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**MODERN LOGISTICS AND CONTEMPORARY SUPPLY CHAIN
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The article deals with the modern logistics is becoming as an integrated and innovative process. Disclosed question: smart logistics, innovativeness and innovative process, contemporary (global) supply chain management, safety of logistic processes, cost optimisation in logistics, business orienting towards the consumer's need and expectations, ongoing self-improvement and employee education.

Keywords: logistics, supply chain management, smart logistics, innovativeness.

Statement of problem. The contemporary approach to the notion of logistics is not merely a consequence of global changes, effects of the crisis or ongoing progress in the field of computer science, but it also draws abundantly from the knowledge on the customer and the intention to do whatever it takes to satisfy the latter. Not only must one know about the latest technologies and concepts of the global market development, but also know how to perfectly implement them in order to accomplish the goals envisaged and make the most of them while gaining a competitive edge. What also matters is the ability to notice individual trends and spheres as well as tendencies in the development of modern logistics. It may seem like a cliché to claim that logistics is a major fundamental component of each country's economic growth. The same can be said about the need of its ongoing improvement, innovativeness, pursuit of perfection, increased «smartness» or more and more frequently observed demand not only for competition but also collaboration, particularly under the supply chain. Ecology has become a completely new challenge for logistics companies. At the same time, despite the increasing quality of technical support for logistics, the unpredictability of forecasts and the necessity to respond rapidly and accurately to the changing market situation are also growing. Hence the question: what should modern logistics and the people managing it be like? What are the general trends and spheres of changes taking place in the contemporary logistics?

For more than a dozen years now, we have been involved in a « technological revolution», which changes the way we live, think,

communicate to a considerable extent, placing completely new and increasingly difficult demands ahead of us at the same time. Consequently, new challenges and postulates of a modern society towards various spheres of our lives are becoming more and more explicit, which also pertains to the sphere of logistics, and not only perceived from an economic point of view, but primarily in terms of improving the quality of life and functioning of entire societies where the role logistics plays is becoming increasingly important. It entails the necessity of introducing fundamental changes to the field of logistics, to the approach towards logistic education as well as thinking about it and its goals, since one must be aware of the fact that, despite the said changes and transformations occurring in logistics, their progress frequently cannot keep up with the changes taking place in various aspects of our economic and social life. And not only must logistics keep up with the latest changes, but in many cases, it needs to be ahead of them in order to satisfy the customers' expectations. Therefore, a standard component of logistic activity must be studying and forecasting of changes. However, not only does it require noticing the changes and new logistic challenges, but also a multi-faceted analysis and understanding of mutual relationships and impacts. By comprehending them better, one can find ways to face up to them, but may also use them to develop new logistic concepts to fully utilise the opportunities emerging. It is difficult to project what the most important conditions of these concepts and evolutionary trends will be, still, it is worthwhile focusing on some of them.

Analysis of recent papers. Smart logistics. Logistics is a major fundamental compo-

ment of economic growth as it constitutes the critical bond between the supplier and the customer, comprising all aspects of transport management, safety and storage of goods. As such, it is influenced by the process of ongoing evolution related to all the changes taking place in the spheres of the contemporary scientific development affecting many areas of life. The telecommunication revolution of the recent decades has brought almost unimaginable opportunities to facilitate and control even the most complicated processes. Hence the latest novelty in the nomenclature of the subject, namely the notion of «smart logistics» which, in fact, is nothing new in the very essence, but it only indicates the fact that logistics has noticed the new solutions offered by information technologies as well as their practical applications in logistic processes [1]. The foregoing results from the nature of logistics, which, for ages, has always succumbed to such changes that enabled it to keep up with the evolution of the economic environment and the altering customers' expectations. It would lead to ongoing improvement of the efficiency of logistic processes so that one can ensure that sufficient quantity of appropriate goods is delivered to the right location on time and at appropriate price. However, this field of expertise is definitely more complex as it comprises such problems as service quality, customer service, supply chain management, transport and its safety, storage or customs. Consequently, there is a need for ongoing improvement of the state of knowledge and implementation of innovative solutions by means of appropriately trained workers and managers on each level of the logistic chain.

