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Contents

INTRODUCTION

We are happy to invite you to get acquainted with the first issue of the new scientific and practical publication "Intellectualization of Logistics and Supply Chain Management".

We strongly believe that the launch of this magazine indicates the objective need to rethink a wide range of issues related to the development of theory and practice in logistics and supply chain management, awareness of the need to unite the scientific community and logistics practitioners, dissemination of modern knowledge and best practices for innovative development of the logistics services market.

The first issue of the magazine is published at a difficult time. The global coronavirus pandemic and the deep economic crisis have significantly worsened business activity in the world. Currently, global supply chains are collapsing, international trade is declining, and competition between global and regional logistics operators is intensifying. The most common thesis is that the world will never be the same again. Industry experts predict the emergence of new, more flexible and adaptive supply chain management strategies and approaches to logistics business process management. The trend towards collaborations, cooperation and unification of services is emerging, comprehensive proposals for clients are being developed. There is increasing talk about the need to build bimodal supply chains, which involves the development of different decision-making scenarios: the traditional approach - cost-effective efficiency, low risk, high predictability; a new approach "second mode" - rapid recognition of opportunities, adaptability, willingness to solve unexpected problems and look for new opportunities.

Radical transformations of the global and national markets for logistics services require appropriate scientific support. Logistics science has a special role to play in this process. Initiating the emergence of a new journal, we decided to focus on its coverage of problematic aspects of the formation and development of logistics systems at the micro, mezo and macro levels, supply chain management, digitization of logistics, methods and tools for optimizing processes in logistics and supply chains, sociopsychology relations and network interaction of enterprises using cloud technologies, artificial intelligence, e-learning, neural business process management systems, etc.

Therefore, we invite scientists, researchers and business representatives, as well as our colleagues from abroad, to cooperate and present the results of scientific research, to discus and debate on them, to work together to develop the scientific theory of logistics and promote mutual intellectual enrichment.

We hope that the new scientific publication will become a theoretical guide for young researchers and representatives of other fields.

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SUPPLY CHAIN SPIRAL DYNAMICS

Volodymir Koulik, ZAMIAR Zenon. «Supply chain spiral dynamics». *The article is devoted to the research of modern tendencies of defining the essence of supply chain management as an innovative philosophy of spiral business dynamics. The research is based on the generalization and application of the basic principles of wave theory of development, classical theory of marketing, modern provisions of the theory of TQM and conceptual provisions of the theory of spiral dynamics. A new look at supply chain architecture, from identifying growing needs for specific products and ending with utilization, namely the emergence of new links in the chain of transformation of resources such as the stage of intelligent innovation processes to create modifications and upgrades or design a new product to meet growing needs. A multicomponent process of change is considered in view of current trends. The application of the theory of the spiral dynamics of the supply chains is a logical and predictable extrapolation of the general tendencies of the development of the life support system and the growing needs of society, starting from the "subsistence economy" and to the creation of modern global economic associations such as transnational corporations and international transport corridors. economic associations of countries and international programs of scientific search in the field of artificial intelligence and development of the cosmos.*

Keywords*: strategy, integrated logistics, social psychology, supply chain, spiral dynamics of development, logistics.*

Володимир Кулик, ZAMIAR Zenon. «Спіральна динаміка ланцюгів постачань». *Стаття присвячена дослідженню сучасних тенденцій визначення сутності управління ланцюгами постачань як інноваційної філософії спіральної динаміки бізнесу. Дослідження базуються на узагальненні та використанні основних положень хвильової теорії розвитку, класичної теорії маркетингу, сучасних положень теорії TQM та концептуальних положень теорії спіральної динаміки. Новий погляд на архітектуру ланцюга постачань, починаючи з виявлення зростаючих потреб в конкретних видах продукції і завершуючи утилізацією, а саме появі в структурі ланцюзі нових ланок трансформації ресурсів таких як етапу інтелектуальних інноваційних процесів створення варіантів модифікації та модернізації або розробки проекту нового продукту для задоволення зростаючих потреб. Розглянуто мультикомпонентний процес змін з огляду на тенденції сучасності. Застосування теорії спіральної динаміки ланцюгів постачань є логічною і передбачуваною екстраполяцією узагальнених*

7-16
v.1 (2020)
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тенденцій розвитку системи забезпечення життєдіяльності та зростаючих потреб суспільства починаючи від «натурального господарства» і до створення сучасних глобальних господарських об'єднань, таких як транснаціональні корпорації та міжнародні транспортні коридори й трансконтинентальні ланцюги постачань, економічні об'єднання держав та міжнародні програми наукового пошуку в галузі штучного інтелекту та освоєння можливостей космосу.

Ключові слова: *стратегія, інтегрована логістика, соціальна психологія, ланцюг постачань, спіральна динаміка розвитку, логістика.*

Владимир Кулик, ZAMIAR Zenon. «Спиральная динамика цепей поставок». *Статья посвящена исследованию современных тенденций определения сущности управления цепями поставок как инновационной философии спиральной динамики бизнеса. Исследования базируются на обобщении и использовании основных положений волновой теории развития, классической теории маркетинга, современных положений теории TQM и концептуальных положений теории спиральной динамики. Новый взгляд на архитектуру цепи поставок, начиная с выявления растущих потребностей в конкретных видах продукции и заканчивая утилизацией, а именно появление в структуре цепи новых звеньев трансформации ресурсов как этапа интеллектуальных инновационных процессов создания вариантов модификации и модернизации или разработки проекта нового продукта для удовлетворения растущих потребностей. Рассмотрены мультикомпонентный процесс изменений учитывая тенденции современности. Применение теории спиральной динамики цепей поставок является логичной и предсказуемой экстраполяцией обобщенных тенденций развития системы обеспечения жизнедеятельности и растущих потребностей общества начиная от «натурального хозяйства» и к созданию современных глобальных хозяйственных объединений, таких как транснациональные корпорации и международные транспортные коридоры и трансконтинентальные цепи поставок, экономические объединения государств и международные программы научного поиска в области искусственного интеллекта и освоения возможностей космоса.*

Ключевые слова*: стратегия, интегрированная логистика, социальная психология, цепь поставок, спиральная динамика развития, логистика.*

Logistics' rapid development in the modern world economy is a critical factor in the cost and products value building that meet the growing needs of society and consumers. Management of the business processes in cross-cutting integration through the supply chain and the transformation of primary resources into final products creates the necessary conditions for the continual development and improvement of logistics activities. According to Donald Bowersox and David Closs, the main paradigm of modern logistics is the creation of a logistic system in the form of a unified holistic association, the integration of which provides a much more prominent performance than a separate management of individual logistic functions [2]. After all, when every business process and operation is integrated into interrelated flows, chains, and networks, they create the key area of logistical competence in the economy, being the source of the competitive advantages formation for certain types of products and their producers [1].

The theory of integrated logistics was formed in the end of the last century. Integrated logistics involves the creation of a holistic cross-flow control system that passes through all integrated chain's links, which goes through the stages of product's life cycle starting with design, supply of resources, then production and straight to the end user and after-sales service. The integrated logistics concept relies on the enterprises personnel' efforts unification - logistic partners and their concerted action based on the common goals and the entire supply chain efficiency criteria [12].

The integrated logistics concept has been transformed into business-concept Supply Chain Management (SCM). Douglas M.

Lambert and Stoke J.R. define supply chain management as the integration of key business processes that begin with the end-user and cover all suppliers and goods, services and information manufacturers, add value to consumers and other stakeholders [10]. This business concept develops on the basis of inter-functional and inter-organizational coordination of interconnected and consistently ordered elements of a complex logistics system - the supply chain.

Supply chains' functioning is associated with considerable uncertainty. Uncertainty is a general indication of various kinds of random events that violate the normal operation of the system and create the risk of not receiving the expected results. The reasons for the uncertainty may be: changing needs, changing requirements for a product that is designed to meet the need, science and technology innovations, as well as demand fluctuations, forecast errors, loss of resources, data inaccuracy, managers' miscalculations, inaccurate transmission of information and the interpretation of various events, delayed receipt of an order from the client, unexpected production failure, damage to the goods at delivery to the consumer or delivery outside the place of destination, targeted actions on the destruction of the supply chain (terrorism, goods' thefts), and such contingencies as political or natural conditions changes.

Uncertainty is one of the main problems that could arise in supply chain management. All supply chain links and all functional cycles of logistics exposed to it, that's why the uncertainty factors and risks should be taken into account both when planning the supply chain, and when implementing the plan. This significantly complicates planning in the supply chain, reinforces the requirements for the plans' flexibility and the development of mechanisms for supply chain participants coordinated actions in both regular and extraordinary situations. As uncertainty is eliminating (minimizing), the efficiency of supply chain management is raising.

Thus, minimizing uncertainty and timely adjusting actions through operational changes in the flow of the supply chain and the activities of its business entities are key tasks of SCM.

Logistics Strategic Management Specialists (Stoke and Lambert) argue that managing partner engagement will only succeed if it is perceived as a "multicomponent process of change" that takes into account simultaneously and in the full range all components of the supply chain and on all the links [10].

The implementation of such approach is proposed to be reached using the author's scheme of cascade-integrative method of change management in the supply chain system.

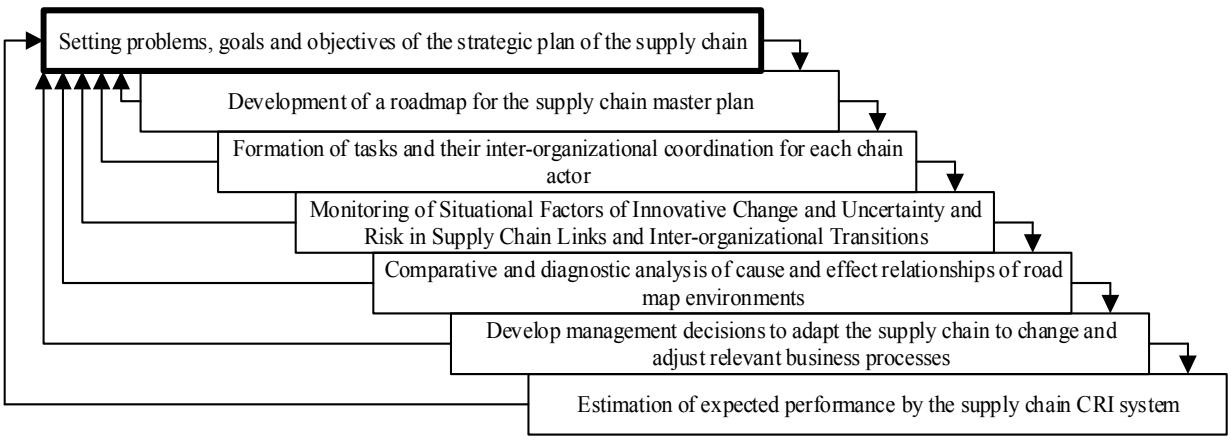

Fig. 1. Cascade-integrative change management in supply chain

Taking into account the accelerating pace of innovation in the development of equipment and machinery, technology and their consumer market, as well as the expedited change in the consumers' needs and preferences, according to many researchers, the business concept of SCM requires a wider interpretation of the concepts and components of integrated logistics in general and the nature and structure of the supply chain before all as a single business complex - systems of resource support for the design, production and consumption of products which are needed to meet the growing demands and new needs of society.

