

## ENVIRONMENT AND LOGISTICS: IMPACTS AND TRENDS

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**Abstract:** *Globalization, urbanization, shorter lifespan of the users, increased ecological awareness, development of new technologies, infrastructural development and other factors which increase complexity of logistics activities and which increase the importance of logistics. Changes in the environment are becoming more intense and are increasing the meaning of pleasing the end user, safety and security in logistics processes, decreasing expenses and adding new technologies. The review of political, law, economical, technological, socio-cultural and ecological impacts on logistics and the changes in the environment is given in this paper. Some of the most significant trends which are the consequence of environmental and market changes are shown.*

**Keywords:** *logistics, environment, influences, trends.*

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### 1. INTRODUCTION

Changes that happen on the market in modern terms of management affect logistics greatly. They cannot be watched separately from changes in the environment because they have strong interaction. Changes which are caused by political, economical, law technological, cultural or ecological factors influence planning and realization of logistics' activities.

Trends that appear due to these impacts and that are dominant on the market are outsourcing, e-trade, off/on soaring, logistics postponement, multimodality, intermodality and city logistics. In order to make adjustments and assure competitive lead on the market, the companies have to answer quickly to demands, so for now, flexibility and agility of companies are gaining in importance.

### 2. IMPACTS

To observe all factors that affect logistics' processes is of great importance. However, not all factors have the same impact on logistics and not all factors are dominant in every market. In further work is given the view of factors that have the biggest impact on logistics globally.

#### 2.1 Political

*Deregulation of transport on the level of EU (European Union).* With the improvement of institutional limits of transport in EU, it comes to strengthening of competition inside and in-between of ways of transport which would increase the efficiency of the transport in general.

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Right now, level of deregulation varies according to the way of transport. Deregulation on logistics market would make redistribution of transport work and improvement of the service level in freight transport, while the increase of competition would lead to the change of performances of freight transport system (utilization of the train park, quality/reliability of services, time of realization) (EC, 2015).

*Privatization of the railway.* The goal of railway deregulation is greater usage, the improvement of attractiveness and competitiveness and quality of railway transport services by liberalization of national and EU markets. International railway market inside EU has been deregulated since 2007, but there are still some differences between countries. The opening of the national and EU market in the field of transport integrates the networks all around the Europe and with that it decreases the time of travel and the costs of transport and it has positive influence on the environment and health of people. Sequel of liberalization and the increase of competition in rail freight traffic will have positive influence on logistics. Services in railway transport will be more flexible and prices will be lower which could significantly affect the increase of technological involvement of intermodal transport.

*The environment.* The politics are trying to decrease the pollution and to affect the behavior of customers by encouraging the industry to choose low-energy products and by using renewable sources of energy (Energy Tax Directive 2003/96/EC67) whose goal is to efficiently use the energy and to enable states which are members to offer companies tax reliefs in order to reduce harmful gas emissions. Energy Tax Directive negatively influences logistics because it raises prices of transport services (EC, 2015). However, externalization of transport expenses can have multiple positive effects on long-terms. Putting costs of negative influence on the environment into price of transport increases competition of ecologically acceptable means of transport and greater usage of intermodal transport technologies. In this way total price of realization of logistics' chains doesn't have to be bigger, it will just come to the change of the chain structure (Tadić & Zečević, 2016).

*Infrastructural development.* Giving the fact that the development of the transport infrastructure is key prerequisite to increase flexibility of the supply chain, EU's goal is to develop TEN-T main network which includes main corridors and terminals of various means of transport. The development of this network provides total coverage of EU and accessibility to all regions, which provides more acceptable redistribution of transport work between means of transport and more efficient realization of commodity costs. (EC, 2015)

*Trade restrictions.* With liberalization up to speed and growth of global trade, complicated administrative procedures slow down the realization of costs and are becoming bigger problem of logistics chains. With the proliferation of the supply chains, the increase of production and retail processes, barriers in trade will become problem because of increased importance of products that keep losing their value for the end user. Administrative procedures in import and export in some parts of the route, testing certifications of products delay time of delivery, which is a great problem of logistics sector. (EC, 2015) In the future, we can expect different scenarios- from further growth of liberalization and global trade to regionalization and protectionism (Tadić et al., 2013).