Nevertheless, the contemporary approach to logistics is not merely a consequence of the information technology progress; it also reflects the suppliers' and the carriers' understanding of the customers' needs as well as the fact that satisfying those needs may be decisive for the given logistics company's survival or fall. Hence IT only functions as an enabling technology to create appropriate conditions for the given type of action, and therefore, it is a tool that needs to be integrated with the entire complex system of logistic processes in order to make them faster, more efficient and more integrated internally and externally with the sur-

rounding. As a result of trends thus defined, every single component of the technological development taking place in logistics increases competitiveness to a considerable extent while acting in a more and more demanding environment. As a good illustration to the foregoing, it is worth mentioning logistic centres equipped with state-of-the-art technologies enabling them to automate numerous processes performed, hence exerting a positive influence on the costs, reliability, speed and punctuality of services. It may seem all the more important that their role and relevance increase as they are factors accelerating the economic growth on a regional, national and international level.

The dynamic changes to the modern logistics have affected the way in which the fact of being «smart» is stressed with regard to the said process based on utilisation of advanced information and communication technologies in logistics, which in facts makes it smart. The «smartness» should be sought in highly advanced decision making models and algorithms supporting the activities undertaken by men and aimed at increasing efficiency and safety of logistic processes on all levels. It seems reasonable to concur with what M. Stolarczyk claimed indicating four pillars of smart logistics, i.e. integrated planning and execution, transparency, cooperation and analysis.

Smart planning and execution related to establishing links between planning and executive processes and the systems, which enable instilling logistics with «smartness» on the strategic, operating and tactic level. Integrated planning and execution are key elements of smart logistics. Optimisation of freight and transaction-oriented execution support real-time optimisation and high-precision execution through closed circulation and feedback linking these two factors. Smart logistics is not merely about simple modelling of each process based on the parameters extracted but about developing systems capable of learning and adapting to the emerging needs as well as coping with information shortage. These systems must be able to generate forecasts and show the capacity to respond and adapt to changes. Furthermore, they must communicate with other systems and feature such properties as the ability to work in real time; the capacity of applying standard

solutions and interfaces as well as openness to new information sources; the ability to acquire, aggregate, process, distribute and transfer data as well as utilise large quantities of highly diversified data; the adapting and scaling capacity; the ability to learn and acquire data, and deliver feedback; the possibility to respond immediately to the changes taking places in the sphere of operating conditions; the possibility to expand; module-based structure and mechanisms ensuring security and high operating reliability.

Aim of the paper. Aim of this paper is to analyze the modern methods and approaches to the management of logistics

Materials and methods. Innovativeness and innovative process in the contemporary world not only provide the grounds for modern strategies of economic growth and business development more and more frequently but are also perceived as a concept and solution applied in the competitive struggle [2]. Structures of highly developed economies constantly shift towards knowledge-based industries and services. A knowledge-based economy has become the very foundation of modern growth. Innovativeness and the innovative process itself are no longer perceived as individual, and are more and more often treated as a complex structure of undertakings creating new products, standards, technologies and services. The speed of changes taking place in the sphere of engineering, technology and organisation enables only the enterprises capable of introducing innovative changes to survive in the increasingly competitive market. Therefore, most contemporary enterprises operate under high pressure of innovation, frequently coexisting in multiple areas at the same time (new products, techniques and technologies, organisation, partnerships etc.).

The efficiency of entrepreneurs in the field of innovation depends to a considerable extent on their competences and managerial skills as well as the strategies adopted. One may also observe a growing relevance of the environment in which companies operate, and particularly such factors as policies and initiatives of public authorities, which may create favourable conditions for emerging of innovative atmosphere for entrepreneurship. What

also matters is the system solutions assumed, such as those of the EU or national ones, which constitute the general framework in which the economy functions (national and regional innovation systems, innovative environment etc.).

Logistics, being a fundamental factor of business competitiveness, is particularly sensitive to any kinds of innovation being introduced [3]. Hence innovations should be a major issue for both the present and the future logistic solutions, since innovativeness is a crucial prerequisite conditioning the increase of attractiveness of products and services which leads to the development of market and export, and hence it is decisive for the company's position in the given environment. Innovations should be introduced by all contemporary companies, both the most renown ones, having their market position well-grounded, and those only entering outlet markets. Introducing innovation should be an inherent part of the company strategy, and indeed a major one as well.

Innovative solutions may not be technologies and techniques derived straight from science fiction films at all. One should review one's business sector in a creative manner to find out that sometimes just a bit of change is enough to become innovative. Hence it truly pays to invest in new solutions, concepts or technologies instead of financing solutions that have been applied in the industry for years.