This paper is aimed to study and elaborate separate discussion positions and ideas about changing the paradigm of supply chain formation and its performance management. The research is based on the synthesis and use of the basic provisions:

— the wave theory of development and changes in technological methods (by M. Kondratiev and J. Schumpeter) in the formation of strategic views on the changes dynamics in logistics systems of each layout and the continuous improvement and modernization of subsystems and business processes of functional logistics [11];

— the classic Philip Kotler's Marketing Theory and the Maslow's hierarchy of needs [8]. After all, with a certain stability and persistence of representations about the generalized term "necessity", the complex (spectrum) of "localized needs" is growing constantly for its satisfaction, which in turn are disaggregated into the specified "needs in certain products or services", which individual life cycle continually shrinks while the growth rate of their innovative update increases all the time. Consumption products, in line with the consumer response and the achievements of science and technology, have to constantly improve their functional characteristics, economic parameters by modifying, modernizing or transitioning to a fundamentally new level of needs' satisfaction [9];

— modern provisions of the TQM theory - the total quality management by W. Edwards. Deming and Joseph Juran, according to which the quality of the product is provided by a closed system - "quality loop" - interconnected processes of managing the technological complexity and quality of all successive stages of the design, production and use of a product or service with their constant changes, improvements and refinements during the life cycle [5, 7];

— the theoretic provisions of the concept of spiral dynamics by Beck and Cowan as an instrument for the formation of the global outlook and system values of individuals and society, as well as changes in priorities in their interrelations for different levels of human development and socio-economic systems [3, 4]. The transfer of these problems from pure sociopsychology into the most pragmatic level of organizational-technological and socio-economic tasks of supply chain management allows us to scientifically substantiate the necessity to change the focus from managerial egocentrism to the integration sociocentrism, which is typical for such virtual associations with the partner heterarchy system in the management of their functioning.

The principles of system integration and globalization can extend the concept of the supply chain, not as a system of successive "door-to-door" movement of supply objects, but as a system of ordered business processes meeting the needs of "0 to 0", that is, from the moment when a need occurs and up its full satisfying by means of the necessary complex of products and services for this purpose - objects of supply. This approach radically changes the architecture of the supply chain due to the emergence of new resources transformation elements in the chain structure:

— separate parts of business processes of resource - material, energy, financial, cognitive - ensuring the state of effective and

competent consumption (use, exploitation) of the product, its recycling and, then, utilization;

— consumers' final assessment stage of the used product conformity level based not only the international standards ISO, but also with the individualized needs and requirements of the client;

— the stage of intellectual innovation processes creating options for modification and modernization or design of a new product to meet the growing needs and requirements of both society and individual consumers [6].

Determining the need for a single common point, "0 →0*" of the supply chain origin and finalization, fully complies with the SCM concept to begin the supply chain key business processes formation from the end user and its needs.

Since in our case the supply chain end point is its return to its starting "0", but already at the estimated level "0*", as a result of needs' satisfaction or their change, the supply chain graphic representation might be expedient not as a linearly ordered set of stages and logistics business –processes, but as "loop-spiral" of the full cycle of supply management. This chain form provides implementation of one of the basic requirements for a modern management system - the system's closed contour presence with feedback in conditions of high uncertainty and risk at the business process docking stages and the transition of transformed supply objects in the logistics chain from one economic entity to another.

The global supply chain, focused on the full satisfaction of the generalized need-"necessity", takes into account its differentiation to local needs and, correspondingly, forms a local logistics supply chains system of a specific set of tangible and intangible products for the comprehensive provision of specific needs of consumers.

Fig. 2. Loop-spiral of global supply chain

Thus, the loop-spiral of the supply chain is a complete set of logistic chains and flows of homogeneous supply objects - resources, parts, semi-finished goods, goods, etc., as well as the stages (links) of their gradual technological transformation into final products to meet the needs of consumers (Fig. 2).

The main stages of the objects transformation in the global supply chain are the following:

0 — identifying specific needs through awareness of its importance for the consumer;

1 — product concept generating to satisfy the need by transforming intellectual search into the product idea;

2 — project development concerning the needed product for consumers through the use of intellectual resources to create the main project components: constructional, technological, resource, investment, informational;

3 — resource source search and order placement by transforming the need in the resources into supply contracts;

4 — product manufacture of the required quality and functionality as a result of the resources transformation into specific products;

5 — product transformation into the good as a result of its commercialization;

6 — good distribution and its delivery to the consumer through order transformation into the object of ownership or leasing;

7 — product effective consumption (use, exploitation);

8 — logistic service and product of consumption recycling through the restoration of lost properties;

9 — product utilization and formation of secondary resources as a result of their processing;

10 — determining the level of customer satisfaction and the need for new products to meet the needs through the formation of new product requirements;

0* —formation of an updated need in a new or upgraded product.

— local logistics flows of displacements of homogeneous objects of supply between the points of their transformation.

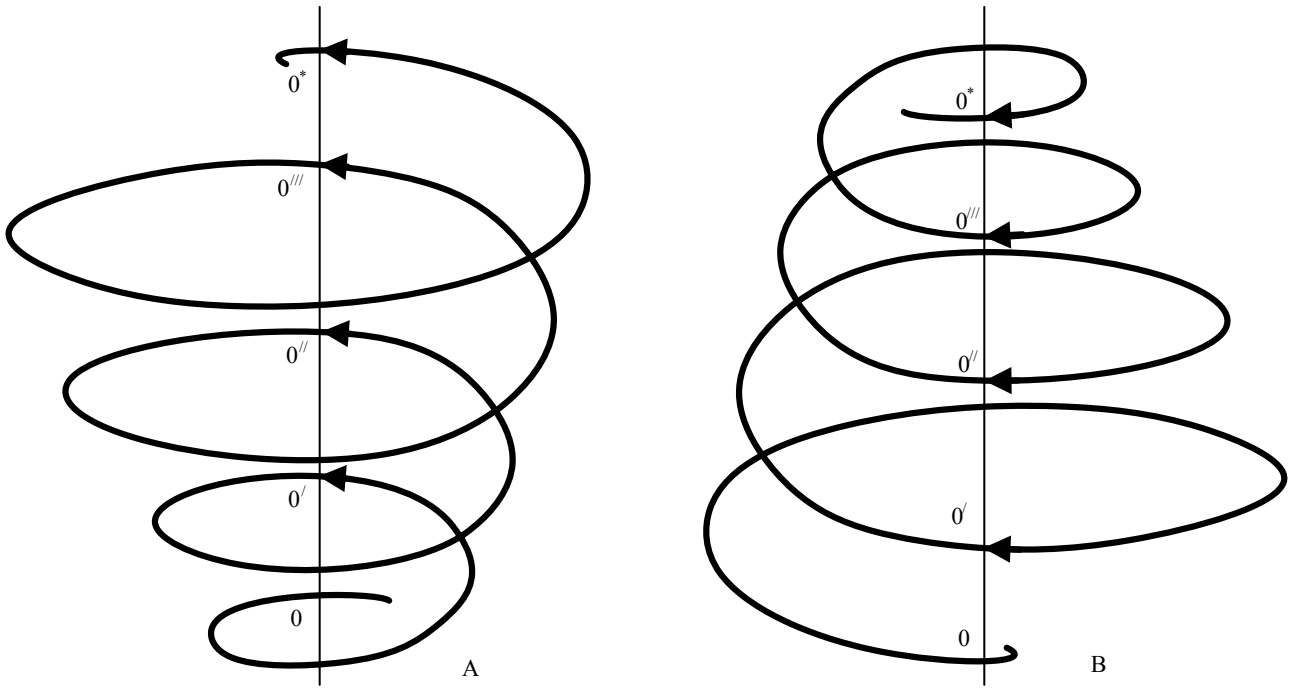

Fig. 3. Spiral funnels for increasing (A) and degrading (B) supply chains

The spiral dynamics concept of development assumes the formation of the next turn of the spiral in accordance with the most currently relevant values for society and individuals, which consistently develop on the basis of the previous values system and become dominant, then to give way to a more progressive stage of development. This means that at each stage of development, a specific system of production relations that corresponds to the level of intellectual, technological, informational state of the technological structure and society as a whole is created.

Clare Graves came to the conclusion that our society has reached the period of the world centered development stage, which has a global systemic vision of the unity of all processes, the flexibility and pluralism of human and inter-organizational relations, the tendency to integration and team work.

Main provisions of the supply chain formation and management concept are consistent with all of these principles. Practice empirically proves the unconditionality of the spiral nature of the movement and the scale changes of the supply chains loops. These changes, on the one hand, are oriented towards innovative developments of future products and forms and methods of their supply to consumers, and on the other hand, on previous trends in supply chain functioning. Therefore, graphically, the spiral of the chain development has a non-cylindrical, but a cone shape of the "spiral funnel" type of global supply chains. "Spiral funnels" can have different directions and forms of development:

— for degrading chains of fading needs that do not meet the present requirements to products - supply objects, "funnel" is narrowing, and individual links of supply chains are simplified;

— for increasing supply chains of innovative products and meeting new consumer needs, the "funnel" is expanding due to increased demand, the development of effective logistics infrastructure, globalization and the integration of logistics functions.

The needs category inclusion as a source of efficient supply chain management and as a whole spiral dynamics of integrated logistics concept is based on the voluntary uniting of the all enterprises concerted efforts - supply chain participants to achieve a common final result - meeting the consumers' needs. Harmonization of changes in the functional business processes and actions of the chain participants in space and time in response to updated consumer requests is carried out through logistic coordination based on:

— organizational unity of flow processes in all links and at all stages of local logistics chains and flows;

— the target strategy of the global supply chain spiral dynamics development, fixed in the agreements between its participants;

— technological unity of unified business processes and international standards and logistics requirements;

— diversified activities and conscious responsibility of the supply chain participants;

— economic unity of the entities' efforts in forming the value chain of integrated logistics services;

— information unity of flow processes as a result of business entities participation in the formation and use of a common information platform for global supply chains at all levels of management.

Conclusions The idea of the spiral dynamics of supply chains is a logical and predictable extrapolation of the generalized tendencies in the development of the system of providing vital functions and growing needs of society from the "natural economy" to the modern global economic associations, such as transnational corporations and international transport corridors and transcontinental supply chains, economic state unification and international research

programs in the field of artificial intelligence and development of space capabilities.

All of these trends in the world and regional economies development are directly related to the formation of new perspectives on the current and future needs of society and their satisfaction logistics. Consequently, the concept of spiral dynamics of supply chain development on the principles of globalization, integration and partner interaction could contribute to the search for new forms, methods and tools for supply chain management as a business concept of the economic system of modern logistics.

Certain provisions of this research are only fragmented and sketchy, so they can be controversial and need further development. Interested scholars and practitioners of the logistics community are invited to discussions and debates.

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INTEGRATED LOGISTICS SUPPORT FOR THE LIFE CYCLE OF BUILDING OBJECTS

Volodymir Marchuk, Henryk Dźwigoł. «Integrated logistics support for the life cycle of building objects». *The role of integrated logistical support in the after-sales stages of the life cycle of construction sites is considered. It is shown that the effective management and operation of buildings and structures, their engineering equipment, is impossible without the analysis of logistical support, which is carried out at the design stage and is refined at the following stages of the life cycle of construction objects on the basis of accounting and analysis of operational information on the management of technical condition of construction. An information model of integrated logistic support for the life cycle of construction structures has been developed. It is shown that the core of the information model is an integrated information environment that contains information about the construction object, resources and processes, ensures that the data involved in the life cycle of the entity is stored and accessible. Data is added to the information environment by all participants throughout the lifecycle of the objects, allowing you to receive and analyze up-to-date project documentation and visualizations at any time. The stages of the life cycle of construction objects in an integrated information environment are analyzed.*

Keywords*:* integrated logistical support, life cycle of a construction object, BIM technologies, information model, logistic analysis.

