LOGISTICS MEGATRENDS AND THEIR INFLUENCE ON SUPPLY CHAINS

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Abstract

Term 'megatrend' is being defined in logistics as a significant transformation in functioning of logistics business entities, reorganisation of their general activities and operations on competitive market. It is a new phenomenon which has not only local but also global range and has a potential to play a major role in the future societies, including logistics activities. The most important megatrends are: transformations in logistics models (placement of business centres in Asia, Africa and Eastern Europe), growing influence of modern, innovative and intelligent technologies, increasing concern about natural environment (necessity of sustainable development in building business strategies), changes inside corporations, significant demographic changes (an ageing population concerning in particular heavily industrialized countries), global competition (e-trade and e-purchasing development, mobile services expansion) and various cultural transformations. All of them directly influence functioning of supply chains which become more multidimensional and complex but still adapted to changing business environment.

The aim of the paper is to indicate the changes in supply chains which occurred as a result of logistics megatrends. The objective is to be achieved through comparing own surveys data, carried out in 2012 and 2017. The studies were conducted on a group of 120 people - managers in manufacturing companies responsible for supply chains.

Key words: megatrends, supply chain, intelligence

1. INTRODUCTION

Supply Chain (SC) has firstly appeared in the literature more than thirty years ago when Oliver and Webber proposed the first definition for the management of such systems (Oliver &Webber, 1982, p. 63-75). The SC is a concept of closely coordinated, cooperative networks, competing with other networks (Christopher, 2005). The focus is on managing processes that engage other companies as partners in managed relationships to perform the activities necessary to fulfil the process (Bielecki & Szymonik, 2014; Bielecki & Galińska, 2017, p. 93-107). It is propelled by the realization that no organization can be good at all things, and by the expanding

reach and ease of access to information and communication technology. This perspective is necessary not only for growth but survival in the struggle for each markets (local, regional, national, international or global). No company alone can accomplish the complete process of meeting the demands of the market in the face of intense competition, rapidly changing technologies and evolving customer requirements (Skjøtt-Larsen et al., 2007, p. 17). SCs, in its classical form – forward supply chain, are viewed as a combination of processes aimed at fulfilling customers' requests, that include all possible network entities such as suppliers, manufacturers, transporters, warehouses, retailers and customers, whose main purpose is the customer´s satisfaction at a minimum cost (Simchi-Levi et al., 2003; Simchi-Levi et al., 2007). However, such a purpose has enlarged over time, and SCs have been expanding their activities towards the goal of integrating not only economic, but also environmental and other aspects (Barbosa-Póvoa et al., 2018, p. 399-431).

SCs transformations are mainly influenced by megatrends which are economic, social, political and cultural trends resulting from the civilisation development. They have an impact on societies in the country and abroad, on other continents, covering whole globe and defining the main objectives and goals for humanity development.

The most important megatrends are: transformations in logistics models (location of business centres in Asia, Africa and Eastern Europe), growing influence of modern, innovative and intelligent technologies, increasing concern about natural environment (necessity of sustainable development in building business strategies), changes inside corporations, significant demographic changes (an ageing population concerning in particular heavily industrialized countries), global competition (e-trade and e-purchasing development, mobile services expansion) and various cultural transformations. All of them directly influence functioning of SCs which become more multidimensional and complex but still able to adapt to changing business environment.

The aim of the paper is to indicate the changes in SCs which occurred as a result of logistics megatrends. The objective is to be achieved through comparing own surveys data, carried out in 2012 and 2017. The studies were conducted on a group of 120 people - managers in manufacturing companies responsible for SCs. This paper is playing a role of introduction to the series of articles dedicated to the issue of Intelligence and intelligent solutions in SCs.

The paper is divided into 6 sections. The first one contains definition of SC and description of the most significant megatrends in logistics which have influence on SCs. The second section is focused on the most important megatrends which influence logistics areas such as SCs. The third one presents methodology and the scope of empirical research enabling objective of the studies. Also, the characteristics of the study data is provided. The fourth section contains results of the research and similarities/differences in SCs functioning resulted from megatrends. The final conclusions are presented in the fifth section of the paper. The paper is supplemented by a list of references (6. section).

2. TREND VERSUS MEGATREND

Trend is a statistical term which refers to the direction of global changes in the future (Hillman, 2007, p. 907). In simple terms, trend indicates the course of action which will ensure integrity and balanced development in particular sectors of economy (Pradel & Aretz, 2008, p. 230).