There is another important problem arising from the following questions: evolutionary or revolutionary innovation? Well-known solutions versus one's own innovative and revolutionary solutions? These are indeed important and difficult questions, particularly under the Polish conditions. They seem even more difficult to answer when perceived from the perspective of pragmatics and financing sources [2].

What should also be explicitly stressed is that another factor of innovation having a crucial importance is a man [2]. It is the creative, well-educated and qualified people that exert a decisive impact on the emergence and development of innovation. It is for the creativity of people as well as their strength in implementing new ideas that innovation can exist at all. Therefore, it is so important to educate employees, to share knowledge and experience, be-

cause it is the man that creates new things and new concepts (ideas). It may be concluded from the analyses conducted that the higher the education level of a company owner or manager is, the more frequent the innovations introduced by the company are.

Innovativeness in logistics and in management of contemporary supply chains (networks) is not limited to mere involvement of modern IT solutions in the process. A common feature of projects being implemented in this area is high creativity accompanied by integration. They are projects of high technological complexity. The main assumption of all those solutions is to adapt to the changes of the surrounding better and to attain a capacity to respond more rapidly to the market needs. In times of ongoing and unpredictable changes taking place in the business environment, enterprises willing to be successful in the 20th and 21st century must be capable of making quick reactions in this difficult and permanently variable surrounding as well as to take responsibility for the natural environment [4].

What are those innovative solutions and in what way should they evolve?

In this context, it is particularly worth making a reference to an interview with Prof. H-Ch. Pfohl entitled «Perfection in Logistics» [5] where he claimed the following: «In a competitive economy, logistic services are becoming more and more crucial. Contemporary consumers are provided many options to choose products based on highly advanced technology, the value of which being comparable. Therefore, in order to obtain the competitive edge, what matters is not the product alone but an efficient chain of supply. Logisticists should be prepared to face the unpredictability of forecasts and rapidly respond to the changing market conditions. Those that can meet these requirements will gain the competitive edge. Critical success factors in terms of the supply chain are the structure of regional networks, flexibility as well as management of risk and current assets [5]. The author of the publication quoted also stresses the fact that progress in a supply chain takes place through an ongoing process of improvements, and it is people that form the most innovative link in the supply chain. (...) What will the future bring? We shall see, but I

believe that development of the Internet and of the communication based on it may have a considerable impact on logistics [5]. »

H-Ch. Pohl referred to two breakthrough innovations introduced in logistics, i.e. a container, which completely revolutionised the material flow, and the RFID technology, which has improved the transparency of the supply chain, but he also drew our attention to such critical success factors as:

- in terms of the supply chain: structures of regional networks, flexibility, management of risk and current assets;
- increase of the recipients' expectations in the scope of lead times, availability and reliability of deliveries;
- what matters hugely is the preparatory services conforming with consumers' needs. With regard to the supply chain, the foregoing means that manufacturers should manufacture close to the consumer, so that they can rapidly respond to the demand;
- a key to success may become the supply chain segmentation targeting demand and specific needs of recipients. The supply chain segmentation may contribute to reduction of stock levels, and hence optimise costs;
- requirements related to safety and potential hazards occurring in the supply chain will also gradually grow in importance;
- another significant issue will also be the management of risk involved in the supply chain, as only 1/3 of companies studied have introduced the risk management component to their supply chain;
- those that manage supply chains should bear in mind that the society is aging and become aware of the implications of this phenomenon in terms of distribution in large towns;
- in the future, ecological aspects will play an increasingly important role and this trend must be taken into consideration in the supply chain management;
- ecology has become a completely new challenge for logistics companies. Protection of the natural environment and its resources should be an integral part of logistic strategies [2].

The aforementioned factors and change trends should be accordingly reflected in innovative logistic solutions. And through the scale effect, they should lead to emergence of further solutions enabling logistics operators to meet the requirements of the 21st century consumers.