Володимир Марчук, Henryk Dźwigoł. «Інтегрована логістична підтримка життєвого циклу об'єктів будівництва». *Розглянуто роль інтегрованої логістичної підтримки на після продажних стадіях життєвого циклу об'єктів будівництва. Показано, що ефективне управління і експлуатація будівель і споруд, їх інженерне оснащення, неможлива без проведення аналізу логістичної підтримки, яка здійснюється на стадії проектування і уточняється на наступних стадіях життєвого циклу будівельних об'єктів на підставі обліку та аналізу експлуатаційної інформації з управління технічним станом об'єктів будівництва. Розроблена інформаційна модель інтегрованої логістичної підтримки життєвого циклу будівельних споруд. Показано, що ядром інформаційної моделі є інтегроване інформаційне середовище, яке містить відомості про об'єкт будівництва, ресурси і процеси, забезпечує збереження і доступність даних тим суб'єктам, що беруть участь у життєвому циклу об'єкту. Дані додаються в інформаційне середовище усіма*

учасниками протягом всього життєвого циклу об'єктів, що дозволяє в будь-який момент часу отримувати актуальну проектну документацію і візуалізації, а також її аналізувати. Проаналізовано стадії життєвого циклу об'єктів будівництва в інтегрованому інформаційному середовищі.

Ключові слова: інтегрована логістична підтримка, життєвий цикл будівельного об'єкту, BIM-технології, інформаційна модель, логістичний аналіз.

Владимир Марчук, Henryk Dźwigoł. «Интегрированная логистическая поддержка жизненного цикла объектов строительства». *Рассмотрены роль интегрированной логистической поддержки на после продажных стадиях жизненного цикла объектов строительства. Показано, что эффективное управление и эксплуатация зданий и сооружений, их инженерное оснащение, невозможно без проведения анализа логистической поддержки, осуществляемой на стадии проектирования и уточняется на последующих стадиях жизненного цикла строительных объектов на основании учета и анализа эксплуатационной информации по управлению техническим состоянием объектов строительства. Разработанная информационная модель интегрированной логистической поддержки жизненного цикла строительных сооружений. Показано, что ядром информационной модели является интегрированное информационное пространство, которое содержит сведения об объекте строительства, ресурсы и процессы, обеспечивает сохранение и доступность данных тем субъектам, которые принимают участие в жизненном цикле объекта. Данные добавляются в информационную среду всеми участниками в течение всего жизненного цикла объектов, что позволяет в любой момент времени получать актуальную проектную документацию и визуализации, а также ее анализировать. Проанализированы стадии жизненного цикла объектов строительства в интегрированном информационном пространстве.*

Ключевые слова*: интегрированная логистическая поддержка, жизненный цикл строительного объекта, BIM-технологии, информационная модель, логистический анализ.*

Research Justification. Today, the construction projects' life cycle processes are undergoing major changes related to the rapid development of innovative technologies that allow to optimize the processes of buildings and structures' design, construction and operation, to solve complex problems of construction project management, to provide information support among all participants in the life cycle. The life cycle of construction sites is inextricably linked to the logistical support for managing the business processes of design, supply, construction, transportation, warehousing and after sale of facilities. This reinforces the need to develop and implement logistical approaches to managing the business processes of construction sites at all stages of the life cycle.

Publications review and analyzing unresolved issues. To date, the formation of logistic activity of construction industry enterprises and their participation in the life cycle of construction objects is characterized by the presence of unjustified high logistics costs, direct material and financial losses, which lead to instability of their financial volatility. Especially for the stage of the construction facilities operation, which is the longest stage in the life cycle, and can last up to 50 years or more, and the costs may exceed five to seven times the nominal value of initial investment and three times the cost of construction [1].

It becomes evident that modern innovative tools need to be used to reduce the logistical costs of the construction life cycle. Today's tool is BIM (Building Information Modeling), an information modeling and lifecycle support for construction projects. BIM technologies are treated as the development of Continuous Acquisition and Life Cycle Support (CALS) technologies for construction projects. CALS technologies combine the principles and technologies of product's life cycle

information support at all its stages, and an integrated information environment utilization, based on the open architecture usage, international standards, database management, electronic exchange of data between participants of the life cycle within their powers [2].

BIM technologies allow to combine information already owned by the organization with the new knowledge that emerges in the company when moving to BIM. It provides data exchange between existing enterprise systems and the BIM model. The information model becomes a data provider for procurement systems, scheduling, project management, internal ERP and other enterprise systems. BIM modeling for building objects offers the following main benefits that an organization receives, namely [10]:

- virtual model of the building;
- individual parameters of the object;
- quality project documentation;
- the ability to quickly identify inaccuracies and errors in projects, as well as their immediate elimination;
- experimental methods of object examination under given different conditions;
- management and control of the object at all stages of the life cycle;
- concurrent information model use of a building or structure by several contracting organizations to perform their work;
- possibility of repair works, reconstruction of objects in accordance with operational requirements.

BIM technology demonstrates the ability to achieve high speed and quality of design and construction work, as well as significant cost savings.

Although the concept of BIM technology is relatively recent and constantly evolving, today it is a comparatively new type for buildings and structures 3D design. Unlike CAD, where systems based on simple lines and shapes are represented, BIM measurements of a building and all kinds of systems are made in the form of data based on a single digital model, which includes three-dimensional objects whose characteristics and purpose are integrated synchronized [3].

Specialists of different companies and organizations (design, construction, operation) within the scope of their powers take part in the construction object's life cycle. Each participant in the life cycle introduces its conditions, changes and details in the information model of the building, which avoids gross mistakes during construction, reducing costs during operation. As a result, in the virtual model, in addition to the basic elements, a large number of objects (library elements) are created and supplemented. Thus, "archives" with various variants of building elements appear [4].

Basic information model formation allows to perform a preliminary logistic analysis of indicators, during which user can evaluate alternative measures to improve the performance and efficiency of the building. A virtual model of a construction object associated with an information database, in which each element of the model is assigned additional attributes.

The advantages of the virtual model include the consideration of all details, finished elements and nuances, clear structural and economic calculations, the materials library formation and analysis of the buildings behavior in emergencies [5]. Such libraries can contribute to the development of an accessible environment, since the basic elements have certain parameters and form. The model of such elements already contains technological nuances, details and other necessary information. At the project stage there will be no errors when creating ramps and other special elements, as it could be used the finished elements, adapted to the situation.

An integral part of a building information model is its Building Energy Modeling (BEM), which is widely used worldwide in the design of public and residential buildings [6, 7]. Currently, there are a large number of

software systems for energy modeling that can be used to solve a wide range of project tasks, as follows: development and selection of measures to improve the energy efficiency of buildings; estimation of recoupment of energy saving measures; selection of the optimal tariff for energy resources; determination of the operational cost (annual cost of energy) of the building; provide accurate values from solar radiation, including for modern buildings with complex architectural forms.

Implementation of BIM technologies is explained by the benefits from the use of this technology at different stages of the life cycle of a construction object, the submission of electronic documentation, simplification and reduction of construction costs, reconstruction, major repairs, increased control and supervision of construction, the ability to manage the project life cycle construction prior to its decommissioning. Thus, since 2016, the UK government [8], one of the leading countries in the use of BIM technologies, has mandated the use of BIM models, with the mandatory inclusion of digital data required for the operation phase of the building.

Effective management and operation of buildings and structures, their engineering equipment, is impossible without carrying out the analysis of logistical support at the design stage and their refinement at the next stages of the construction objects life cycle which is based on accounting and analysis of operational information for the technical condition control of the construction objects. Logistical support is not limited to the LC (life cycle) phase, as has been reported in many publications. Its mission is much broader, it affects all stages of the LC and aims to reduce logistics costs in the after-sales stages.

Problem statement. The purpose of the study is to analyze integrated logistics support for construction sites, which is a set of management measures aimed at reducing logistics costs at the after sales stages of the life cycle.

Results of the study and their analysis. Integrated logistical support is a set of management measures aimed at reducing logistics costs at the after-sales stages of the life cycle of construction sites.

It is carried out at all stages of the life cycle from the initial idea of the owner to the management, operation, maintenance and repair of objects and its subsequent decommissioning (dismantling). This involves the collection and comprehensive processing of all information about the object of construction (design, technological, operational, economic and other).

The level of detail is ensured by the fact that each life cycle participant, within his or her mandate, has access to the information about the object, which forms the fundamental basis for all decisions throughout the life cycle of the object.

The paper presents an information model of integrated logistics support for the life cycle of construction objects (Fig. 1), which is based on the conceptual model CALS [2]. The core of the information model is an integrated information environment that contains information about the construction object, resources and processes, ensures the storage and availability of data to those who involved in the life cycle of the object.

The data is added to the information environment by all participants throughout the life cycle of the objects, which allows to receive and analyze current project documentation and visualizations at any time. This is necessary for planning and managing business processes, designing, purchasing materials, coordinating work in different areas of the project, installation work, construction, operation, maintenance and repair.

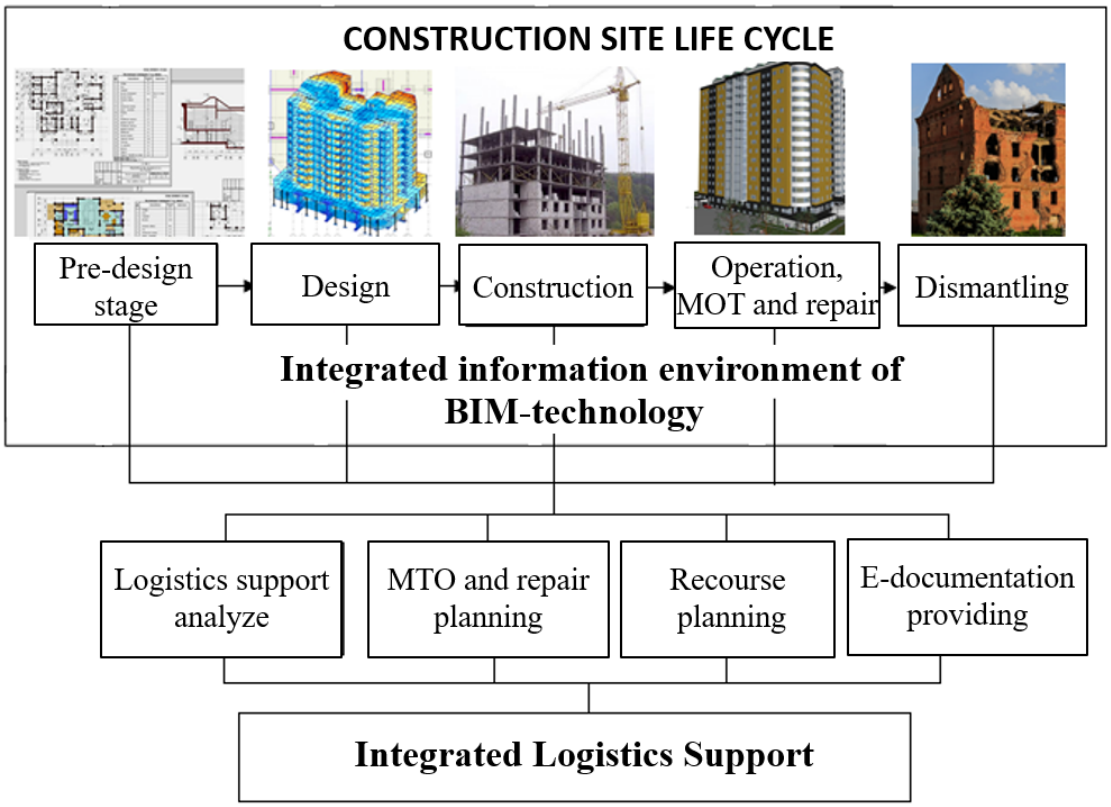

Figure 1. Information model of integrated logistics support for the construction sites life cycle

Integrated logistics support is one of the key concepts of the information model. It includes: logistical support analysis (logistic analysis), maintenance and repair planning, resource management, electronic maintenance and repair documentation. Logistic support analysis is carried out at all stages of the life cycle and is performed to ensure the necessary level of reliability of construction sites, as well as to establish requirements for: construction of construction facilities, placement of engineering and technical communications subject to regular maintenance, replacement and repair; technical systems and equipment; qualifications of service personnel; nomenclature, quantity and quality of resources (spare parts, supplies, etc.).

