

MAJOR TRANSFORMATIONS OF THE 21ST CENTURY LOGISTICS AND THEIR IMPLICATIONS TO THE LOGISTICS MAHAGEMENT

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ABSTRACT

The modern world and logistics is subject to constant transformations. The dynamics of these changes continues to increase thus affecting the efficiency and effectiveness of current concepts and logistics solutions. There are new needs and new opportunities that dictate the need for a new view and constant transformations of logistics concepts and operations. The logistics expertise is becoming outdated, especially in the aspect of the implementation of operational activities. This situation generates a need to introduce a comprehensive and innovative solutions that would stay ahead of the time of action. New perspectives of logistics management is the challenges for the future logisticians. Workers and managers in the logistics industry face new challenges, which also imply other than the long-term perspectives of enterprises.

Forecasting the development of logistics is neither easy nor simple, it requires not only to perceive new prospective circumstances and challenges for logistics, but also their multifaceted analysis, understanding of mutual implementation and impact. Despite the extremely large scale of difficulty, this seems to be a necessary action, not only because of the growing competitiveness in global markets, but mainly because of the requirements posed by the modern world for the leaders of logistics. We may not be able to predict exactly all conditions of functioning of logistics, but we can sensitize the future logistics managers to them, and indicate expectations of their knowledge, competence and the ability to cope in new dynamically changing conditions of logistics functioning.

The empires of the future are the empires of the mind.
Winston Churchill

Introduction

Because of its importance in the economy logistics must still evolve to meet the demands of modern business and adapt to the dynamic changes in the economic environment. Globalization and networking as well as growing virtualization of contemporary economy place in front of it a number of new challenges and needs, set new directions and trends of changes in the current and prospective conditions. In addition, the development of a variety of technologies generates not only new opportunities, but also is, to a large extent, conducive to the development of logistics enterprises. The changes in this area are taking place virtually before our eyes. The logisticians of present as well as future will design and perform tasks with optimal crossing of time and space so that the delivery is made in accordance with the expectations of the client, using for this purpose the latest techniques and the latest technologies. The knowledge about the latest concepts and solutions and their correct implementation to support such efforts within company's operations becomes one of the essential elements of success in current and prospective market conditions.

The aim of the article is to synthetically present selected trends and directions of the development of logistics with a focus on the role of innovation in its development, including the implementation of the latest technology and information and communication technologies. The presented content is also to indicate the need and directions of changes in a broadly understood system of logistics education which should educate future logisticians so that they have adequate knowledge, skills and abilities that allow them to act effectively in the new, dynamic and prospective conditions of functioning of logistics.

To predict the future, a variety of techniques and tools are used, together with a selection of theoretical approaches. However, the forecast is always rooted in what we know about the past, in observed trends and in what we know about the future. We have specific experience, habits, and our thinking is dependent on a particular perspective, according to which we have learned to perceive the world. However, our perception is often too one-sided and should be supplemented or confronted with the concepts of other authors, which is also the situation in the case of this article. Presented forecasts are also the result of multi-criteria assessment of the changes that occur in various areas of our life, especially related to the development of new technologies. The final effect of the presented considerations was also significantly affected by conversations with representatives of Polish science as well as practitioners.

Formal circumstances

We think about the future mainly in the context of achieving goals or constructing development plans. In the first case, this means, most often, very short time horizon, and a little longer one in the second case, however, the practise shows that we rather do not exceed beyond 2020. Meanwhile, today one can see changes in the social and economic sphere of our life that are signs of future permanent changes in a much longer term, the best example of which are projected demographic changes related to the ageing of society.

Forecasting for a few years ahead is a difficult and often a daunting task, because we live in the age of technological and scientific revolutions, in which the rhythm of new developments and discoveries is constantly

accelerating. Over the last several decades more knowledge has been accumulated than during the entire history of mankind. By 2100, this knowledge will again be multiplied (doubled) (Kaku, 2011). It is worth to note this fact, because according to to-date experience, future forecasts, with a few exceptions, have never properly valued the growth of technological processes.

Despite the fact that the history of science teaches how dangerously it is to make any assumptions about the future, they are still necessary, for at least two reasons.

The modern logistics must not only continuously and quickly respond to the still emerging new needs and challenges, but also make full use of emerging possibilities. The pace of changes, the scale of needs and expectations result in the need for a completely different changes in thinking about logistics, its objectives and the ways of how to implement tasks. Logistics must not only keep up with the changes, but in many cases stay ahead of them, generating a kind of new solutions, concepts and ways of action, which will fully satisfy the new expectations and needs, particularly in the area of the new requirements of the potential customers. It should also be noticed that the logistics in a wider aspect is directly and indirectly affecting the economy and the transformations undergoing in it (Coyle, Bardi, Langley, 2003), and thus generate new challenges for itself.