The research conducted under the study entitled «Innovation Excellence in Logistics [6] has made it possible to establish the areas of logistic innovation and develop both general and detailed recommendations with regard to a specific potential for improvements. It has been evidenced that one should follow the following guidelines:

- modularisation of logistic services combined with cost reduction is currently a crucial target envisaged for innovations in logistics;
- cost-oriented innovations will be substituted with customer-oriented innovations;
- creating new services in order to meet the current requirements as well as creating new requirements and responding to them at the same time will become the most important target of innovations;
- the actions to be undertaken should enable increased transparency of the actions themselves;
- the incentives for the innovation development at providers of logistic services are mainly customer-oriented projects;
- understanding the dynamics of the customer's value perception entails significant opportunities for the logistic innovation development;
- latest achievements in the field of information and communication technologies and systems feature major innovative potential;
- the concept and the virtual reality itself as well as automated systems are particularly important in terms of innovation development;
- developing and implementing standards that will reinforce the inter-operability of supply chains and transparency of actions.

A company's innovative potential depends on the development of enterprise knowledge bases, created owing to effective utilisation of both internal and external rela-

tionships with partners. Their lacking as well as insufficient human and capital resources are main reasons for a failure in logistics. The largest potential for innovation introduction can be found in logistic systems and networks characterised by a high capacity to adapt and flexibility. Enterprises reporting high innovativeness ratios incur relatively lower costs related to logistics or gain higher margins.

An indicator of being innovative and modern in logistics is not only the set of solutions based on faster and faster computers. It is also, if not primarily, the way of thinking. And perhaps it is the excessive focus on technologies which causes that concepts and philosophies of action, growing in popularity abroad, remain practically unnoticed in a wider context of our country. Innovative solutions in logistics involve so much more than the mere improvement of the logistics processes themselves. What they also entail is the improvement of the team responsible for the performance, and hence conceptual implementation, of smart thinking as well as ongoing verification of work and involvement. It is the continuous watching over the quality of actions. It is the transparency of operations and honesty towards the customer. It is a solution which requires constant focus on the work, the team in which one works, the practices being implemented and the values pursued. It is an ongoing action which consists in seeking newer and better ways to accomplish logistic tasks. And last but not least, it is the satisfaction of the work done, the customers' respect and further developmental opportunities.

A success in modern logistics is not only determined by an innovative approach to the typical issues and tasks of the industry, but also by very high specialisation, mutual trust of partners, labour culture, rigorous cost management as well as speed and efficiency of resource exchange within a network. What should also be stressed in this respect is that, despite the aforementioned advantages of innovative logistics, no such model, concept or method of logistic management, not even the most innovative one, has ever been invented so far that would prove efficient in every situation.

Contemporary (global) supply chain management. The technological development

and competitive struggle have led us to a point where contemporary consumers are provided many options to choose products based on highly advanced technology, the value of which being comparable or less and less noticeable. Under such conditions, gaining and maintaining competitive advantage will become increasingly dependent on the efficiency of the entire supply chain rather than on the product alone. Therefore, the critical success factors in a supply chain are gradually also becoming the speed and flexibility of responding to the changing market situation, besides the chain's organisation (range) itself.

A supply chain should feature an improvement process constantly being performed. Hence the supply chain management or its coordination, in other words, is becoming a very significant task. One may now observe an increase of the recipients' expectations in the scope of lead times, flexibility, availability and reliability of deliveries. The customers' expectations and requirements are growing, and on the other hand, there is a need for cost reduction and limitation of the assets frozen in stocks. Reduction of the supply chain related expenditures is not only a direct path towards maintaining or even strengthening the company's competitiveness, but also expedience linked with functioning in harsh times of economic crisis, when a simple conjunction often occurs that whoever has cash at hand has the advantage.

What matters considerably for contemporary consumers is products and services matching their individual needs. Consumers are becoming more and more impatient. So how to face up to such challenges in terms of the supply chain? It requires speed of response to the customer demand and generates the need to manufacture close to a potential consumer. Hence there is a substantial necessity to manufacture in different parts of the world, which simplifies the supply chain of finished goods, but often complicates the process of supplying raw materials and semi-finished products. Facing such a situation, a key to success may become the supply chain segmentation targeting demand and specific needs of recipients. The supply chain segmentation may contribute to reducing stock levels, particularly of the goods

less popular among consumers, and may consequently lead to cost optimisation. Combining these concepts with EOQ (Economic Order Quantity), which remains to function, as the basic economic paradigm in the supply chain, is one way to find a solution and succeed in the contemporary world, full or more and more complex correlations and uncertainty.

Also the requirements related to safety and potential hazards occurring in the supply chain will gradually grow in importance. Not only will it result from the growing expectations of consumers, but also from their needs changing in a manner noticeable in a longer time horizon. Under such conditions, flexibility will most often decide about a company's competitiveness in the market. Furthermore, this problem will become even more complicated due to the society's ageing and migration towards large towns, which raises serious implications as regards distribution in urban areas. Moreover, in the future, ecological aspects will play an increasingly important role in the supply chain and this trend must be taken into consideration in the supply chain management.