In the analysis of logistical support, an information flow is formed regarding the nomenclature and the required amount of resources to carry out and support the maintenance and repair of construction objects. Logistic support analysis aims to reduce costs over the life cycle of construction projects.

The planning of maintenance and repair of objects is carried out at the design stage and is specified during the production and operation of the product.

In the integrated information environment of the information model, the life cycle stages of the construction objects are implemented, such as pre-design stage, design, construction, after sales (operation, maintenance and repair), dismantling of the objects function.

Pre-design stage is the initial stage at which ideas about the future object are formed. At this stage, the analysis and selection of the most appropriate solutions are performed, also it is needed to determine the functional purpose of the construction object, its appearance and other aspects. The result of the pre-design stage is a sketch of the object containing the basic technical

solutions that are needed to formulate a technical specification for the next stages of the life cycle. The sketch project allows to obtain a more complete and comprehensive assessment of the planned object and to identify immediately possible problems and shortcomings, which in the short term shortens the project development time at the design stage.

At the design stage, engineering and technical solutions are being developed, the reliability of structures and the possibility of their realization are determined. At this stage, one of the basic principles of integrated logistical support for CALS technology is being implemented - the principle of parallel engineering, which involves the execution of development and design processes while simulating the processes of building and operation of construction sites. Recommendations are being made for design changes to improve the maintenance of construction sites through functional analysis, as well as to analyze the construction of sites to test for spatial collisions, which eliminates most of the alterations in the construction process and avoids critical situations, that may occur during operation. On the basis of this information, they determine the need for resources, calculate the estimated cost of construction, prepare specifications for materials and equipment, elaborate units and specify other points.

The result of the design is a complete set of design documentation required for the installation and construction work. Most of the documentation is formed on the basis of an information model that reflects all the technical solutions needed to perform the construction work. Engineering systems and individual engineering elements reflect the calculated figures for the decisions taken (energy costs, pressure losses, electrical characteristics, etc.).

At the construction stage, building and assembly works are carried out in accordance with the basic set of working drawings (architectural model, model of engineering systems, model of structures, master plan) with obligatory control over the construction process (quality of the works performed, compliance of the completed construction works with the working documentation, adherence to the calendar). With the help of visual planning and control, users could monitor the actual condition of construction objects, the flow of cash flows, moreover the necessary management information is obtained in real time, which helps not only to avoid mistakes in budgeting, but also allows to accomplish the set tasks precisely in time and with the slightest differences in estimates.

At the after-sales stage, the use of the results of logistic support analysis allows the owner to simulate different modes of operation of the object in the information model, to choose the best option based on the site needs, and to reduce the total cost of ownership. The safety of the construction sites during operation is ensured by the maintenance, periodic inspections and control tests, as well as checks of the foundation condition, building structures and systems of engineering and technical support through the implementation of routine preventive, routine repairs, sanitary maintenance of structures. All parameters, as well as the characteristics of building structures and systems of engineering and technical support, obtained during operation are recorded in the passport of the building, as well as recorded and stored in a single information model.

Thus, in addition to the obvious cost savings, it is possible to extend the life of the joint operation of construction sites due to the fact that all necessary information on the maintenance and repair of engineering and other equipment will be stored in a single model that can be accessed by life cycle participants within their authority, and timely repairs and maintenance minimize the likelihood of emergencies.

Conclusions. Integrated logistical support is one of the key concepts of the

17-25
v.1 (2020)
https://smart-scm.org

information model, which is a set of management measures aimed at reducing the costs of after-sales stages of construction objects life cycle. The main process of integrated logistical support is logistic analysis, which, in addition to the obvious cost savings, allows to extend the life of construction objects by using data of a single model and the possibility of access within the authority to all participants in the life cycle. The information obtained helps to reduce the occurrence of emergencies, reduce the number of errors, improve communication between project participants, reduce the use of resources and improve the quality of the construction object.

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LOGISTICS POTENTIAL USAGE FOR RAILWAY TRANSPORT ENTERPRISES COMPETITIVNESS ASSESSMENT

Nataliya Chornopyska, Kateryna Stasiuk. «Logistics potential usage for railway transport enterprises competitivness assessment». *Research relevance. The problem of logistics potential development for the railway transportation companies with a purpose of strengthening its competitive positions is actualized in the conditions of railway transportation market liberalization and deregulation.*

Purpose: to develop a methodology for railway enterprises logistics potential evaluation by supplementing it with qualitative parameters (by applying the hierarchy analysis model) and thus expanding its scope. In particular, when assessing competitiveness.

Methods: the hierarchy analysis model by T. Saati; expert evaluation method; the integral index of competitiveness evaluation method.

Conclusions and value added: The enterprises logistics potential evaluation method with hierarchy analysis model usage was further developed. The logistics potential assessment problem is presented in a form of three-tier hierarchy of criteria. The hierarchy consists of eighteen third-level criteria and five second-level criteria, which compose a comprehensive system of indicators for railway enterprise logistics potential assessing. The qualitative parameters were obtained for enterprises logistics potential criteria evaluation. The research with the described method usage allowed to distinguish the components of logistical potential according to their level of importance in terms of strategic priorities for the industry development in general and the target market requirements; and to identify those criteria, the consideration of which will allow to increase the railway transport enterprises competitiveness. This approach expands the enterprise's logistics potential methodology scope, especially when assessing competitiveness, helps to choose a further strategic direction.

Keywords*:* logistics potential, railway enterprises, rail freight, logistics potential index (IELP), hierarchy analysis method, expert evaluation, pairwise comparisons method, hierarchical model of logistics potential evaluation, ABC-classification, competitiveness, competitiveness integral indicator.

Чорнописька Наталія, Стасюк Катерина. «Логістичний потенціал в оцінці конкурентоспроможності підприємств залізничного транспорту». *Актуальність дослідження. В умовах лібералізації та дерегуляції ринку залізничних перевезень актуалізується проблема*

розвитку логістичного потенціалу підприємств залізничного транспорту з метою посилення його конкурентоспроможних позицій.

Основна мета: розвинути методику оцінки логістичного потенціалу підприємств залізничного транспорту доповнивши її якісними параметрами (застосування моделі аналізу ієрархії) і тим самим розширивши сферу її застосування. Зокрема, при оцінці конкурентоспроможності.

Методи: метод аналізу ієрархій Т. Саамі; метод експертних оцінок; метод розрахунку інтегрального показника конкурентоспроможності.

Висновки та додана вартість: Отримала подальшого розвитку методика оцінки логістичного потенціалу підприємства з використанням моделі аналізу ієрархії. Проблему оцінки логістичного потенціалу представлено у вигляді трьох-рівневої ієрархії критеріїв. Ієрархію складають вісімнадцять критеріїв третього рівня та п'ять критеріїв другого рівня, що в сукупності складає цілісну систему показників оцінки логістичного потенціалу підприємства залізничного транспорту. Отримано якісні параметри оцінних критеріїв логістичного потенціалу підприємства. Проведені дослідження за цим методом дозволили виділити компоненти логістичного потенціалу за рівнем їх вагомості з погляду стратегічних пріоритетів розвитку галузі загалом та вимог цільового ринку та виявити ті критерії, урахування яких першочергово дасть змогу підвищити конкурентоспроможність підприємств залізничного транспорту. Такий підхід розширює сфери використання методики логістичного потенціалу підприємства, зокрема при оцінці конкурентоспроможності, допомагає вибирати подальший стратегічний напрям.

Ключові слова: логістичний потенціал, підприємства залізничного транспорту, залізничні вантажні перевезення, індекс логістичного потенціалу підприємства (IELP), метод аналізу ієрархій, експертна оцінка, метод попарних порівнянь, ієрархічна модель оцінки логістичного потенціалу, АВС-класифікація, конкурентоспроможність, інтегральний показник конкурентоспроможності.

Чорнописька Наталья, Стасюк Екатерина. «Логистический потенциал в оценке конкурентоспособности предприятий железнодорожного транспорта». Актуальность исследования. В условиях либерализации и дерегулирования рынка железнодорожных перевозок актуализируется проблема развития логистического потенциала предприятий железнодорожного транспорта с целью усиления его конкурентоспособных позиций.

Основная цель: развить методику оценки логистического потенциала предприятий железнодорожного транспорта дополнив ее качественными параметрами (применение модели анализа иерархии) и тем самым расширив сферу ее применения. В частности, при оценке конкурентоспособности.

Методы: метод анализа иерархий Т. Саати; метод экспертных оценок; метод расчета интегрального показателя конкурентоспособности.

Выводы и добавленная стоимость: Получила дальнейшее развитие методика оценки логистического потенциала предприятия с использованием модели анализа иерархии. Проблему оценки логистического потенциала представлены в виде трех-уровневой иерархии критериев. Иерархию составляют восемнадцать критериев третьего уровня и пять критериев второго уровня, в совокупности составляет целостную систему показателей оценки логистического потенциала предприятия железнодорожного транспорта. Получены качественные параметры оценочных критериев логистического потенциала предприятия. Проведенные исследования по этому методу позволили выделить компоненты логистического потенциала по уровню их значимости с точки зрения стратегических приоритетов развития отрасли в целом и требований целевого рынка и выявить те критерии, учет которых в первую очередь позволит повысить конкурентоспособность предприятий железнодорожного транспорта. Такой подход расширяет сферы использования методики логистического потенциала предприятия, в частности при оценке конкурентоспособности, помогает выбирать дальнейший стратегическое направление.

Ключевые слова: логистический потенциал, предприятия железнодорожного транспорта, железнодорожные грузовые перевозки, индекс логистического потенциала предприятия (IELP), метод анализа иерархий, экспертная оценка, метод попарных сравнений, иерархическая модель

26-38
v.1 (2020)
https://smart-scm.org

оценки логистического потенциала, АВС-классификация, конкурентоспособность, интегральный показатель конкурентоспособности.

Introduction. The problem of railway enterprise competitiveness is one of the most fundamental among the many challenges in the context of rail market liberalization. Its fundamentality is caused by the fact that "the ability to withstand competitive pressure and the action of market forces" is a basic criterion for the ability of Ukraine's rail transport to integrate into the EU's single transport space. As of 2019, the infrastructure component of the Logistics Performance Index (LPI) estimates 2.22 with a European average of 3.24. In order to match the European level, it is necessary to eliminate the bottlenecks in cargo transportation, to increase the transportation speed, to reduce the unproductive transport costs of enterprises, etc. The lion's share of these tasks lies in the area of logistical capacity utilization at the macro level, but in the context of liberalization, deregulation and privatization, they are inseparable with the efficiency of logistics potential management at the level of railway undertakings.