Trends form the way of development for many different fields, being the monotone component varying according to the investigated moment of time. It is a process of transformation presented from economic, psychological or sociological perspective which can be short-, medium- or long- term phenomenon of a regional or global scope (Vejlgaard, 2008, p. 9).

Buck et al. highlight two definitions. The classic definition describes a trend as an ongoing and fundamental societal change over an extended period. In contrast, the modern definition, treats a trend as a short-term phenomenon, such as in fashion or music (Buck et al., 1998). Liebl offers a third perspective, defining a trend as a phenomenon that is always complex and that cannot be perceived simply as a fashion; neither can its lifespan be measured accurately. A trend is a connection, an association that is defined by crossing contextual borders (Liebl, 2002, p. 161-184). The new emerges when these boundaries are crossed, which implies that a trend occurs at the point where its objects could be divided into different past contexts. In this respect, researching trends means looking out for the new ones. While the objects linked in a trend do not need to be new, they are likely to be reconfigured and the trend itself must constitute a new phenomenon (von Groddeck & Schwarz, 2013, p. 28-37).

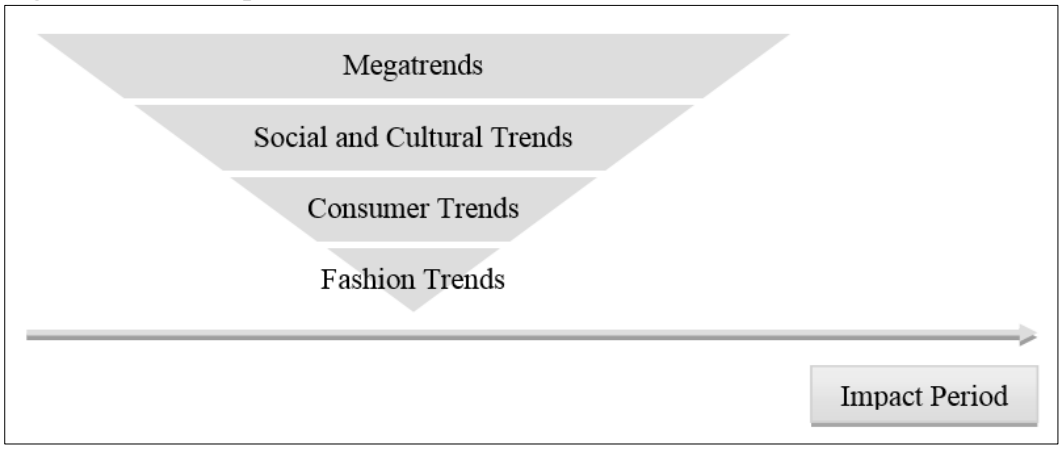
Trends influence life's conditions and peoples' behaviours, have stability over time and are composed of many interconnected occurrences (Müller & Müller-Stewens, 2009, p. 4).

In addition, trends cannot be analysed separately as they interact with each other, being a warrant for a dynamic development in a complex system of economy (Pradel & Aretz, 2008, p. 232). From business perspective, trends are considered as a crucial element in forming companies' overall strategy (von Groddeck & Schwarz, 2013, p. 28-37). As their results, new types of businesses appear on the market (Becker & Freeman, 2006, p. 17-27). Trends may differ depending on their range and time of duration. There are regional, domestic and global trends. What is more, trends are divided into (Wicker, 2010, p. 7):

- short-term trends (fashion trends);
- medium-term trends (consumer trends);
- medium- and long-term trends (social and cultural trends);
- long-term trends (so-called Megatrends).

Below figure illustrates relations between specified trends.

Figure 1. Trends Specification



Source: (Wicker, 2010, p. 7)

Short-term trends closely depend on current market mood, a superficial phenomenon or an ongoing trend. Simply saying, trend is a need to follow other people. It is often connected with style understood as outfit, appearance, manner of behaviour, music style, artistic style, system of believes or general lifestyle popular in particular time and environment. Such trends are able to exists up to 5 years, however in most cases they change seasonally (trend changes when season changes: summer/winter season) (Wicker, 2010, p. 9-10).