Modern concepts implemented in supply chains should break the walls of enterprises, both the internal ones, separating artificially isolated organisational units (departments) from one another, and the external ones, for the sake of successful integration of the company's technology with its business, technical or social environment.

Based on considerations thus concluded, one should assume that the factors having an essential impact on supply chains (networks) in the next decade will include:

1. Consumer dialogue:
 - customer's preferences, personalised promotion;
 - orders, comments, demands;
 - mass adaptation of modern technologies.
2. Information sharing (network approach):
 - standardisation with regard to the scope and form of communication;
 - common platform for data sharing;
 - data extracted from various sources (cash points, forecasts, promotions, customer surveys, product circulation etc.);

- Global Data Synchronisation Network (GDSN);
 - global standards: shared identification mechanisms GTIN, GLN, EPC codes, GS1 communication standards, new networking solutions, e.g. EPCglobal networks;
 - growing importance of access to comprehensive information in a supply chain.
3. Synchronised production.
 4. Integrated logistics / home fulfilment.
 5. Sustainability:
 - sustainable development in the sphere of health care and healthy life style;
 - sustainable development of transport.
 6. Changes to the corporate culture:
 - increase of trust, shared strategies and tactics.

Safety of logistic processes.

One of important aspects of modern logistics is safety which has also become a serious challenge. According to a classical approach to this notion, one usually stresses the variability of demand, lengthening of supply chains, use of combined transport, disturbances in the utilisation of logistic infrastructure or the number of logistic operations performed under a supply chain.

However, one of the most serious reasons for the focus on safety matters in logistics is the terrorist threat and the global war fought against this phenomenon in every corner of the world, which has led to increased complexity and obstacles in the performance of logistic processes, particularly the transport related ones. The current state of challenges and the threats involved in this phenomenon as well as such issues as, for instance, growing international business fraud, have made it necessary to develop and implement innovative procedures based on new technologies, so that one can successfully face these threats. The large relevance of the issue in question has made numerous national governments as well as governmental and non-governmental organisations start perceiving safety and security of transport as a priority [7].

Cost optimisation in logistics.

Cost optimisation in logistics is a perma-

nent issue, which has even grown in seriousness due to the global economic crisis. The aforementioned concept of smart and innovative solutions is one way to optimise costs in logistics. Innovativeness in the sphere of logistic costs does not only come with a completely novel approach to this problem, but in many cases, it will consist in applying a different, more up-to-date and unconventional attitude to proven methods of cost optimisation. In this respect, one may highlight other innovative concepts, including those pertaining to standardisation, changes to the logistic cost structure, implementation of the same IT system in all company structures, application of in-house IT solutions, smart solutions or making use of what external partners offer (outsourcing).

An attempt to comment upon the aforementioned solutions requires putting an emphasis on the fact that they may often coexist in correlation, conditioning the efficiency of one of them through the functioning of another one, or yet a completely different element. It may well result from the fact that, in order to be able to respond effectively and appropriately to all changes, one needs an ongoing analysis of the company's general financial standing, this being practically impossible in the present times without using IT systems. The same systems will be used to optimise costs in general and in individual spheres (structures). Information systems will to a large extent ensure correctness of the decisions made with regard to cost reduction owing to the possibility of conducting various simulations.

The said simulations constitute one of the most basic tool enabling the right decision to be made in multiple spheres of business activity, such as, for instance, in terms of storage cost optimisation or transport consolidation. Generally speaking, owing to simulations, one can find the best proportions enabling the costs to be reduced while, at the same time, the company's priorities are maintained.

Transport consolidation is yet another solution which enables reduction of costs in logistics. It is one of the best known and proven methods, however, it is worthwhile considering it anew in the contemporary context. Orders are smaller and smaller, and they are placed more frequently nowadays. This noticeable and grad-

ually expanding trend is related to fragmentation of shipments and requires a new approach to consolidation problems. Modern and well thought out concept of consolidation, implemented via a thoroughly selected operator in disposal of a well-developed network of connections, makes it viable to complete even the smallest orders sent from any place in the world. Such solutions are also very positively perceived from the ecological perspective and correspond well with the concept of corporate social responsibility.