## 2.2 Law

With the increase of global trade, consumer society and changes in customers' demands, it comes to starting a large number of road freight vehicles. In order to increase reliability of the chain supply and safety and security of the driver during driving comes to social regulation. Daily period of driving is included by various regulations, total driving time and weekly and daily resting period during driving. Regulations are referred to freight vehicles in terms of construction, equipment, minimum and maximum of the usual allowed weight and dimensions, including cross-border transport (EC, 2015). EU directives, whose goal is to increase safety and

security in road transport bring additional costs to directive implementation, equipment, driver's training and similar.

### **2.3 Economical**

Countries of EU have partly recovered after global economic crises. The differences in the view of economical activities will equalize between the members of EU in the near future, which will have impact on the type of product that end users consume and by that on logistics sector, too. (EC, 2015) With globalization and making unique market comes to strengthening service sector over production sector which brings to separation and departure of the place of the production and consumption and increase of requests for logistics services. In these conditions, the existence of logistics providers depends on the quality of services. (Tadić & Zečević, 2016) In direction of globalization and economical increase, change of power on financial market is based on dislocation of economical powers and power on economical market (from west to east markets). In the future the sequel of economical activities globalization is expected and the increase of international market efficiency through the increase of intermodality. What could bring to losing capital of logistics companies are stricter conditions of risk evaluation by insurance companies, and because of more extreme weather conditions, which are considered to often interrupt the supply chains and make their planning more difficult (Tadić et al., 2013).

### **2.4 Technological**

*New vehicle technologies.* Due to bigger climate changes and increased awareness of environmental pollution, vehicles that are better for the environment are developed. Energy efficient vehicles are developed in order to decrease the usage of energy, CO<sub>2</sub> and other pollutants, and vehicles with implemented SCR (Selective Catalytic Reduction) technologies in diesel motors. In order to decrease pollution of the air some hybrid diesel electric motors are developed. When it comes to usage of energy and fuel, the design of the vehicle is very important. In that sense, some heavier or longer vehicles are developed, vehicles with improved aerodynamics and regenerative brake system. The development of new vehicle technologies brings to bigger demand for skilled workforce and to larger training costs (EC, 2015). Infrastructural development and standardization of road traffic, railways and waterways are helping the development of new technologies. Improved vehicle and infrastructural technologies lead to greater initial investments and bigger fixed costs but on the other hand, it decreases the time of realization, decreases stop time during unexpected slowdown, increases flexibility and reliability and it decreases the pollution.

*3D printers.* With the development of 3D printers for home use it comes to personalization of production and change of demands. Individual production and consumption forms will bring to increase of regional trade provide that only data and goods circulation would be done on global level. Market success in these conditions will have only companies which place popular data sets, which supply with goods, produce 3D printers and offer support services like recycling servicing and consulting. Due to personalized production, the increase of total consumption and goods is predicted (Tadić et al., 2013), just like the increase of demands for home delivery and logistics recurrent costs on logistics level (Tadić & Zečević, 2016).

### **2.5 Socio-cultural**

The increase of population in urban areas is projected from 3.6 billion in 2011 to 6.3 billion in 2050 (UN, 2012). Rapid urbanization leads to bigger demands for goods in urban areas which, as a consequence, have starting larger number of vehicles and standstill on roads, which negatively influences life conditions, mobility and the environment (Tadić & Zečević, 2016). Aside from rapid urbanization, it comes to accelerated aging of population. The participation of old people (65 years and more) is predicted about 29.9% by 2050 year in EU25 (CEMR, 2006). From the

logistics aspect, it comes to organization problems and realization of goods costs due to larger number of home deliveries, the increase of buying in local stores, larger number of delivery vehicles and mileage. All of this negatively influences the environment and the living standard in the city. In order to decrease negative influences which are caused by a large number of home deliveries, stations for delivering and taking goods should be developed.

## 2.6 Ecological

Due to greater need for fast and reliable logistics service it comes to the increase of bad influences which are initiated by freight transport (Tadić et al., 2013). By some researches, global concentration of CO<sub>2</sub> has reached the level of 405.75 ppm with growing trend of 2 ppm per year (ESRL, 2017). The lack of fossil fuels leads to increase of energy costs for production and logistics and development of alternative energy sources which also generate certain costs. Advantages for vehicles with alternative drive, in the sense of taxes, will have positive impact on logistics which could result in larger share of hybrid vehicles. Reduction of the fuel use with the help of streamlined trucks for greater distances in road transport will have very important economical and ecological contribute (EC, 2015).