Medium-term trends are mostly related to general changes in consumers' behaviours. On average they are replaced every 10 years and are influenced by marketing and sales trends or by the existing fashion. In consumers' behaviours trends are reflected in changes of consumers' lifestyles regardless of their will and consciousness. They are a consequence of acting environment from a social, economic, legal, political, demographic and technological perspective on consumers' purchasing behaviour and as a result they create new consumption models (Zalega, 2015, p. 79-92). In addition, consumers' trends have a great impact on businesses operations, thus creating new rules for contemporary organisations (Shaw, 2009).

Social and cultural trends (medium- and long-term) are related to evolution of modern lifestyle. They describe changes in attitudes, needs and behaviours of society. Such trends relate to social, economic, political and technological changes. They appear gradually and do not have impact on people's life (Naisbitt, 1982). Social and cultural trends define long-term social-political, cultural and technological changes of a global character and they adjust slowly. Nonetheless, once created, they are able to last for a long period of time. These trends endeavour to compensate any social deficits existing between consumer and megatrends (Horx et al., 2007, p. 31).

Megatrend is 'an important shift in the progress of a society or of another particular field or activity' (The Oxford English Dictionary). It is frequently used within the scenario planning literature, especially as a particular step in scenario planning methodology, where it is commonly understood to mean those global factors which have an impact and a high degree of certainty but over which there is a little control (Ilbury & Sunter, 2004). Megatrends therefore refer to trends that are global and call for strategies for adaptation, rather than strategies for change to the trends themselves (Retief et al., 2016, p. 52-60). They have a potential for existence up to 50

years and are characterised by long-term changes (Pillkahn, 2007, p. 25). Surprisingly, because of their global character, they are able to overcome any economic interruptions. Megatrends are considered as a strong form of a trend as many other issues are attributed to them (Wicker, 2010, p. 11). What is more, understanding these trends is highly relevant in major fields of human 'development' such as economics, agriculture, energy, urban planning, resource planning, etc. a body of practitioner literature around megatrends has emerged in recent years.

The term 'megatrend' was used for the first time by J. Naisbitt over 30 years ago (Naisbitt, 1982). The author distinguished new megatrends - far-reaching transformations, expecting them to happen in the future. These are (Naisbitt, 1982):

- transformation from industrial to information society;
- change of mechanical technology into ultra-technology;
- transformation from national into global economy;
- transition from short-term thinking to long-term thinking;
- replacement of centralisation by decentralisation;
- transition from institutionalised aid to self-care;
- replacement of direct democracy to representative democracy;
- transformation from dualistic to multiplistic way of thinking.

In year 2012 Hajkowicz et al. distinguished six major megatrends, such as (Hajkowicz et al., 2012):

- rapidly changing demographics;
- rapid urbanization;
- accelerating technological innovation;
- power shifts;
- resource scarcity;
- climate changes.

At the same time, different author indicated six more specific megatrends i.e. (Tinnilä, 2012):

- changes in population age structure and urbanisation processes;
- societies' movement toward 24-hour access to various goods, services and consumption;
- ICT implementation;
- major expansion of consumers due to the wide access to information;
- e-trade, e-shopping and mobile services expansion;
- business globalization as a consequence of structural changes on competitive market.

Two years later Hessel wrote about commonly accepted set of megatrends. The author described them as global changes in individual, social and technological structures which are thought to have a major impact on the futures markets. These are in particular (Hessel, 2014):

- demographic changes;
- individualization reaches a new stage;
- social and cultural disparities;
- reorganization of healthcare systems;
- changes to gender roles;

- new patterns of mobility;
- digital culture;
- learning from nature;
- ubiquitous intelligence;
- technology convergence;
- globalization;
- knowledge-based economy;
- business ecosystems;
- changes in the work world;
- new consumption patterns;
- upheavals in energy and resources;
- climate change and environmental impacts;
- urbanization;
- new political world order;
- global risk society.

From a wide spectrum of megatrends, Gröhn indicated a group of logistics megatrends. They represent the way logistics business entities operate. Megatrends directly apply to the manner of business operating and their existence on the market. They appear globally and influence on particular aspects of organisation e.g. SC. These logistics megatrends include (Gröhn, 2006):

- changes in logistics models;
- increasing influence of modern, innovative technologies;
- global competition;
- changes inside corporation;
- demographical transformation;
- cultural transformation;
- increasing effect of natural environment.