It is also worth reviewing the application of modern, innovative and smart solutions once again in the context of logistic cost reduction or optimisation. This is a particularly complex issue, since there is no doubt that implementation of innovative solutions is costly, as one must first incur the necessary expenditures (invest the capital) in order to gain benefits of reduced logistic costs after some time. One must also bear in mind that application of innovations is often no guarantee of direct cost reduction, but their actual purpose is to increase the competitiveness of a company as well as the services or products it delivers. Here the problem becomes even more complex, but it is doubtless that, in a longer time horizon, not only are investments profitable but virtually necessary.

In the context of innovativeness, what is also worth stressing is the matter of a uniform IT system being implemented across the entire company, even the most expanded one. It is now a necessity but also the simplest way to reduce logistic costs. Unification of the communication system within the same network functioning in a company entails rapid and accurate data exchange and savings resulting from reduction of the time needed for information transfer, equipment operation, decreasing the number of errors and hence the working time as well. Using a single system across the whole company is a possibility to optimise virtually all processes, and the more advanced the system integrated with other state-of-the-art technological solutions, such as e.g. shipment tracking, the higher the benefits. A well-planned and implemented IT system reinforcing management will not only enable the work efficiency to be increased, but also, owing to the

wide spectrum of information obtained in real time, it will guarantee suitable and efficient management of the business, and so of the logistic processes as well. Such a system is a particularly important value for a company, but also a necessity when it comes to operating in the rapidly changing economic reality of today.

Information systems are not only a guarantee of quick and accurate information exchange. Companies should be in disposal of software supporting integrated management of as many of their resources as possible. There is an increasing number of ERP class systems available in the market, and there are numerous dedicated solutions such as warehouse management and transport management modules. One can also develop comprehensive in-house information solutions based on the variety of computer applications already implemented in the company. It is obviously difficult to indicate the single correct and efficient solution to the problem of "buy or develop". Not always is a company in disposal of such capacities to develop their own system, and on the other hand, they may often be short of sufficient funds to purchase ready-made solutions. There are definitely more dilemmas to this matter. Besides well chosen components of the system, precisely adapted to the company's needs, one must not forget about the system implementation costs to be kept as low as possible, since every software purchase usually involves the necessity of incurring additional costs of adapting it to the actual needs of the given company, introducing improvements and servicing.

Appropriately prepared and precisely implemented system reinforcing the company management, regardless of the purchase and implementation costs incurred, should lead to logistic cost reduction and hence to a return of the financial outlays incurred, and in a longer time horizon, ultimately enable the company to increase the profit. However, this assumption does not always come true. One must be aware of the scale of the company's operations. The smaller the company, the higher the risk that the ERP system proves to be a cost without the return envisaged. Therefore, regardless of all the efforts related to purchasing new ERP class IT solutions, which usually turn out to be rather expensive, one had better consider the option of

developing one's own solutions, whose most fundamental and unquestionable advantage is the adaptation to the needs, the structure and the equipment the given company has. One can develop more comprehensive in-house information solutions based on the variety of computer applications already implemented in the company. This option, however, may be too unattractive and unacceptable for larger partners, particularly the foreign ones. One should also not forget about the emergence of the latest solutions applied in this respect, especially while seeking state-of-the-art and innovative SaaS based solutions (Software as a Service) which assume the operations to be performed in a cloud, meaning that services are purchased in the form of access to advanced software, or rather to its access points, to be more precise. Cloud computing is one of the leading trends of the global IT market development [8]. And it is the transfer into the cloud that contemporary companies may perceive as a source of financial benefits and opportunities to maximise the process optimisation.

Next to usually expensive investments, such as e.g. management supporting systems, one may speak of far simpler solutions which can also greatly contribute to reducing costs of logistics. Those would certainly include standardisation. Standardisation of logistic processes and operations across the entire company not only leads to cost reduction but also to properly arranging business operations in multiple spheres, and hence it decreases the number of possible errors to be made. Standardisation of the scope of services, for instance, as well as of the manner in which they are rendered enables application of a proven process, already optimised in terms of costs. Standardisation facilitates execution of simple tasks, such as purchasing, as well as the most complex ones. Even the contemporary trend of product individualisation, more and more clearly noticeable, does not contravene standardisation, because it is possible to apply the same standard actions to individual components, even in the most complex and individualised processes. The best piece of evidence highlighting the role and relevance but also outcomes of standardisation is the ongoing, gradual displacement of general cargo vessels in international transport

with container ships or the increasing share of container-based shipments in air transport.