## 3. TRENDS

With the growth of the number of factors which affect logistics activities, the number of logistics trends is growing. Full review of trends which were the most dominant in the literature is given in the further text.

*Outsourcing.* Number and competition of outsourcing companies and providers of logistics services is increasing rapidly. Rapid increase of organizations which have decided to outsource some of their logistics functions has started in the early nineties (Srabotič & Ruzzier, 2012), besides that, globalization and liberalization of the market lead to greater specialization and growth of outsourcing (Tadić et al., 2013). In terms of individualization of production and the growth of consumer society, companies that focus on their main activity, quality of the product and satisfaction of the customer generally, with the help of outsourcing, will have more success.

*E-commerce.* Growth of consumer society leads to the growth and need for larger assortment of products which, on the other hand, causes certain problems in logistics. With the development of e-trade, the demands for frequent, fast, exact and reliable deliveries of smaller quantity grow (Tadić et al., 2013), and because of increased environmental pollution logistics activities should be organized in ecologically acceptable manner. Companies have to make certain CRM (Customer Relationship Management) in order to follow shopping habits of end users and decrease of level of stochastic demands and more reliable predictions.

*Off/On/Shoring.* Changes in economy have brought in question the decisions about locations of production and places of providing services. Great companies take their business activities back to domestic market. By transferring from offshore to onshore production it is possible to make positive financial effects, better managing the product and storage capacity (Tate et al., 2014), greater flexibility through logistics postponement (De Treville & Trigeorgis, 2010), decrease of the risk of breaking the supply chains due to errors in the product quality and theft of intellectual property which are more common on offshore locations (Ellram et al., 2013; Zimmerman, 2013) and marketing advantages (Robinson, 2015). The advantage of offshore locations are lower costs of manpower (especially regions in Asia) (EC, 2015), but because of a trend of paycheck equalization among different locations (Li at al., 2012; Tate et al., 2014) we could expect many companies to question their decisions about off shoring and to return or start onshore production.

*Logistics postponement.* In market conditions where pleasing the end user but also decreasing the supplies which represent opportunity cost to the companies are becoming more and more

important, making the right decisions on various levels of managing is becoming bigger problem. Logistics postponement strategy can reduce the disagreement between predicted production and real demands, decreasing in that way Bullwhip effect in supply chains (Wong et al., 2010). However, using this strategy can cause problems about the level of supplies in the storage and about type of the product which is in the storage (semi-finished or finished product) which represents the biggest dilemma about its usage (Quin, 2011). Still, with the increase of individualization of production and participation of track expenses, we could expect the increase of use of this strategy, partly because it allows the use of intermodality, increase of end user's pleasure and decrease of costs of delivery and of keeping stocks.

*Multimodality/Intermodality.* Pollution problem getting bigger, fuel prices getting higher, traffic congestion-due to all this, we need new solutions for freight transport. Successful realization of activities in local and global supply chains demands the development of integrated multimodal and intermodal network. What can limit the growth of intermodality is its complex nature and the lack of efficient and effective informational connection among various means of transport. Latest discoveries on ITC field, like cloud computing, social networks and wireless communication have changed the way of sharing information and the structure of the supply chain in a revolutionary way, thus enabled the development of intermodality (Harris et al., 2013).

*City logistics.* During the last decade, the realization of logistics activities of delivery/collecting goods has become important factor of sustenance of urban environment (Morfoulaki et al., 2015). With urbanization and population aging, e-trade development growth and mulching of trade ways, apropos moving great number of road vehicles which makes great problems in chain realization. In order to define sustainable solutions of city logistics, all the activities have to be looked at, all means of transport technology, all the participants and all freight ways, but also all characteristics of urban area (Tadić & Zečević, 2016).

### **3. CONCLUSION**

In the last couple of years it has come to some great changes when it comes to logistics' companies business. Companies that want to be on the competitive market have to follow new trends that are showing up and that become because of various environmental factors. Each company has to choose the right business strategy which is in terms with its business policy and goals. Will some trend be applied in a specific case depends on costs, incomes, available technologies, its positive or negative influence on the environment and on all participants in the supply chain. Trends have to be followed by efficient flow of information, and also informational and communicational technologies which support them so that supply chains could take place without interrupting and in conditions to needs of the company and end users.

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