Many researches of the economic science founders and modern scientists-economists are devoted to theoretical and methodological questions considering the problem of competitiveness. Modern competitiveness analysis methodologies have been developed by the world's leading think tanks, including the world's most authoritative institution in this respect, the World Economic Forum, which publishes the Global Competitiveness Index annually (GCI). In terms of railways density, Ukraine ranked 23rd in the Global Competitiveness Report 2018 [1]. At the same time Ukraine is ranked 37th in terms of rail transport services efficiency in 2018 [2].

Logistic potential development applied issues are reflected in numerous works of foreign and Ukrainian scientists. Polish scientist P. Smoczynski conducts railway safety research [3]. The author has proposed a modern method for accident detection/reporting on the railway. Accident modeling allows detailed causality analysis to prevent such a situation in future. Latvian scientist G. Bureika considers Eurasian rail corridors environmental performance in his study. Factors affecting environmental performance are infrastructure, rolling stock, road electrification, and more. It is suggested to use an ECO TRANSIT WORLD (ETW) software package throughout the logistics chain to evaluate them [4]. I. Posokhov in his article highlights the existing problems of the Ukrainian railway - high level of assets depreciation, lack of modern equipment, outdated technologies, inappropriate environmental measures, low level of transport safety, etc. [5]. The capitalization is proposed as a tool for solving these problems, which is the managerial decision to improve the productivity of fixed assets (acquisition of new assets, capital repairs of old funds, modernization, reconstruction), optimal allocation of investment resources and reduction of environmental payments by reducing emissions. This approach addresses some of rail transport problems and contributes to its sustainable development. The scientific research of O. Chupyr [6] presents a methodological approach for strategic planning process optimizing based on the resource potential development for railway enterprises. The proposed method allows to diagnose resource potential management bottlenecks for the enterprises of the railway industry, and in accordance to the results obtained, to carry out further strategic management of enterprises and the railway industry in general. The Ukrainian Institute of the Future study provides a detailed analysis for the rail transportation industry, identifies a number of important challenges for the railways and the Ukrainian economy in general, the most important of which are: critical infrastructure wear,

technical wear and tear, locomotive obsolescence, poor fare management, imperfect tariff management, inefficient investment development, digital and technology challenges [7].

All these studies evidence the multifaceted nature of the logistics potential concept and a necessity for generalized assessment.

At the same time, despite the existence of sound scientific achievements in the area of multifaceted problems of competitiveness, the issues of railway transport logistics potential are mainly considered at the macro level; the problem of logistic potential at the micro level, which determines the railway transport enterprises competitiveness, has not been sufficiently researched.

Purpose and objectives for the study. The main purpose for the study is to further develop practical tools for railway enterprises logistics potential assessing from the perspective of competitiveness development.

The following problems are to be solved to achieve this goal: enterprise logistics potential estimating indicators system is to be supplemented with qualitative parameters by applying the T. Saati hierarchies analysis model; comprehensive generalization and appropriate recommendations are to be provided considering the practical importance of logistics potential assessing methodology development for railway enterprises in terms of their competitiveness.

Primary materials and results. In authors' previous research devoted to theoretical and methodical and practical aspects of enterprises logistic potential [8,9] the author's methodology was proposed for the index of enterprises logistic potential evaluation (I_{ELP}). The author's methodology for enterprises logistic potential evaluation includes the following steps: indicators definition, indicators grouping by components, partial indices calculation for each logistics potential component, sub-index determination for each component, enterprises logistics potential index calculation. The authors have restricted the methodology with the available and practical statistics that was considered best to characterize rail freight transportations. All 18 indicators were grouped into these components: technic-technological, economic, environmental, competence, quality. The proposed authoritative methodology for the enterprises logistic potential evaluation is universal (can be adapted to different companies in the logistics market), available (all the indicators are statistical) and effective (the enterprises logistical potential evaluation results are important for comparing with competitors and positioning the enterprise in the market).

T. Saati's analysis method allows to present the railway transport enterprises logistic potential evaluation problem with consideration of the constituent elements in the hierarchy, which reveal its essence. A detailed description of all the stages of logistic potential evaluation using the hierarchy analysis method is presented.

Stage 1. Representing a problem in a hierarchy form.

The first level represents the study purpose - to evaluate the railway enterprises logistics potential.

The second level of the hierarchy is represented by the components for evaluation: Technic-Technological component (K1), Economical component (K2), Ecological component (K3), Competence component (K4), Quality component (K5).

Third level - each component is divided into sub-criteria:

1. Sub-criteria for Technic-Technological component:

Cargo transportation on average per day (Q1),

Average transportation distance for one ton of goods (Q2),

Transportation intensity (Q3),

Warehouse capacity (cargo stations) (Q4),

Total number of rolling stock (Q5).

2. Sub-criteria for Economical component:

Cargo turnover (Q6),
Cargo transportation (Q7),
Revenue (Q8),
Enterprise capital investments (Q9),
Expanses/cost (Q10).

3. Sub-criteria for Ecological component:

Pollutants emission rates into atmospheric air (Q11),
Transport safety (transport events) (Q12).

4. Sub-criteria for Competence component:

Total number of employees involved (Q13),
Skills/training of Logistics&SCM (Employees number having advanced training courses in logistics passed) (Q14),
Skills/higher education of Logistics&SCM (Employees number having higher education diploma for logistics speciality or certified according to international standards (e.g. ELA) (Q15).

The problem decomposition is reduced to a hierarchy (Fig. 1).

5. Sub-criteria for Quality component:

On time (Q16),
In Full (Q17),
Error-free (Q18).

The first stage results in a three level hierarchy model for railway enterprises logistics potential analysis.

Stage 2. Expert evaluation. Pairwise comparisons are determined by peer reviews as an advantage of one element over another. Railway enterprises senior managers represented experts. A relative importance scale by T. Saati (Table 1) is used for evaluations, because its efficiency is proved in comparison to other scales [10].

The second stage resulted in expert evaluations of pairwise comparisons for all the elements of three level logistics potential analysis model for railway transportations enterprises.

Stage 3. Results summary in a form of a matrix. Obtained expert evaluations are represented in a form of a matrix of pairwise comparisons for the second decomposition level of the model (Table 2).

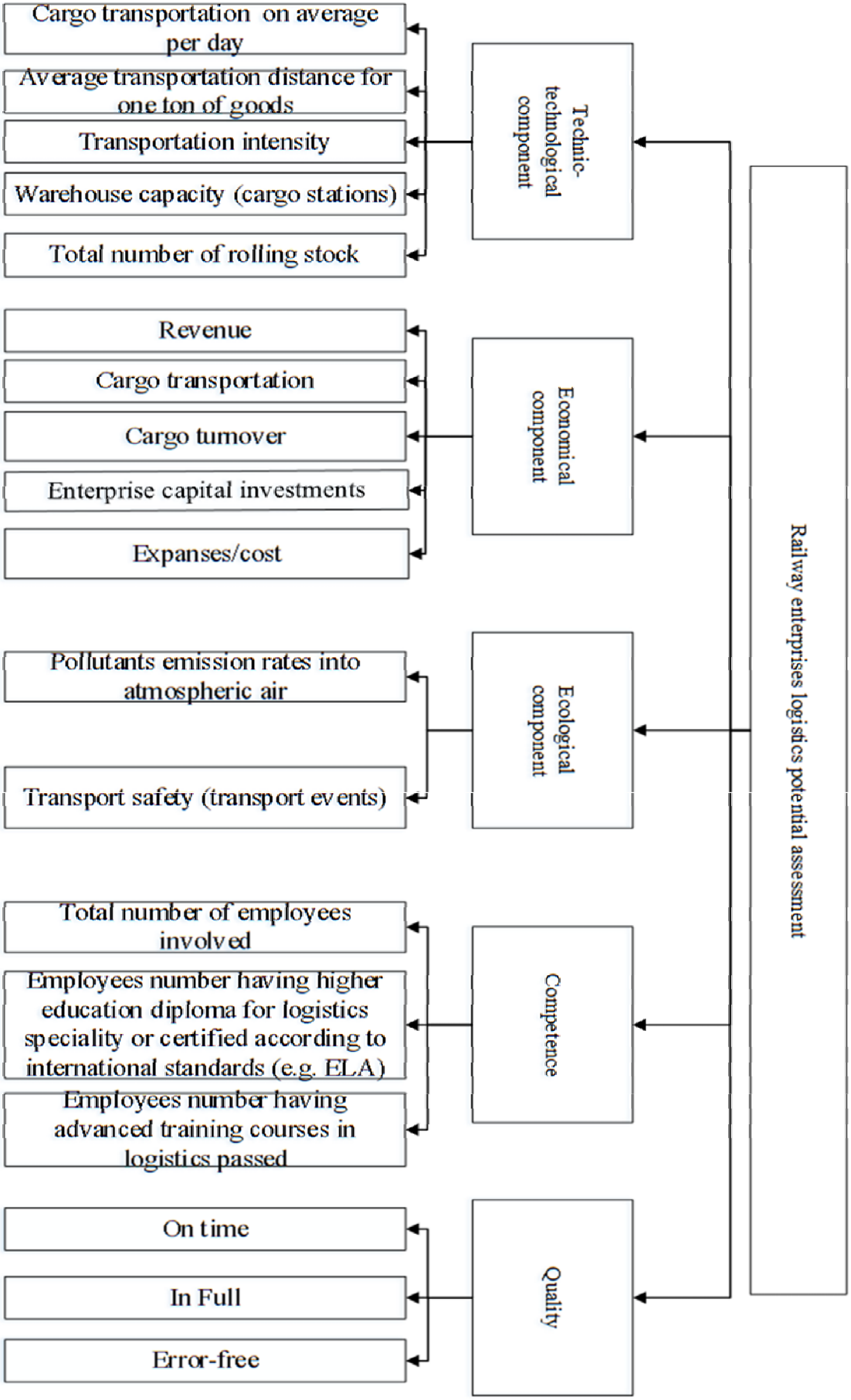

Figure 1. Information model of integrated logistics support for the construction sites life cycle

Source: developed by authors based on [8]

Table 1

Relative importance scale by T. Saati for hierarchies analysis method

Relative importance, point	Definition
1	Equal importance
3	Moderate superiority of one over the other
5	Essential or strong advantage
7	Significant advantage
9	Very strong advantage
2,4,6,8	Intermediate values
Opposing values	If one of the above numbers x is obtained when comparing A and B, then the inverse of 1 / x is obtained when comparing B and A

Source: [10]

Table 2

Pairwise comparisons matrix for the second level components

Element	Hierarchical model second level elements names	Element					Local priorities vector, u_i
		K1	K2	K3	K4	K5	
K1	Technic-Technological component	1	1	5	3	3	0,329
K2	Economical component	1	1	3	7	5	0,390
K3	Ecological component	1/5	1/3	1	3	3	0,139
K4	Competence component	1/3	1/7	1/3	1	3	0,084
K5	Quality component	1/3	1/5	1/3	1/3	1	0,058
λ_{max}=5,396; ІУ=0,099; ВУ=0,088<1							

Source: compiled and calculated by authors based on expert evaluation.

All the calculation details for the second level components of the model are shown below.