Hoppe et al. described megatrends with regard to the same aspects concerning logistics (especially as key factors affecting the transformation process of the transportation system). The authors indicated (Hoppe et al., 2014):

- globalization (a qualitative change in global economic growth);
- world population growth;
- urbanization growth;
- increase in international social disparities;
- increasing wealth and income levels;
- demographic and social changes including population ageing, mostly in heavily industrialized countries, decreasing household sizes influence the demand for housing, leading to new settlement structures and shifts in traffic;
- knowledge society and economy (related to the structural change in the European economy from production to services and the shift within industries);
- climate changes, environmental pollution and environmental ethics (growing pro-ecology movement).

One of the most contemporary approach in megatrends analysis which influences logistics and its fields (including SC) is presented by Gernandt in the research report 'Megatrends and their impact on logistics'. According to the author megatrends have an enormous impact on global society and continuously change the way people live, their necessities, desires and possibilities. Therefore, global demand shifts cause large scale effects for resources needed, production locations and supply chains. Some of these megatrends have a direct impact on logistics and its main fields such as SC. These are especially (Gernandt, 2012):

- globalization – localization – glocalization (although global trade will generally stay intact, growth will be limited due to the shift towards regional markets; the logistics industry will face more intra-regional supply chain demands, and will have to rely more on trucking and short sea services);
- virtual goods (digitalization, Internet, Internet of Things, Big Data, 3D Printing, online shopping; the shift of investment and value creation into the digital world will be a dominating trend for logistics services; the logistics market will continue to expand faster than trade growth only if we include a growing number of services around trade intelligence, supply chain intelligence and logistics intelligence);
- demographic changes (the consumer behaviour of an older population will have an enormous impact on the economy);
- global population and urbanization (the increasing concentration of many people in little space; migration pressure and growing ethnic diversity in industrialized nations, e.g. in Europe and China; towards cities and megacities);
- communication and connectivity (telephones, Internet, Facebook and email allow people to communicate with others or access information in many different ways; this megatrend has been facilitated by ongoing miniaturization and portability; object-to-object communication: sensors, cameras, RFID chips→ smart technologies; more powerful hardware and software will help significantly in managing increased data volumes and more complex supply chain models; crowd business);
- increasing speed of innovation (reduction of weight and size of products; new materials; more powerful IT systems);
- sustainability, resources and recycling (a crucial element for the future development of 'green logistics services' will be the consumer's willingness to accept higher product prices in order to finance sustainability and environmental protection).

On the basis of literature review, it should be noted that there is a great number of various megatrends which may influence businesses activities (including SCs). The most frequent are: logistics models transformations, globalization, global competition, growing influence of modern, innovative and intelligent technologies, growing influence of natural environment, changes inside corporations and international concerns, demographic and cultural transformations. These megatrends are likely to play a very important role in the future, modifying logistics and its particular fields.

3. METHODOLOGY, EMPIRICAL RESEARCH AND CHARACTERISTICS OF STUDY SUBJECTS

The aim of the paper is to indicate several changes in SC which resulted from logistics megatrends. The study was based on empirical data where questionnaire was applied. The questionnaires were carried out twice, in 2012 and in 2017. There were 120 respondents participating each time - managers from different companies responsible for SC management and distribution. The territorial scope of the research was Poland.

Empirical data was gathered due to carried out questionnaires. The selection of the test method was justified by characteristics of the study and necessity to reach more respondents. What is more, study was contained in clear and friendly form and provided a great level of anonymity. Also questionnaire completion was not time-consuming and the general costs of the research was comparably low. Distribution of the questionnaires' papers had been preceded by telephone interview with companies' owners or other employees in order to indicate the appropriate respondents. The questionnaire was sent via e-mail, as it was the fastest way of communication.

Importantly, study was conducted although existing limitations of questionnaire method. The most important were a small number of the issued questionnaires filled in and possibilities of incorrect understanding and interpretation of some enquiries. Also, the questionnaire was dedicated to persons responsible for management and distribution of SC in the surveyed companies i.e. directors and purchasing specialists (in case of medium and large companies) and owners and presidents (in case of small companies). After respondent's participation agreement, the questionnaires' paper were forwarded by e-mail.

Respondents were selected deliberately, taking into account those who were able to understand the issue of logistics megatrends, their meaning, growing influence and changes which they cause in SCs. Although some respondents had different nationality than Polish, all of them resided in territory of Poland.

The research was carried out twice in 2012 and 2017. Each time, 120 respondents participated.