To conclude the considerations on reduction of logistic costs, it is worth focusing on one more aspect of the problem, namely on outsourcing. The organisation and performance of logistic operations can be commissioned to an external company, especially when the parent company is facing problems appropriately executing the chosen actions and logistic processes. The benefits of outsourcing include numerous factors, such as the company's orientation on the core business, gaining access to high-quality professional services, releasing internal resources to be utilised for other purposes, substituting fixed costs with variable ones, risk diversification, effective solving of the problem with logistics functioning poorly in the company. Despite all these unquestionable advantages of outsourcing, the decision to make use of it must be preceded with a thorough analysis of the parent company's current standing. One of the contemporary examples of innovative outsourcing is the aforementioned concept of SaaS, particularly in a one-to-one model which assumes that the equipment and the application remain with the provider incurring all the maintenance costs. On the other hand, a company deciding to implement this type of SaaS can actually reduce the expenses being incurred to those system features that they use at the given time. They pay for what they use, and not for the entire system. Consequently, it may be anticipated that SaaS models will become more and more popular in the nearest future, particularly those that enable making use of professional tools on considerable reduction of the related expenses and the time required to implement them as well as on the total cost of ownership maintained on a low level. Such solutions may be efficiently applied to increase the competitiveness of companies.

Business orienting towards the consumer's need and expectations.

A major issue is to fully understand that while solving complex problems the modern logistics is facing in the age of market economy, the attention must be focused on the customer whose choices determine the success or fall of logistics enterprises [9]. Therefore, being fully aware of this fact must become the found-

dation of activity and evolution of enterprises, and so the development prerequisite and target, at the same time, should be the orientation towards the consumer's needs and expectations. On the other hand, the key to development and implementation of modern solutions is the ability to obtain information and utilise it effectively. In this respect, one should not forget that excess of information and its inappropriate utilisation may be deleterious to the entire functioning logistic system, causing information jams and making it impossible to use the dedicated specialist software. The foregoing particularly applies to a situation when the system is being clogged up with news irrelevant from the logistics perspective, and hence the selection and distribution of data must be carefully thought out, particularly since modern technologies enable acquisition of enormous amounts of information transferred via the global network. Active smart logistics being currently analysed is but a necessity and a prerequisite of survival in the market of logistic services. Consumers and business partners seek such service providers which are known to be reliable and efficient, and whose expectations can be satisfied. Therefore, the logistics companies' capacity to implement modern solutions and keep increasing the quality of their services is of utmost importance in terms of gaining a competitive edge in the market, which is becoming more and more difficult and demanding.

Ongoing self-improvement and employee education.

The contemporary reality challenges employees, and managers in particular, with tasks of growing magnitude and difficulty. They must constantly solve a number of new subject matter related problems as well as methodological and organisational ones. Ongoing changes certainly lead to an increase of operating efficiency in various dimensions. However, achieving such effects requires ongoing mobilisation and continuous self-improvement as well as knowledge in the given field of expertise, but also in numerous other areas not always directly related to the major one.

A human thought, an idea, an intention to overcome obstacles or curiosity are inherently rooted in the origins of all man's actions and their outcomes – new inventions or technolo-

gies. Their development, or often merely the predictable possibility of implementing a certain concept, becomes the foundation for building new theories and using them in practice, also in the field of logistics. An equally common phenomenon is the lack of technical capability to satisfy certain needs, those occurring in an objective reality, being the reason for further studies and the engineering development, but also for utilisation of past inventions, seemingly unrelated to logistics, in order to develop new prospective logistic concepts.

Finally, there is no doubt that the largest challenge to logistics is the people (personnel of logistics companies), namely their mobility, skills and capacity to adapt to new and dynamically changing conditions. It is also necessary to combine solid but frequently also outstanding professional skills with ambition, creativity and experience.

One must also apply new, high education standards in logistics. Better education enables better understanding of new challenges and makes it possible to find a way to overcome them. Hence the widely promoted quality of logistics education should not only be considered as a paradigm for its appropriate development in the future, but also as a necessity in a society that many theoreticians refer to as *knowledge-based society and economy*.