Local priorities vector components are calculated by formulas:

$$\overline{u_i} = \sqrt[n]{\prod_{j=1}^{n} a_{ij}};\ i=\overline{1,n}; \qquad (1)$$

where a_{ij} – the i-th element of the j-th column in the matrix of criteria pairwise comparisons.

n – criteria number,

$$u_i = \frac{\overline{u_i}}{\sum_{i=1}^{n} \overline{u_i}};\ i=\overline{1,n}; \qquad (2)$$

Second level components of the local priorities vector:

$$\overline{u_1} = \sqrt[5]{1*1*5*3*3} = 2{,}141;$$
$$\overline{u_2} = \sqrt[5]{1*1*3*7*5} = 2{,}537;$$
$$\overline{u_3} = \sqrt[5]{\frac{1}{5}*\frac{1}{3}*1*3*3} = 0{,}902;$$
$$\overline{u_4} = \sqrt[5]{\frac{1}{3}*\frac{1}{7}*\frac{1}{3}*1*3} = 0{,}544;$$
$$\overline{u_4} = \sqrt[5]{\frac{1}{3}*\frac{1}{5}*\frac{1}{3}*\frac{1}{3}*1} = 0{,}375;$$

$$\sum_{i=1}^{5} 2{,}141 + 2{,}537 + 0{,}902 + 0{,}544 + 0{,}375 = 6{,}499;$$

The maximum eigenvalue for an inversely symmetric pairwise comparison matrix is determined by the formula:

$$\lambda\max = \sum_{j=1}^{n} u_j \left(\sum_{i=1}^{n} a_{ij}\right), \quad (3)$$

Intermediate calculations for maximum value determination for the inverse-symmetric pairwise comparison matrix:

$$u_1 = \frac{2{,}141}{6{,}499} = 0{,}329;$$
$$u_2 = \frac{2{,}537}{6{,}499} = 0{,}390;$$
$$u_3 = \frac{0{,}902}{6{,}499} = 0{,}139;$$
$$u_4 = \frac{0{,}544}{6{,}499} = 0{,}084;$$
$$u_5 = \frac{0{,}375}{6{,}499} = 0{,}058.$$

$$\sum_{i=1}^{5} a_{i1} = 1 + 1 + \frac{1}{5} + \frac{1}{3} + \frac{1}{3} = 2{,}867;$$
$$\sum_{i=1}^{5} a_{i2} = 1 + 1 + \frac{1}{3} + \frac{1}{7} + \frac{1}{5} = 2{,}676;$$
$$\sum_{i=1}^{5} a_{i3} = 5 + 3 + 1 + \frac{1}{3} + \frac{1}{3} = 9{,}667;$$
$$\sum_{i=1}^{5} a_{i4} = 3 + 7 + 3 + 1 + \frac{1}{3} = 14{,}333;$$
$$\sum_{i=1}^{5} a_{i5} = 3 + 5 + 3 + 3 + 1 = 15.$$

$$\lambda\max = 0{,}329 * 2{,}867 + 0{,}390 * * 2{,}676 + 0{,}139 * 9{,}667 + + 0{,}084 * 14{,}333 + 0{,}058 * * 15 = 5{,}396$$

Compared items relative importance evaluations consistency is determined by the consistency index (ІУ) and consistency relation (ВУ):

$$\text{ІУ} = \frac{\lambda\max - n}{n-1} \quad (4)$$

$$\text{ІУ} = \frac{5{,}396-5}{5-1} = 0{,}099;$$

The random preferences consistency index value (ВІУ) is chosen considering the number of elements being compared by Table 3.

Table 3

Random consistency index values by T. Saati

n	1	2	3	4	5	6	7	8	9	10
ВІУ	0,00	0,00	0,58	0,90	1,12	1,24	1,32	1,41	1,46	1,49

Source: [10]

The optimum consistency index value should be ВУ < 10 %.

$$ВУ = \frac{ІУ}{ВІУ} \quad (5)$$

$$ВУ = \frac{0,099}{1,12} = 0,099;$$

The model in question deciphering algorithm is implemented using the application toolkit MS Excel.

Stage 4. All third-level sub-criteria are analyzed in respect to each second level element-component (Tables 4–8).

Table 4

Paired comparisons matrix for third-level elements by component «Technic-Technological component»

Element	**Hierarchical model third level elements name**	**Element**					**Local priorities vector, V_{i1}**
		Q1	**Q2**	**Q3**	**Q4**	**Q5**	
Q1	Cargo transportation on average per day	1	1	1	5	1/7	0,129
Q2	Average transportation distance for one ton of goods	1	1	1/3	3	1/7	0,094
Q3	Transportation intensity	1	3	1	3	1/5	0,156
Q4	Warehouse capacity (cargo stations)	1/5	1/3	1/3	1	1/5	0,0469
Q5	Total number of rolling stock	7	7	5	5	1	0,574
λ_{max}=5,4363; ІУ=0,10; ВУ=0,097<1							

Source: compiled and calculated by authors based on expert evaluation.

Table 5

Paired comparisons matrix for third-level elements by component «Economical component»

Element	Hierarchical model third level elements name	Element					Local priorities vector, V_{i2}
		Q6	Q7	Q8	Q9	Q10	
1	2	3	4	5	6	7	8
Q6	Cargo turnover	1	1/7	1/6	1	3	0,081
Q7	Cargo transportation	7	1	1	5	4	0,369
Q8	Revenue	6	1	1	5	8	0,411
Q9	Enterprise capital investments	1	1/5	1/5	1	4	0,095
Q10	Expanses/cost	1/3	1/4	1/8	1/4	1	0,042
λ_{max}=5,235; ІУ=0,058; ВУ=0,052<1							

Source: compiled and calculated by authors based on expert evaluation.

Table 6

Paired comparisons matrix for third-level elements by component «Ecological component»

Element	Hierarchical model third level elements name	Element		Local priorities vector, V_{i3}
		Q11	Q12	
Q11	Pollutants emission rates into atmospheric air	1	1/5	0,309
Q12	Transport safety (transport events)	5	1	0,691
λ_{max}=2,683; ІУ=0,683; ВУ=0,01<1				

Source: compiled and calculated by authors based on expert evaluation.

Table 7

Paired comparisons matrix for third-level elements by component «Competence component»

Element	Hierarchical model third level elements name	Element			Local priorities vector, V_{i4}
		Q13	Q14	Q15	
Q13	Total number of employees involved	1	5	1/3	0,279
Q14	Skills/training of Logistics&SCM	1/5	1	1/7	0,0719
Q15	Skills/higher education of Logistics&SCM	3	7	1	0,649
λ_{max}=3,065; ІУ=0,032; ВУ=0,056<1					

Source: compiled and calculated by authors based on expert evaluation.

26-38
v.1 (2020)
https://smart-scm.org

Table 8

Paired comparisons matrix for third-level elements by component «Competence component»

Element	Hierarchical model third level elements name	Element			Local priorities vector, V_{i5}
		Q16	Q17	Q18	
Q16	On time	1	9	9	0,808
Q17	In Full	1/9	1	1/3	0,062
Q18	Error-free	1/9	3	1	0,129
λ_{max}=3,135; ІУ=0,0678; ВУ=0,1<1					

Source: compiled and calculated by authors based on expert evaluation.

Stage 5. Third level global priorities evaluation. The third level elements global priorities are determined using the synthesis principle:

$$Z_i = \frac{V_{ij}}{u_i} \quad (6)$$

The calculations result into the global priority values in a range between 0,189 and 0,006; the third level element are classified into three groups of importance A, B, C according to the results obtained. Obtained results are summarized in Table 9.

Table 9

Third level elements global priorities

Element	Hierarchical model third level elements name	Global priority (descending), Z_i	Element importance group
Q5	Total number of rolling stock	0,1891	A
Q8	Revenue	0,1607	A
Q7	Cargo transportation	0,1443	A
Q12	Transport safety (transport events)	0,0960	B
Q15	Skills/higher education of Logistics&SCM	0,0543	B
Q16	On time	0,0513	B
Q3	Transportation intensity	0,0466	B
Q11	Pollutants emission rates into atmospheric air	0,0429	B
Q1	Cargo transportation on average per day	0,0426	B
Q9	Enterprise capital investments	0,0372	B
Q6	Cargo turnover	0,0317	B
Q2	Average transportation distance for one ton of goods	0,0309	B
Q13	Total number of employees involved	0,0233	B
Q10	Expanses/cost	0,0163	C
Q4	Warehouse capacity (cargo stations)	0,0154	C
Q18	Error-free	0,0075	C
Q14	Skills/training of Logistics&SCM	0,0060	C
Q17	In Full	0,0036	C

Source: compiled and calculated by authors

Group A indicators have the greatest influence on the enterprises logistics potential. It is important to prioritize these indicators development, as they can in the

end affect the enterprise positioning by logistic potential in relation to other companies.

The third level element global priorities can be interpreted as the weighting coefficients of individual indicators. They are determined by independent experts regarding the target market expectations, current trends in railway development, the National Transport Strategy, etc. The importance of supplementing the author's methodology for enterprise logistics potential assessing is manifested in the comparative analysis of the competing enterprises logistics potential. Integral competitiveness indicator for enterprises logistics potential can be used for this purpose; it be determined by the formula:

$$K_{int} = \sum_{i=1}^{18} \frac{Q_i}{Q_{ib}} * V_i \quad (7)$$

where K_{int} – integral competitiveness assessment;

Q_i – i-th indicator parameter for the valuation enterprise logistics potential;

Q_{ib} – i-th indicator parameter for logistics potential of the enterprise-competitor, selected as a comparison basis;

V_i – i-th indicator importance coefficient;

while

$$\sum_{i=1}^{18} V_i = 100\%.$$

It can be argued, considering the metrics obtained:

firstly, which enterprise logistics potential is more powerful (if $K_{int}>1$, than analyzed one);

secondly, identify not only the strengths or weaknesses of the studied enterprise logistics potential, but also identify its competitive vulnerability or, conversely, its competitive advantage. This approach provides a possibility to evaluate the enterprise prospects in the target market.

Conclusions. Logistic potential is the basis of railway enterprises competitiveness. Logistics potential evaluation methodology development provides an opportunity to consider the company in comparison with its competitors, to compare its priorities with the strategic priorities of the industry development and to make strategically important decisions for it. The hierarchy analysis model is an effective tool for assessing the importance of all components and elements of an enterprise's logistics potential. The obtained qualitative indicators and importance coefficients of all logistics potential components allow adjusting the method quantitative indicators and getting the most reliable result. The main advantages for the enterprise include low time and money expanses for logistics potential evaluation and quantitative and qualitative indicators analysis that can be used for promising decisions. A clear understanding of which indicators have the greatest impact on the enterprises logistical potential allows to prioritize and set the right development vector to achieve the appropriate results.

The list of enterprises logistic potential indicators, as well as their weight, can be revised according to the change of goals and objectives. For example, for businesses serving the passenger transportation segment, the filling will be different, although the methodology itself can be used due to its versatility.

The proposed approach for enterprises logistic potential evaluation expands practical tools of strategic management and can serve as a basis for portfolio analysis, which will be a prospect for authors further researches.