Secondly, the predictions of the development of logistics are necessary for a proper preparation of logistics personnel for present and prospective tasks. This is a very important, and, at the same time, complicated and difficult problem. It requires taking into account multiple analyses and actions that will help to prepare professional, active, innovative and committed employees (Harakalova, 2014). An essential and an extremely important part of this issue is the concept of education at universities. The prospect of students' graduations within three years (I-level studies) or within next five years (I and II level studies) must raise a number of questions such as shown in Figure 1.

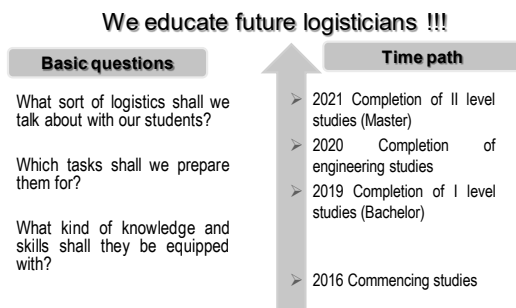


Figure 1. Time axis – education of logistics managers

Source: own study.

It should be also indicated that the overriding condition of the success in the context of upcoming new conditions and transformations is the time and the pace of the introduction of pragmatic changes in the functioning of logistics. Time must be properly seen and used. Consequently, the preparations for the expected changes or long-term trends shall be commenced today. In this case, it seems that the following thesis sounds factual: the sooner we start to foresee these effects and detect their symptoms, the better we can prepare for them, and,

consequently, minimise the potential risks or, given a good market situation, succeed thanks to the right preparation of personnel, structures and activities in multi-variant terms.

Selected modern circumstances of development of logistics

The modern concept and perception of logistics is the successor of different aspects, concepts and solutions. The continuous development of ways and concepts of implementation of logistics tasks is clearly noticeable. Also, their scope is constantly expanding together with their scale of complexity and dynamism of the processes as well as the scope and the way of using and implementation of increasingly sophisticated tools resulting from technological and technical development in the field of operational, tactical and strategic activities at local, regional and global levels. They must generate such capabilities, which will allow effectively meet the challenges of the present and prospective circumstances.

Today, many of these concepts involve “megatrends” of the development of logistics, which are the result of ongoing changes in the global economy. “Megatrends” can be defined as constant economic, social, political and cultural trends or phenomena arising in the process of civilization development of society, with various conditions affecting the humanity beyond national borders and continents, embracing the whole globe and determining the main directions and objectives of the perspective development of humanity (Dressler, 2004). In terms of logistics, the concept of “megatrend” shall be defined as the force which is fundamentally changing the way the logistics operators function, their way of acting, competing. It is also referred to as an important direction, tendency or force that appears either globally or locally and has a chance to act in the future, which has a significant impact on almost every aspect of the functioning of the societies and logistics itself.

In the presented conception the megatrends affecting the development of logistics can be viewed in the overall socio-economic (civilization) terms as well as in terms of industry, in our case logistics. However, this division is blurred and many items will complement and penetrate each other, generating specific feedback of various megatrends.

The first group of civilization megatrends shall certainly include those that were pointed out by John Naisbitt (1988). The author indicated 10 emerging new megatrends – deep changes that will take place in the future:

- from the industrial society to the information society,
- from power technology to the ultra-technology/ultra-contract,
- from the national economy to the global economy,
- from short-term thinking to long-term thinking,
- from centralisation to decentralisation,
- from institutional support to self-help,
- from representative democracy to participatory democracy,
- from hierarchy to network,
- from North to South,
- from “either-or” format to multiple choice.

M. Tinnilä, on the other hand, distinguished six major megatrends and their impact on the lives of societies (2012):

- changes in the age structure of the population as well as ongoing urbanization processes,
- transition of societies towards 24-hour access to goods, services and consumption,

- all-pervasive use of ICT,
- expansion of the power of consumers due to the availability of information in networks,
- e-commerce, e-shopping and the expansion of mobile services,
- globalization of business, which is the result of structural changes caused by the competition, including business services.