Empirical data collected from respondents' responses allowed for selecting two problem areas:

- significance of megatrends in logistics and their influence on logistics elements (including SC);
- the most notable changes in SCs which result from megatrends existence.

Calculations and analysis of empirical data were performed by means of Microsoft Excel.

120 respondents participated in research, all employed in companies of different sizes. Pursuant to the Law it has been presumed that (Commission Regulation (EC) No 70/2001):

- large companies employ more than 250 employees;
- medium companies employ up to 250 employees;
- small companies (including micro-companies) employ up to 50 employees.

Altogether the following number of persons participated in research (table1).

Table 1. Size of the companies and their representatives

Company's size	2012	2017
Large companies	28	34
Medium companies	37	41
Small companies	55	45

Source: based on own research

Respondents represent companies which conduct different business activities (table 2). The dominant form is manufacturing activity which is a leading form in all analysed companies.

Table 2. Type of business activity in the surveyed companies

Activity type	2012	2017
Trade	31	29
Manufacturing	69	74
Services	20	17

Source: based on own research

Surveyed companies represent various industry sectors. The highest number of respondents are employed in automotive, converting, electric machines, textile and furniture industries (table 3).

Table 3. Companies' industry sectors

Sector	2012	2017
Construction	4	1
Electric machines	11	8
Pharmacy	3	5
Other	9	11
Cosmetic	4	4
Contruction materials	5	3
Furniture	17	15
Automotive	19	17
Paper and printing	3	4
Converting	19	23
Food	12	5
Textiles	10	16
Plastics	4	8

Source: based on own research

Respondents operate mainly on domestic, EU and world markets. They sporadically operate on local or regional markets. This fact demonstrates a great progress of the companies which are focused on expanding their business operations. It is also presumed that companies which purchase goods on the international market also sell their products there, being not limited only to domestic market. In addition, respondents who participated in the research represent companies - depending on selection criteria. It provides an overall view of the companies where distribution and

SCs management is characterised by a different level of complexity. The respondents presented different understanding of megatrends, thus indicating different aspects of SCs' transformations during recent years. The research results are further presented in the next section of this paper.

4. RESULTS OF THE RESEARCH

As a result of the research carried out (in 2012 and 2017, on group of 120 respondents - SCs managers representing various industry sectors) there have been some visible transformations in SCs due to the impact of logistics megatrends.

In order to establish certain position and significance of variants (provided answers) there have been also some determinants applied. Frequency determinant is formed from frequency of indications - frequency was independent from indication type. Thus, frequency determinant is the one with the highest number of indications. Relating to a value lying at the midpoint of a frequency distribution of observed values, it allowed to estimate their meaning. In statistics median, also known as a middle or average value, is the middle data value of an ordered data set.

Results of the research demonstrate the number of transformations concerning logistics megatrends (table 4). In year 2012, respondents indicated certain changes in logistics models performance (fraction 0,11) and identified the following megatrends as the most influencing on supply chains: global competition (fraction 0,10), changes in business centres locations (fraction 0,09) and broad implementation of ICT technologies (fraction 0,09). Respondents' indications from 2017 present different approach in megatrends' perception. They selected the following megatrends: changes in business centres locations (fraction 0,12), growing impact of modern, innovative, intelligent technologies (fraction 0,11), ICT technology (fraction 0,10) and globalization and regionalization (fraction 0,09). Conflicts, crime and terrorism were the least meaningful, not much influencing supply chains from respondents' perspective (fraction 0,01). This megatrend remained on the same position over the years.

Table 4. Logistics megatrends and their impact on SC

Megatrends	Respondents' indications in 2012	Respondents' indications in 2017
	Fraction	Fraction
Changes in logistics models	0,11	0,08
Changes in business centres locations	0,09	0,12
Declining resources	0,02	0,03
Material engineering innovations	0,03	0,02
Growing influence of modern, innovative and intelligent technologies	0,05	0,11

ICT broad implementation (information and communication technologies)	0,09	0,10
Growing influence of natural environment	0,06	0,08
Transformations of companies and corporations	0,06	0,04
Global competition	0,10	0,08
Globalization and regionalization	0,08	0,09
Demographic changes (aging societies)	0,06	0,06
Cultural transformations	0,03	0,04
Diversification of societies	0,03	0,01
Individualisation and consumers' expansion	0,05	0,03
Consumptionism	0,06	0,06
Urbanization growth	0,07	0,04
Conflicts, crimes and terrorism	0,01	0,01

Source: based on own research

Identified megatrends (table 4) have a great impact SC's general performance, especially on selection of supply regions, cooperation with suppliers, sort of purchases, modes of transport or transportation units selection. The results of those studies are presented below.