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RESEARCH STATUS OF AUTOMATION OF LOGISTICS TRANSPORT AND DISTRIBUTION PROCESSES

Hanna Prymachenko, Yelyzaveta Hryhorova. «Research status of automation of logistics transport and distribution processes». *An analysis of the performance of modern companies has revealed a trend of active investment in innovation, especially in such a dynamic field as logistics in order to optimize supply chains. The article proves the need for a systematic approach to innovative measures in the transportation and distribution system based on the analysis of foreign experience. The dynamism of logistics processes complicates the process of control and forecasting of enterprises. The logistics trend of DHL, which regularly publishes a key tool for the global logistics community, is a radar of logistics trends that reflects the development of society, business and technology. Two major trends are analyzed: 1) social and business and 2) technological. To solve this problem, the process of digitization and the willingness of companies to work online with the help of e-commerce technology have been proposed. Two components of modern innovative business models that enable a business to be competitive and efficient are analyzed: the sharing economy and the marketplace in the logistics services market. It is determined that the main resources in logistics are material assets (especially warehouses and vehicles), labor and time. It is established that transport exchanges are actively developing in the Ukrainian market, where logisticians can choose vehicles, but there are no sites where one can simply choose a warehouse on demand (as a service). There are no tools in the Ukrainian market for quick search and safe rent of warehouses for different types of products. Searching for a warehouse is a complicated and lengthy procedure for the following reasons: the lack of a warehouse database in one source and the complexity of comparing warehouses (search on OLX.ua or through a local or international broker, or on the recommendation of acquaintances), the risks of renting warehouses from unverified agents / owners, the procedure for selecting and concluding warehouse lease agreements, the need for warehouses under peak load, continued. Therefore, in 2019, a new Ware Teka online platform has emerged for finding warehouses for rent or purchase with the largest warehouse real estate base to date, allowing real estate to be rented as soon as possible. The basic features of the Ware Teka online platform are analyzed. It is determined that modern logistics companies in Ukraine have started to implement the system of routing of goods (delivery on points of sale) and receive constant errors, therefore the process of digitization of current deliveries in real time is offered. The Ukrainian market for foreign startups is not interesting for today, and they are not ready to costomize, or costomization will have a very high cost and it is necessary to consider the issues of support after adaptation of the ready solution, to make a*

26-38
v.1 (2020)
https://smart-scm.org

premature request about the main problems of adaptation of software products of automation of logistics processes. Support is an important cycle in working with your ISP to be able to refine or modify the software in the future and not be dependent on your provider, so you need to request technical documentation immediately. The importance of automation of logistic processes of transportation and distribution has been proved.

***Keywords**:* logistic process; transportation; distribution; marketplace; digitization; transport exchange; warehouse exchange.

Ганна Примаченко, Єлизавета Григорова. «Дослідження стану автоматизації логістичних процесів перевезення та дистрибуції». *Аналіз діяльності сучасних компаній виявив тенденцію активного інвестування в інновації, особливо у такій динамічній сфері як логістика з метою оптимізації ланцюгів постачання продукції. У статті доведено необхідність системного підходу до інноваційних заходів у системі транспортування та дистрибуції на основі аналізу закордонного досвіду. Динамічність логістичних процесів ускладнює процес контролю і прогнозу діяльності підприємств. Розглянуто логістичний тренд компанії DHL, яка регулярно публікує ключовий інструмент для світової логістичного спільноти – радар логістичних тенденцій, який відображає розвиток суспільства, бізнесу і технологій. Проаналізовано два найважливіших тренди: 1) соціальний і бізнес та 2) технологічний. Для вирішення цієї проблеми запропоновано процес діджиталізації і готовність компаній працювати в он-лайн режимі за допомогою технології e-commerce. Проаналізовано дві складові сучасних інноваційних бізнес-моделей, які дозволяють бізнесу бути конкурентоспроможним і ефективним: sharing economy (бізнес-модель соціальної взаємодії) і marketplace (екосистема і платформа для організації роботи усіх учасників ринку) на ринку логістичних послуг. Визначено, що основними ресурсами в логістиці виступають матеріальні активи (особливо склади та транспортні засоби), трудовий персонал і час. Встановлено, що на ринку України активно розвиваються транспортні біржі, де логісти можуть обрати транспортні засоби, але не має площадок, де просто можна обрати склад по запиту (як послугу). Тому у 2019 році з'явилася нова он-лайн платформа Ware Teka для пошуку складів для оренди чи покупки з найбільшою на сьогодні базою складської нерухомості, що дозволяє орендувати нерухомість у найкоротший термін. Проаналізовано основні функції он-лайн платформа Ware Teka. Визначено, що сучасні логістичні компанії в Україні почали впроваджувати систему роутингу товарів (доставки по торговим точкам) і отримують постійні помилки, тому запропоновано процес оцифровування поточних доставок у режимі реального часу. Доведено важливість автоматизації логістичних процесів транспортування та дистрибуції.*

Ключові слова: логістичний процес; транспортування; дистрибуція; маркетплейс; діджиталізація; транспортна біржа; складська біржа.

Анна Примаченко, Елизавета Григорова. «Исследование состояния автоматизации логистических процессов перевозки и дистрибуции». *Анализ деятельности современных компаний выявил тенденцию активного инвестирования в инновации, особенно в такой динамичной сфере как логистика с целью оптимизации цепей поставок продукции. В статье доказана необходимость системного подхода к инновационным мероприятиям в системе транспортировки и дистрибуции на основе анализа зарубежного опыта. Динамичность логистических процессов усложняет процесс контроля и прогноза деятельности предприятий. Рассмотрен логистический тренд компании DHL, который регулярно публикует ключевые инструменты для мирового логистического сообщества - радар логистических тенденций, отражающий развитие общества, бизнеса и технологий. Проанализированы два важнейших тренда: 1) социальный и бизнес; 2) технологический. Для решения этой проблемы предложено процесс диджитализации и готовность компаний работать в он-лайн режиме с помощью технологии e-commerce. Проанализированы две составляющие современных инновационных бизнес-моделей, которые позволяют бизнесу быть конкурентоспособным и эффективным: sharing economy (бизнес-модель социального взаимодействия) и marketplace (экосистема и платформа для организации работы всех участников рынка) на рынке логистических услуг. Определено, что*

26-38
v.1 (2020)
https://smart-scm.org

основными ресурсами в логистике выступают материальные активы (особенно склады и транспортные средства), трудовой персонал и время. Установлено, что на рынке Украины активно развиваются транспортные биржи, где логисты могут выбрать транспортные средства, но не имеет площадок, где просто можно выбрать состав по запросу (как услугу). Поэтому в 2019 году появилась новая он-лайн платформа Ware Teka для поиска складов для аренды или покупки с крупнейшей на сегодня базой складской недвижимости позволяет арендовать недвижимость в кратчайшие сроки. Проанализированы основные функции онлайн платформа Ware Teka. Определено, что современные логистические компании в Украине начали внедрять систему роутинга товаров (доставки по торговым точкам) и получают постоянные ошибки, поэтому предложено процесс оцифровки текущих поставок в режиме реального времени. Доказана важность автоматизации логистических процессов транспортировки и дистрибуции.

***Ключевые слова**: логистический процесс, транспортировки; дистрибуция; маркетплейс; диджитализация; транспортная биржа; складская биржа.*

Introduction. Many modern companies such as Logistics & IT company, Google, DHL express, Microsoft, Daimler, Uber, Amazon, Maersk, Metro, AT&T, Tesla and others actively invest in innovations. They have huge departments that innovate, they also open their own accelerators and actively work with startups, investing in it to be on top of the latest innovations. For example, Amazon is actively involved in related industries, developing its own projects and startups for drones, Google launches drones, Maersk has launched an accelerator to optimize the supply chain in general from logistics to production. Markets and large corporations work with them. That is, large IT companies and logistics operators understand that you need to work systematically to innovate in the supply chain management.

In addition, innovations in transportation, mobility and logistics are underway by a large number of individual startups worldwide (figure 1).

The purpose and objectives of the study. Some startups function as one business process. For example, the international logistics company FedEx (in the lower left corner of Fig. 1) performs a number of tasks and shows which startups solve them as a separate project. If a company has come up with something and wants to implement it, it is very likely that someone is already doing it, especially in an industry such as logistics. Many Ukrainian logistics companies today do not analyze foreign experience hiring teams of employees to solve their logistical issues that are not competent enough and learning from the mistakes of companies. Therefore, there are two ways for logistics professionals in Ukraine to optimize their operations. The first is to continue to work with the Ukrainian team of workers. The second is to enter the international market and introduce the results of the work of a foreign startup. The best decision to choose the option can only be made by a particular company: whether to implement a ready-made solution (customization), or independently develop it from scratch by the forces of its staff or additional. The Ukrainian market for foreign startups is not interesting for today, and they are not ready to costomize, because a costomization will have a very high cost and it is necessary to consider the issues of support after adaptation of the prepared solutions to make a premature request about the main problems of adaptation of software products of automation of logistics processes. Support is an important cycle in working with your IT-provider to be able to refine or modify the software in the future and not be dependent on your provider, so you need to request technical documentation immediately. Therefore, the purpose of this work is to analyze the automation of transportation and distribution processes. Based on the purpose of the research, the following tasks are to be solved: ways to implement the digitization of logistics processes, to study the consolidation

processes in logistics, to investigate the relevance of the use of the economy of joint participation, marketplaces and big data in the implementation of innovations in logistics, to conduct transport and warehouse research.

Basic material and results. Alexeyev Andriy, Director of Logistics Department of JSC «Milk Alliance» [1], while building a system of operational reporting, production and sales planning, distribution management, discovered a «bush effect» in logistics when buyers form their own warehouses (inventory of products) from one or another reasons, and then they buy the products as usual and after a while begin to use their stocks, which complicates the process of control and forecast sales of products at retail outlets. This is helped by the digitization and the willingness of companies to work online (e-commerce).

The largest international service companies in Europe, for example, delivering aircraft parts worldwide, have their own start-ups such as international aviation (up to 2000 air couriers delivering parcels worldwide) [2].

Today, logistics companies exchange orders, consolidate on delivery, and platforms that allow consolidation of delivery are the future of transport markets.

Figure 2 shows the logistics trend that DHL, known as a delivery service, annually (not yet updated this year), but a huge transportation corporation with the largest number of warehouses worldwide, operating on different models, including not only is it a 3 PL operator, but also one of the largest owners of cargo fleets and its own airports, etc., it therefore occupies a huge segment in the supply chain. DHL Trend Research regularly publishes a key tool for the global logistics community – the radar of logistics trends. For the fourth year, the logistics trend radar is a dynamic, vibrant tool that reflects the evolution of society, business and technology [3]. It has become an inspiring benchmark for strategy and innovation in the logistics industry and has generated many successful, award-winning startups both within DHL and outside the company, in close collaboration with its customers and partners. They develop a radar trend and look at two major trends: 1) social and business and 2) technological. They analyzed what kind of trends in the next 5 years would be implemented and how quickly.

Figure 1. Startups in the world working on innovation in logistics

Over the last 5 years, the sharing economy [5], marketplace [6] and big data [7] are the most relevant topics in implementing innovation in logistics. There are a lot of data in the logistics, but they are structured and understood, it is immediately clear what to look for in the analysis, big data is more for arrays of data that are not systematized. Big data in logistics helps you understand customer behavior patterns, market trends, maintenance cycles, cost reduction methods, and process optimization strategies.

Sharing economy (business model of social interaction) and marketplace (ecosystem and platform for organizing the work of all market participants) are two components of modern innovative business models that allow business to be competitive and efficient in the next 5 years.

What is Sharing Economy? It is a business model, a social trend of interaction in society, when people exchange certain values and receive material benefits from it. An example might be a library when there is no book, but there is a shared space for sharing. You can borrow tools for a while. Also services «GetManCar Car Rental – one minute car rental» is the first Ukrainian car rental, car rental through the app, without manager, office, keys with minute billing [8]. Sharing economy will change the social and economic paradigms, implementation over 10 years will greatly change the supply chain.