They are complemented by seven megatrends which, in the opinion of their authors, significantly affect the development of directions of transformations in logistics both in terms of required capabilities and new directions of development. These are the megatrends as follows (Ministry of Transport and Communications, Helsinki, 2006):

- still increasing influence of the environment,
- transformations in terms of models of the development of logistics services,
- increasing impact of modern and innovative technologies,
- changes within existing corporations and companies,
- future demographic changes,
- global competition,
- projected cultural changes.

One of the most modern megatrends, which will determine the direction companies act, including logistics, now and in the future, were presented by J. Riedl, H. Farag, D. Korenkiewicz, and they include (2014):

- a) changes in the location of business centres; Asian and African countries still gain the importance, due to the trend of regionalization accompanying globalisation – Eastern Europe;
- b) globalization and regionalisation occurring in parallel as a response to the changing economic environment and turbulences which take place in the global economy to varying degrees in different countries;
- c) the growth of urbanization, it is expected that by 2050 over 70% of the world society will be living in cities;
- d) growing environmental movement, increasing importance of the sustainable development in the strategy of enterprises;
- e) ageing of societies, especially in highly industrialised countries; it is estimated that by 2050 the population above the age of 60 will account for 21% of the world's population (in 2000 – 10%);
- f) the dynamic development of e-commerce; the network economy.

The increasingly global nature of manufacturing, purchasing and distribution is a key megatrend which shapes planning and implementation of logistics tasks within new (modern) supply chains. The modern logistics must generate capabilities which will effectively implement the tasks needed in the current and prospective circumstances. This is even more complicated due to the fact that these changes must meet the challenges of the future, which are very difficult to clearly determine. This also applies to the issues relating to the search for more sustainable solutions, which are now one of the priorities. The search for logistics solutions that would be ecology-friendly is also the impulse to create and search for modern and innovative technology. As a result, the process of modifying the model of functioning of logistics and its tasks is continuous, and it causes permanent changes within existing logistics companies, especially in the face of the national, regional and global competition.

The indicated megatrends certainly do not cover all areas of changes affecting logistics in the second and following decades of the 21st century. This thesis is supported by Figure 2, which shows the possible areas, such as the duration of their deployment in international scope (global).

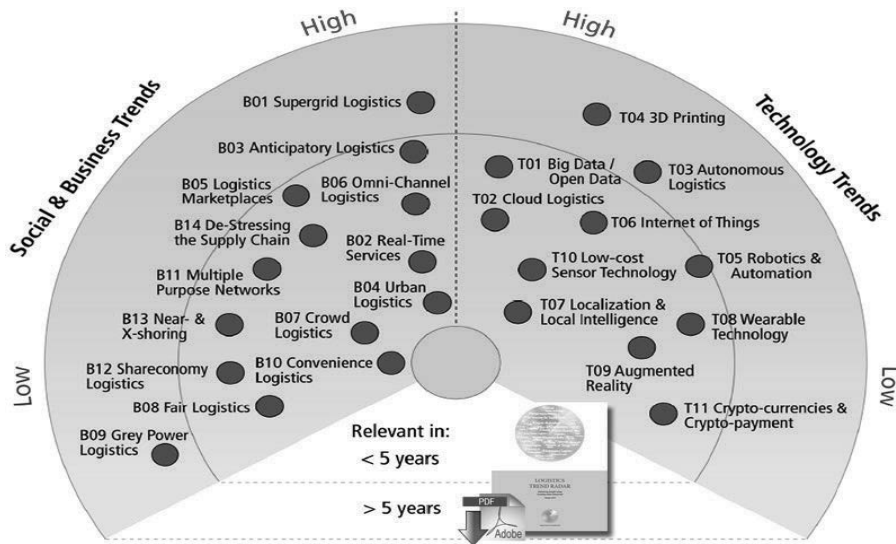


Figure 2. Logistics Trend Radar, Delivering insight today. Creating value tomorrow!, Version 2014

Source: DHL_Logistics-TrendRadar_2014.pdf.

Logistics is changing and will change in the future. Among the many conditions and concepts that currently have the greatest influence on the development of the actions and strategies of logistics the following should definitely be mentioned:

- the development of information and communication technology, the emergence and development of the concept of Cloud-computing and BigData (Kopishynska et al., 2016),
- growing importance of innovation – building the culture of innovation,
- virtualization of processes and activities, sensory perceiving,
- the concept of “Industrial Revolution 4.0” and automation of logistics processes,
- the Internet of Things and the Internet of Everything together with the concept of Omni-Chanel,
- development of the concept of “green logistics” and sustainable development,
- development of large cities and other demographic phenomena – development of urban logistics,
- development of intelligent transport systems (ITS), in particularly the implementation of C-ITS,
- development of logistics infrastructure – building logistics capacity,
- development of logistics services, particularly in the area of TLS,
- development of the concept of 3D printing.

