that comes out of the logistics sphere. The program features the Trace&Track function that enables the customer to get registered in the system, input the transportation number and obtain information about the polluting emissions in the course of the transportation (Jurchak, 2014, pp. 22-25).

Poland has over 200,000 motor vehicles carrying out 89% of commodity transportations registered. Thus raising environmental efficiency in this sphere is critical. Managing means and transport in a prudent and efficient manner contributes to lowering CO₂ emissions. Logistics operator DBSchenkerLogistics is committed to the principle of loading its motor vehicles to the capacity because the more commodities are loaded the fewer trucks are on the road. For instance, loading postal vehicles to capacity resulted in their number on the road coming down by 4,500. Environment-wise, it is 340,000 liters less fuel and a 1,100 tons smaller CO₂ emission footprint. Furthermore, DBSchenkerLogistics' new terminals are designed with environmental solutions in mind: energy efficiency, CO₂ emission reduction, efficient water and thermal resources management (Jurchak, 2014, pp. 22-25).

Logistics trucker FM Logistic in March 2012 launched the GreenFreightEurope initiative involving computation, gathering, analyzing, and monitoring data on CO₂ emissions by freight transport. Its purpose is to improve transport's environmental

compatibility in Europe; it is an independent and optional program which is based on a similar U.S. initiative intensifying co-operation among freight forwarders, suppliers of logistics services and the government. The brand new project in the sphere of pro-environmental solutions is the eco vehicle fleet. Vehicles servicing pharmaceutical industry have natural gas equipment built in to reduce carbon dioxide emissions. Lately, FM Logisitc has joined the ULTRAECO project that was launched under the EU's Horizon 2020 initiative aimed at reducing transport load in large urban communities (Jurcuk, 2014, pp. 22-25).

A group of logistics carriers, Raben, is replacing its truck fleet with new vehicles in order to reduce polluting atmospheric emissions and enable the drivers to use the eco driving system. Intermodal transportations are also in use to opt for a more environmentally friendly transport type (Jurcuk, 2014, pp. 22-25).

Swiss-based GreenCargo logistics supplier may be named an example of intermodal transportations. GreenCargo is primarily positioned as a clean alternative to long-haul trucking of freight. The GreenCargo firm offers its customers the option of having their cargoes transported over railroad for most of the distance with a further switch at the end of the road to trucking to get the cargo delivered to its destination. A flexible service like that prompts numerous customers to transition to railroad transportations (Чеклов, 2014, pp. 43-45).

The above best practices by the leading logistics operators show possible ways to not only lower the environmental load level of the logistics process of transportation, but also to attain objectives of the sustainable development concepts along with other EU initiatives, will bring economic benefits to the companies together with stable and lasting positions in the European marketplace.

The authors believe that the process of ecologization of transportation industry may benefit from a relevant Ukrainian national policy amidst the EU policy. This refers to state support of the development of intermodal transportation technologies; to the support of the development of a chain of logistics centers; to harmonization of standards; to the support of intermodal transportation research projects necessary thereto.

In the EU, the key tool for financial support of such projects is exemplified by Marco Polo, a project which purpose is to aggressively reduce road traffic and to lower the aggravating environmental impact of transport while concurrently enhancing efficiency of transportation systems and their balance. The project targets assistance to transportation and logistics companies in the realization of transport investments with a dedicated budget of 100 million euros. The money was used to finance the three sectors (Миндур, 2011, pp. 425-427):

- measures to move the entire load volume from motor transport to railroad, river or sea transport;
- innovations for quality structural changes in the attempts to manage transportation;
- measures to promote knowledge in transportation, logistics and modern mechanisms of collaboration among transportation market players within the EU.

Within the scope of developing intermodal transportation research projects, first of all it is necessary to conduct research of the macro-level trends and correlations between the GDP dynamics and cargo transportations using a so-called load capacity indicator for motor transportation and its movement speed. Because in these directions a business is able to significantly influence the environment by reducing the transportation costs and time per one product item. Thus we suggest the following mechanism be used to lower the negative environmental impact of transportation (Table 3).

Table 3 Mechanism for lowering negative environmental impact of transportation

	State	Businesses	Logistics services market
Player	1. Logistics infrastructure (logistics centers) 2. Harmonization of standards 3. Research projects	1. Sustainable development concept 2. Outsourcing 3. Marketing 3.0 (marketing of values)	1. Raising the level of vehicles transportation capacity 2. Increasing the cargo movement speed 3. Using transportation tasks to improve cargo transportation route
Directions		<ul style="list-style-type: none"> - logistics outsourcing; - multimodal technologies; - intermodal transportations; - substitution of transportation services with other logistics services.	
Criterion	Total costs model (economic + environmental)		
Macro assessment	GDP transportation capacity (UAH in thousands/kilometers in thousands) $T_{GDP} = \text{GDP}/V \times L \rightarrow \min$ where GDP is the gross domestic product, UAH in thousands; V – vehicle cargo capacity, tons; L – transportation distance, kilometers.		

The indicator T_{GDP} defines the level of a country's GDP transportation capacity and is computed as the ratio of the GDP to the cargo capacity of the transportations and the transportation distance. The value of the indicator has to tend to a minimum, which will signal about the maximum load of the vehicle and long-haul transportation. That said the GDP index has to be growing due to pursuit of an active business in the country and outside.

4. CONCLUSION

The logistics process of transportation is one of the biggest atmospheric pollutants, and its environmental impact translates mainly into emissions of harmful

substances with exhaust gases into the atmosphere. Amidst environmental degradation and growing scopes of globalization of company businesses, the need arises for ecologization of logistics, specifically of one of the most environmentally onerous processes, transportation.

Despite the fact that company's transportation processes maintain their adverse effect upon the environment, technological development creates new possibilities for curbing the negative impact. The positive ecologization experience in the transportation segment of logistics by leading EU logistics operators once again proves the necessity and feasibility of implementing the innovations with the long-term perspective of a successful operation in the market and ensuring the environmental quality for future generations.

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BIOGRAPHICAL NOTES

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