Logistics megatrends forced respondents to purchase goods from different supply regions. In 2012 respondents indicated Europe (fraction 0,56) as the most important supply region, as well as general cooperation with suppliers from Europe and Asia (fraction 0,20). In 2017 the indications were the same, however cooperation with European and Asian regions gained in importance (fraction 0,27). In addition, the selection of European region as an independent supply region decreased by 5 % (table 5).

Table 5. Selected supply regions

Supply regions	Respondents' indications in 2012	Respondents' indications in 2017
	Fraction	Fraction
Asia	0,06	0,07
Europe	0,56	0,51
Europe, America	0,04	0,05
Europe, Asia	0,20	0,27
Europe, Asia, America	0,14	0,10

Source: based on own research

Economic factors mostly determine selection of supply regions in both studies (frequency 90% and 94%) as well as technological level (84% and 89%). There is also a visible impact of logistics megatrends as their importance and frequency of indications increased (median value increase from 4 to 5). Finally, megatrends resulted in the increasing significance of access to line infrastructure (frequency increase of 14%, median value increase by 1) (table 6).

Table 6. Factors determining selection of supply regions

Factors	Respondents' indications in 2012		Respondents'indications in 2017	
	Frequency	Median	Frequency	Median
Territorial factors	67%	3	59%	3
Cultural factors	33%	1	19%	1
Economic factors	90%	4	94%	5
Economic performance	75%	3	77%	3
Technological level	84%	4	89%	5
Time of settling issues at offices	67%	3	53%	3
Legal aid	49%	1	50%	2
Authorities entrepreneurship	45%	2	63%	3
Economic zones presence	47%	3	44%	3
Access to linear infrastructure	65%	3	79%	4
Custom-cleared service	70%	3	65%	2
others	2%	5	1%	3

Source: based on own research

Logistics megatrends also influenced cooperation with suppliers.

Firstly, there are different motivations for cooperating with new suppliers e.g. searching for better quality of goods/service (frequency growth by 6%, one point more in median value). Megatrends also determine further implementation of the particular factor such as willingness to increase company's attractiveness (increase by 9%, the same level of median value). Interestingly, lower price of product/service as a factor contributing to new supplier's searching decreased by 5% (table 7).

Table 7. Reasons contributing to searching for new suppliers

Factors	Respondents' indications in 2012		Respondents'indications in 2017	
	Frequency	Median	Frequency	Median
Inability to provide goods/service themselves	97%	5	94%	5
Lower price of the goods/service offered	90%	5	85%	5
Better quality of offered goods/service	88%	4	94%	5
Cooperation between supplier and main competitor of the company	41%	3	36%	3
Supplier's know-how	53%	4	59%	4
Company's restructuring	23%	2	24%	2
Willingness to increase company's attractiveness	82%	4	91%	4
Willingness to increase company's assortment	73%	4	71%	4
Drive for development and reaching higher position on the competitive market	64%	3	70%	4
Desire for company's improved efficiency	71%	4	74%	4
Desire for company's improved flexibility	75%	4	74%	4
Outsourcing-focus on core business, delegation of side activities to supplier	45%	4	56%	4
Establishing of cooperation determined by main customer/contractor/ parent company	32%	5	37%	5
others	2%	4	1%	4

Source: *based on own research*

Furthermore, megatrends determine suppliers' evaluation and selection criteria. The following criteria gained in importance: quality of product/service delivered (frequency of indications increased by 2%, median value the same), delivery efficiency (frequency increase by 4%, median value by 1) and supplier's flexibility (increase by 6% and median value by 1). The unit price of product/service criterion decreased by 3% which implies changes in models of cooperation with suppliers and paying more attention to the other aspects (table 8).