The solutions based on the idea of “the Internet of Things” (IoT) are now one of the most dynamically developing concepts. Their use in many areas of economic life brings with it a big potential for development. It is worth taking a look at this issue by examining, inter alia, the value chain produced by the market and by analysing its current structure. Thanks to the analysis of this issue companies will be able to change more precisely in the future in order to obtain maximum “value added”. Regardless of the analysed possibilities and directions of the development of this idea, it must be assumed that in the coming years this market will remain very competitive and will be characterised by dynamic changes.

There are definitely more circumstances and problems logistics is facing. The indicated aspects are only to show the importance of the problem and the need for its constant monitoring. The necessity for such actions arises from the need for proper preparation for the expected changes or long-term trends. In this case, it seems that the following thesis is right: the sooner we start to predict these effects and detect their symptoms, the better we can prepare to face them, and the potential risks can be minimised, or with a good market situation, transformed into success. This approach seems to be extremely important for the Polish logistics, which must effectively act in a global and increasingly competitive world.

Areas and directions of change in logistics concepts

The cited circumstances as well as previously described megatrends allow to indicate the following factors determining the development and changes in logistics in the second and following decades of the 21st century:

- even greater targeting of logistics at customer expectations, creating new values and usability for the customer,
- concentration on core competencies, increasingly outsourcing of functions and logistics activities on the outside (the development of outsourcing),
- shortening product life cycle in conjunction with the pressure to shorten the product development cycle and the time to reach to final recipient,
- new concepts and strategies for the functioning of SCM which are subject to increasing trends relating to the limitation of time and cost (Skowron-Grabowska, 2005),
- building strategic alliances,
- moving competition to the whole supply chain,
- initializing and using in practice a stream of innovation,
- introducing innovative IT systems to allow for the full integration of activities within the supply chain, increasing flexibility and reducing costs of operations (Brzozowska, 2014),
- increase in transparency in the operations of the entire supply chain,
- growing importance of combined transport and properly organized (innovative) transshipments (Kadłubek, 2016),
- increase in the volume of shipments in conjunction with the concepts of e-commerce,
- increase of importance of aspects related to the concept of sustainable development,
- the necessity to support a multi-million cities, resorts, whose number and size will grow, especially in the context of the logistics use of their “third” underground area,
- globalisation and liberalisation of world trade.

There is also no doubt that logistics and the processes it contains, in particular modern and future supply chains are more and more:

- multidimensional,
- extremely complex,
- accepting different business models,
- combining previously contrary operations,
- adjusting to the changing environment,
- based on people.

A continuous development of logistic concepts can be seen. The range of tasks and responsibilities of logistics is constantly increasing. The scale as well as the complexity and dynamism of the processes grow, together with the scope and the use and implementation of increasingly sophisticated tools resulting from technological and technical development in the field of operational, tactical and strategic activities at local, regional and global levels. The changes of the following conditions: economic, financial, organizational, legal, international and technical-technological, which took place more or less dynamically, led to the gradual transformation of the traditional model of the functioning of the economy into a very dynamic network of connections and relationships. This results in the fact that modern logistics and the supply chain as its part must be characterized by many features, but the essential include (Kovacs, Kot, 2016):

- capacity for rapid reaction, ability to meet rapidly changing demand,
- flexibility and ability to adapt to the optimum: cost-service level,
- ability to maximize the use of company resources,
- ability to use all of the available information.

Today, in the era of integration and internationalisation as well as very fast and dynamic changes a lot of attention is focused on the search for new forms, ways and concepts of functioning of logistics that would meet current and future requirements, especially in the area of meeting customer's expectations to create a competitive advantage.

It is also worth nothing that not everything requires a broad analysis and building multi-dimensional theories. Some things are already clear and some effects are well predictable, which should be considered and included in the concepts of the development of logistics companies.

The expected changes primarily associated with the speed of response to the needs generated by clients will require bringing logistics structures closer to the customer. They will also require to transfer parts of the production process to a distribution warehouse, closer to the customer, for example, the final assembly, customization of the product, or 3D printing of selected items.

Today, a growing integration with the environment both in terms of IT and physical contact can be seen. The information technology integration mostly involves joining logistics system with e-commerce systems, providing the ability to control the availability and purchasing of goods and devices that communicate directly with each other via the Internet (this includes such concepts as: the Internet of Things or M2M – Mobile To Mobile). Physical integration means primarily improving logistics processes, e.g. automatic loading and unloading, fast path of replenishment in stock, completion of individual client orders, fast paths for completion processes.