In order to recapitulate the foregoing considerations of the contemporary supply chain, it should be stressed once again that its success is determined by very high specialisation, mutual trust between partners, labour culture, rigorous cost management as well as rapid and efficient exchange of resources in a network [10]. A property common to all forms of network-based organisation is the cooperation with various kinds of autonomous companies and organisational units under conditions established according to the principles of formalisation and coordination of the tasks at hand.

Conclusions. The contemporary market lacks many barriers, increasing the level of competition on an ongoing basis, highlighting the need for more and more efficient logistic processes to be performed. The most basic challenges logistics must face include reconfiguration, integration and optimisation of the entire logistic network, changes to the arrange-

ment of its elements, transport planning in the tactic and operational dimension as well as stock management. The complexity of problems and the enormous number of tasks that logistics must accomplish in combination with its global nature make it one of the most difficult to handle and most important elements of contemporary economy. As complex as they are, logistic systems become additionally complicated through globalisation and movement of manufacturers searching for more beneficial manufacturing conditions, increasing requirements of service recipients resulting from large competition in the service market and performance of reverse logistics tasks under closed-loop systems. All these factors are responsible for the growing need for development of new methods of advanced planning and its automation.

Logisticists should not tolerate any stagnation while facilitating the bonds established in the relationships between supply chain partners if they strive to ensure stable flow of deliveries, safety, efficiency and cost reduction under all conditions and relationships. In order to meet such expectations, every logistics company of the 21st century is obliged to use the latest technical achievements and innovative technologies in logistic processes [2].

The spheres discussed should be treated as an open set, and the future will certainly bring the necessity to revise them and work on a far more extensive range of notions. It is obviously difficult to determine with absolute certainty what the future will be like, but one should expect that a considerable impact on logistics will be exerted by further development of communication technologies, and the Internet in particular.

Not only the communication systems but also other spheres of our social and economic life are undergoing permanent changes due to the dynamics of economic growth. The present merges with the future causing new streams and developmental trends to be generated. It requires intellectual courage to develop new concepts and solutions, new ways of thinking and acting, on the one hand, but on the other hand, also very rational and well thought out efforts based on knowledge and experience. All these actions must resist the pressure of time. While

operating in logistics, one cannot postpone the decisions (transformations) that are to be made today.

Bearing the foregoing conditions in mind will make it possible to more easily understand the problems of logistics, notice new trends and facilitate the communication between employees, but it will also allow for acquiring new skills and they will subsequently enable simpler adaptation to the changing conditions of work and the environment.

The development of logistics brings demand for highly qualified personnel on all levels of employment. It is undoubtedly through the education of appropriate professional circles that the concepts and practices of logistics should be absorbed by enterprises. Developing a valuable workforce background in logistics is at the very core of the enterprise efficiency and constitutes an actual challenge that the Wrocław School of Banking has attempted to face.

The aforementioned problems and dilemmas as well as their partial solutions are the essence of education in the field of Logistics at the Wrocław School of Banking. Correlating these problems with the practice, applying the best standards (good practices), ongoing improvement of the contents, forms and methods, including the knowledge and experience of lecturers, ensure the quality of education. And since the logistic solutions being applied in a company should lead to increasing its competitiveness, it is our ambition to educate the best logistics personnel as possible, people successful in the labour market owing to their knowledge, ways of thinking and the idea of innovativeness they have been instilled with. However, the main goal is to make our graduates successful owing to the ability to act innovatively and unconventionally when performing contemporary, more and more complex logistic tasks.

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У статті представлено сучасну логістику як складову інноваційного процесу. Проаналізовано методи й підходи до управління логістикою. Розглянуто проблеми розумної логістики, інноваційності та інноваційного процесу, глобального управління ланцюгами постачань, безпеки логістичних процесів, оптимізації витрат у логістиці. Актуалізовано орієнтацію бізнесу на потреби споживачів, необхідність самовдосконалення й освіти працівників.

Ключові слова: логістика, управління ланцюгами постачань, розумна логістика, інноваційність.

В статье представлено современную логистику как составляющую инновационного процесса. Проанализированы методы и подходы к управлению логистикой. Рассмотрены проблемы умной логистики, инновационности и инновационного процесса, глобального управления цепочками поставок, безопасности логистических процессов, оптимизации затрат в логистике. Актуализовано ориентацию бизнеса на потребности потребителей, необходимость самосовершенствования и образование работников.

Ключевые слова: логистика, управление цепочками поставок, умная логистика, инновационность.

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