Table 8. Suppliers' evaluation and selection criteria

Criteria	Respondents' indications in 2012		Respondents' indications in 2017	
	Frequency	Median	Frequency	Median
Unit price of product/service delivered	94%	5	91%	5
Payment conditions	88%	4	87%	4
Punctuality/ timeliness of delivery	88%	4	90%	4
Reliability of delivery (right product in correct amount and well-done condition)	76%	3	77%	4
Delivery safety	72%	3	70%	3
Quality of product/service delivered	96%	5	98%	5
Delivery costs	81%	4	83%	3
Delivery efficiency (frequency of product/ service deliveries)	90%	4	94%	5
Distance between supplier and company	65%	3	57%	2
Supplier's support (constant monitoring of delivery and passing information to the customer on this subject, ability to react in the event of delivery disturbances)	80%	3	79%	3
Supplier's flexibility - time for completion of sudden/additional delivery	88%	4	94%	5
Total existence on the market	80%	3	74%	3
Market share	84%	2	69%	2
Indicator: volume of sales per employee	57%	2	61%	2
Turnover	71%	3	64%	2
Supplier 's development (know-how, access to specialized machines and devices and their quality, implementation of modern management techniques, pro-ecology aspects)	84%	3	87%	4
others	2%	5	1%	4

Source: based on own research

Logistics megatrends also have an impact on sort of purchase from suppliers. Continuously, the most common sort of purchases are raw materials, yet, respondents purchase finished products more often (increase by 4%). The least common is purchase of services, with no significant influence on megatrends (table 9).

Table 9. Sort of purchases from suppliers

Sort of purchases	Respondents' indications in 2012	Respondents' indications in 2017
	Fraction	Fraction
Purchase of services	0,06	0,04
Purchase of finished products	0,18	0,22
Purchase of semi-finished products	0,22	0,20
Purchase of raw materials	0,25	0,24
Purchase of packaging materials	0,07	0,09
Investment purchase (machines, devices)	0,19	0,18
others	0,03	0,03

Source: based on own research

Supply chains use various modes of transport. The most frequent (recognised as the main along the whole transportation route) is the road transport, even though it slightly lost in significance over analysed 5 years (decreased by 3%). On the other hand, sea transport gained in importance (increased by 4%) which implies transformations in supply markets' shaping or business centres locations and growing globalization forcing necessity of deliveries from distant regions. Rail transport is also becoming more considerable. The reasons for that are existence of so called 'Silk Road', growing importance of duration and timeliness of transportation process and finally more dominant pro-ecology approach (table10).

Table 10. Type of transport

Type of transport	Respondents' indications in 2012	Respondents' indications in 2017
	Fraction	Fraction
Road transport	0,55	0,52
Rail transport	0,06	0,09
Inland waterway transport	0,04	0,02
Sea transport	0,20	0,24
Air transport	0,15	0,13

Source: based on own research

Final studies' results concern types of transportation units used in SCs. As logistics megatrends have a great influence on types of transport used, sort of packaging materials also differ. There is for example a higher selection of containers, common in global supply chains (table 11).

Table 11. Sort of transportation units

Transportation units	Respondents' indications in 2012	Respondents' indications in 2017
	Fraction	Fraction
Palletes	0,46	0,44
Containers	0,17	0,20
Big-Bags	0,06	0,07
Barrels	0,10	0,11
Tankers	0,06	0,04
others	0,15	0,14

Source: based on own research

5. FINAL CONCLUSIONS

Conducted studies identified the most significant megatrends which have an impact on logistics and its particular fields (including SC). Respondents indicated as the most important: changes in business centres locations, growing influence of modern, innovative and intelligent technologies, application of ICT technology (informative and communication), globalization and regionalization. These megatrends considerably impact supply chains performances, especially selection of supply regions, cooperation with suppliers, sort of purchases, transport modes and transportation units.

In particular, respondents indicated Europe and Asia as the most common supply regions. While selecting, they mainly considered: economic factors and technological level. Megatrends also resulted in growing importance of access to line infrastructure which is directly connected with the selection of transport modes and transportation units.

What is more, cooperation with suppliers has been also transformed due to logistics megatrends. Firstly, there are visible changes in motivations for new suppliers search. Higher quality of product/service and willingness to increase company's attractiveness gained in importance. Interestingly, lower price of product/service criterion lost its value. Secondly, suppliers' evaluation and selection criteria indicated by respondents have changed over 5 years. In year 2017, the most important selection criteria are: quality of product/service delivered, delivery efficiency and supplier's flexibility.

Finally, logistics megatrends influenced purchasing choices, modes of transport selection or used transportation units. The most commonly purchased are raw materials and finished products (a significant increase). The purchasing process is

mainly performed by road transport with the growing importance of sea and rail transports. In consequence, containers, as transportation units, have become more common as a result of growing regionalization and globalization processes.

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