Currently, the ecological context is most commonly analysed, first of all, in the context of building a positive image of the company. However, the expected increase in the importance of the ecological concepts and solutions clearly indicates the need for the implementation of energy-efficient solutions and a broad use of renewable energy sources. A certain facilitation for the building of a comprehensive concept of ecological changes, in the longer term, can be positively emerging economic aspect. It is anticipated, on the one hand, that there will be an increase in energy prices, and, on the other hand, a drop in the price of energy-efficient technology.

Taking into account, for example, demographic trends in the future, logistics will have to meet the new requirements of ergonomics. The expected increasing participation of elderly persons and women working in logistics will generate additional requirements for the ergonomics of work stations and the support of employee with extra equipment to facilitate the work.

On the basis of studies carried out, the following factors and circumstances may be identified which will have the biggest influence on the development of supply chains and logistics, research results implication:

- movement of centres of economic activity,
- progressive globalization and the tendencies for the regionalisation of many logistics and industrial activities,
- increase in the complexity of business in terms of the implementation of the concept of outsourcing, offshoring and on-shoring, and other concepts,
- moving away from traditional distribution to e-commerce, Internet sales,
- further development and formation of large urban centres,
- rise of the concept of sustainable development and the development of consumerism,
- changes in the labour market due to demographic changes as well as changes in the mentality of generations.

Some other factors should also be indicated, such as: the formation of mega cities and further urbanization, ageing of societies, migration, growth of services, changes in the system of the world economy. The experts specializing in modern technologies are confident that we stand at the threshold of the fourth industrial revolution. At this point, it appears advisable to pose a question: what will be its consequences for the economy and for logistics?

A very significant factor affecting the development of logistics and its functioning are disasters and natural hazards, whose number in recent years has grown steadily, and the risks arising from intentionally destructive man's activities such as terrorism or organised crime. A significant threat in this respect is also a "domino effect" arising from the growing globalization of modern logistics. This particularly refers to those factors where the delay, for example, in the delivery of the goods to the port as a result of disruptions in the infrastructure or late ferry departure due to bad weather conditions in one region causes delays in many other places, in which goods are expected.

The multiplicity and diversity of logistic processes as well as changes in the surroundings of logistics enterprises make logistics one of the industries most exposed to various adverse factors causing an increase in the level of risk.

In the next few years continuous improvement should be expected, supported by innovative tools and procedures technologies, which are, in fact, means of prevention. It should be noted, however, that the expansion of security procedures may cause limitations in flexibility and creativity of logistics.

Modern logistics is perceived globally, and similarly to science it is constantly expanding its boundaries to be able to effectively adapt to global trends and strategies.

Conclusion

There is no doubt that it is necessary to permanently conduct analyses and research in both the theory and practice of logistics in order to identify the requirements for the current and future logistics system. A multifaceted evaluation of different logistics systems (case studies), the identification of problems in the existing systems, which constitute the barriers, should also indicate the needs and directions of changes and transformations, including changes in the system of logistics education.

Another argument indicating the need for forecasting is growing time pressure, which also applies to actions and decisions in logistics. Therefore, the implementation of new ways and concepts of the implementation of the

logistics operations shall not be delayed. In many cases, decisions about prospective changes are to be taken today, being aware of the fact that each change takes time. The lack of such action results in losing in an increasingly competitive market. The basis for these actions is and will be the knowledge and findings from research and considerations in the form of rational economic and social visions that will create the base to take accurate and meaningful decision changing the image and way of logistics operations.

Properly prepared logistics personnel will change logistics and build new concepts and strategies. In the context of the ongoing considerations not only will their competence, knowledge and the ability to see new challenges and needs be important, but also the courage in taking important decisions. The development of modern logistics concepts, the ability to take calculated risks and not conventional activities will also be of huge importance.

In conclusion, it should be believed that logistics is facing interesting future, but what it will be like largely depends on us. This will depend on our ability to see new conditions, challenges and opportunities and to build, basing on reasonable grounds, new, adequate to current (future) needs concept and rules of operation of logistics.

At the end of the discussion, it seems reasonable to make the following thesis: in the education of future logistics managers more attention should be paid to developing thinking skills in terms of logistics categories, seeing new opportunities and constraints, and perfectly using new technology in the interest of the conducted activities.

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