Marketplaces such as online supermarket Rozetka, prom.ua, kabanchik.ua are examples of business models and allow you to launch a new product line.

There is a significant amount of data in the logistics chain, and in Ukraine there is a problem in obtaining this data, analyzing and making management decisions. For example, installing GPS trackers for trucks in order to obtain vehicle moving data on a map, and you can correctly set up tracker information and receive data such as «driver has or has not reached the point of delivery», collect data about problematic drivers, routes (building the best and adjusting after passing it), etc. GPS – a necessary tool for modern logistics business to ensure the fulfillment of the main task of logistics – delivery on technology «just in time» [9], to bring to a certain place in time, to know whether the driver will have time and to warn the consignee, whether the driver has time to load the cargo and to compare the plan and the fact of the performed works.

Modern logistics companies in Ukraine have started to introduce a system of routing of goods (delivery on points of sale) and receive constant errors, because routers pass the knowledge base on the basis of the plan, but the fact is not taken into account, so the indicators are very different, and if the driver is competent, the load makes it to the point appointment. Therefore, the current delivery process should be digitized, not the correct one.

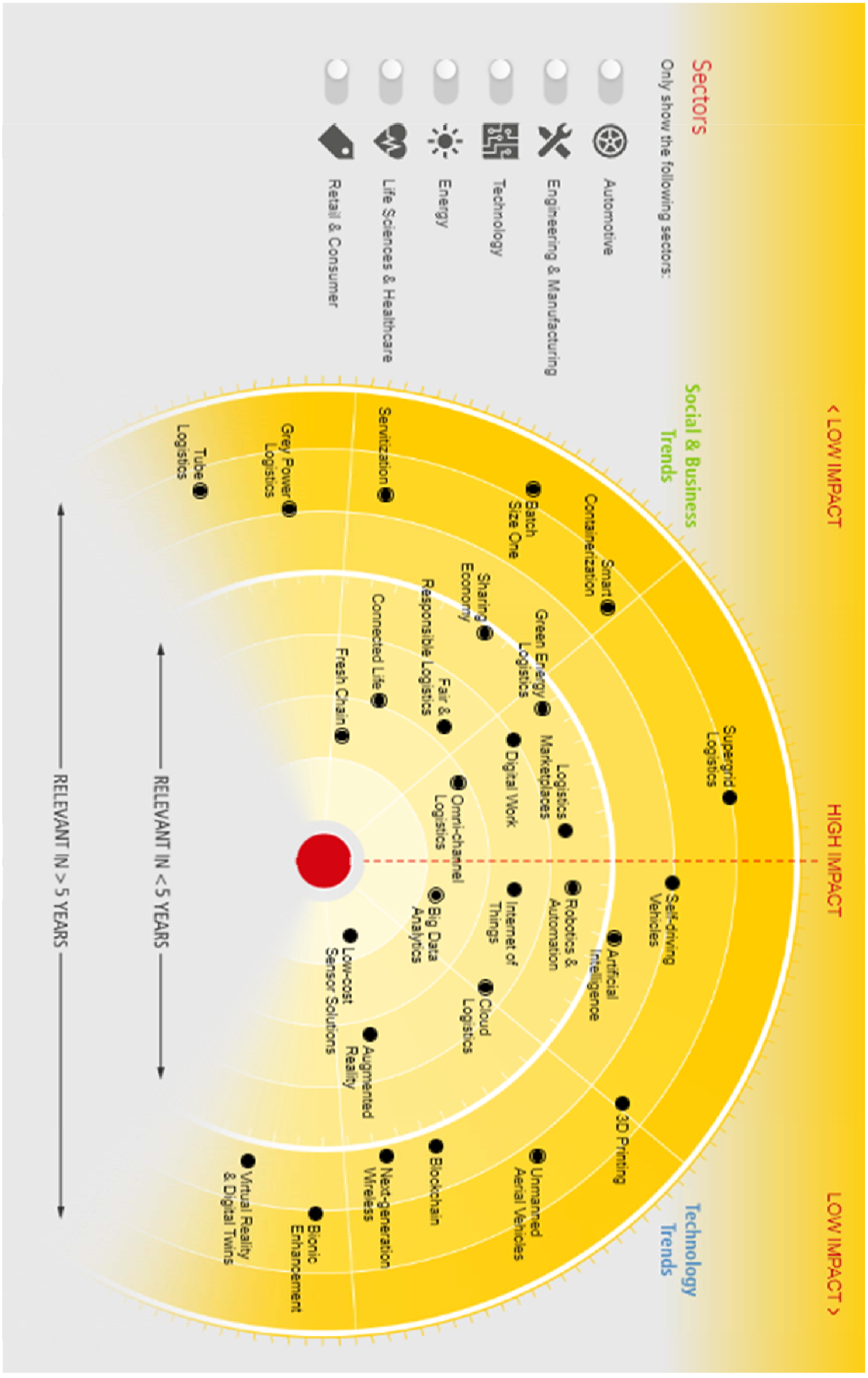

Figure 2. DHL Logistics Trend Radar [4]

The main resources in logistics are material assets, labor and time. Warehouses and vehicles are the key of material resources. Logistics digital platforms based on Sharing Economy business models have been developing in the world for 3-5 years, for example, Park Circa – parking space exchange, Zipline – easy access to idle vehicles through mobile application, Tamyca – platform for Carting, Floow2 – provides a platform for exchanging assets through the exchange of equipment and personnel, Wonolo – a platform for finding temporary logistics staff, Parcelly – a platform for reallocating local businesses to parcels, etc., and Logistics Marketplaces, such as INTTRA – marketleys largest in sea transportations, Saloodo! – DHL freight marketplace, Flexport – the largest international freight forwarding marketplace, iContainers – a comprehensive shipping and forwarding tool for shipping, FLEXE – an online platform for empty warehouse delivery and more. These platforms allow you to manage material, labor and time resources more efficiently. In any business, there are situations when it is unable to fulfill its obligations. For example, DHL found 5-10% of cargoes that were not profitable for them and did not want to spend their resources on them, created a marketplace like Saloodo! and assembled carriers in Germany, Poland, the United Arab Emirates and Africa. That is, when there is a problem of business optimization, you can create a separate project that will help the main business. Saloodo! does not work in Ukraine because it is not a priority market for DHL. And FLEXE operates on the basis of such transport exchanges (marketplaces) as Dilla, Lardi, Timocom, Trans.eu, and there is a verification of carriers, in which a lot of resources are invested. Lardi is changing a lot now, and updates are coming soon. Trans.eu is a site like Lardi, but there is not only a search for vehicles, but also registration of documents for transportation, which is now actively developing in Ukraine.

There are only a few case studies of the use of blockchain technology, such as bitcoin [10], and in the logistics of many Ukrainian experts it makes no sense to use this technology. The main advantages of blockchain technology are the control of events in the supply chain of products, but they can also be controlled on the basis of marketplaces, which are not engaged in the deletion of information and allow you to configure the integration of data from marketplaces to the storage system of a particular company.

Transport exchanges are actively developing in the Ukrainian market, where logisticians can choose vehicles. But in the market of Ukraine and Community of Independent States countries there are no sites where you can simply choose the warehouse on demand (as a service), that is, there are no stock exchanges (marketplaces).

FLEXE falls under the typology and stock exchanges, as it is a platform for renting warehouses, but only in the USA. Created in 2016 and restructured for 42 billion dollars in 2019, they have become a full-time competitor to Amazon. FLEXE provides services 30-50% cheaper than Amazon and allows you to brand your parcels. There are no tools in the Ukrainian market for quick search and safe rent of warehouses for different types of products. Searching for a warehouse is a complicated and lengthy procedure for the following reasons: the lack of a warehouse database in one source and the complexity of comparing warehouses (search on OLX.ua or through a local or international broker, or on the recommendation of acquaintances), the risks of renting warehouses from unverified agents / owners, the procedure for selecting and concluding warehouse lease agreements, the need for free warehouses under peak load, continued.

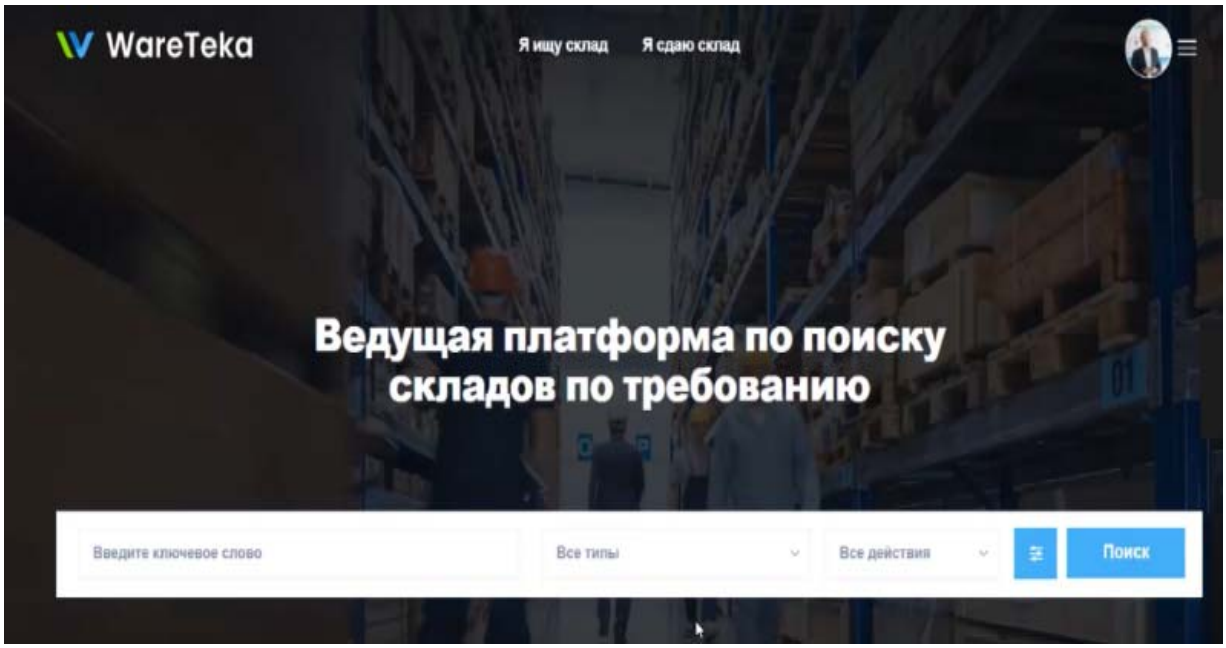

Figure 3 – Ware Teka online platform interface in 2019 first product release

Historically, transport is a dynamic system, so transport and warehouse exchanges are needed. There are up to 10 companies in the world that operate on a similar business model. In Ukraine, in 2019, a new Ware Teka online platform has emerged for finding warehouses for rent or purchase with the largest warehouse real estate base to date, allowing real estate to be leased as soon as possible (figure 3). In one place both search for a warehouse and services of 3 PL operators and brokers (assistance in selecting a warehouse, advice on rental rates and assistance in determining the optimal rental value, etc.). The two largest broker leaders in Ukraine, Cushman and Seberer, have already confirmed their participation on the Ware Teka platform. This is the first version of this product. And the second version of the product appears in May 2020, taking into account the wishes and recommendations of 3 PL operators (fig. 4), already more than 300 warehouses of almost 5 million m2 in the base and it is possible to place its warehouse (fig. 5-6) if the company has empty space and should be disposed of for 3 or 6 months.

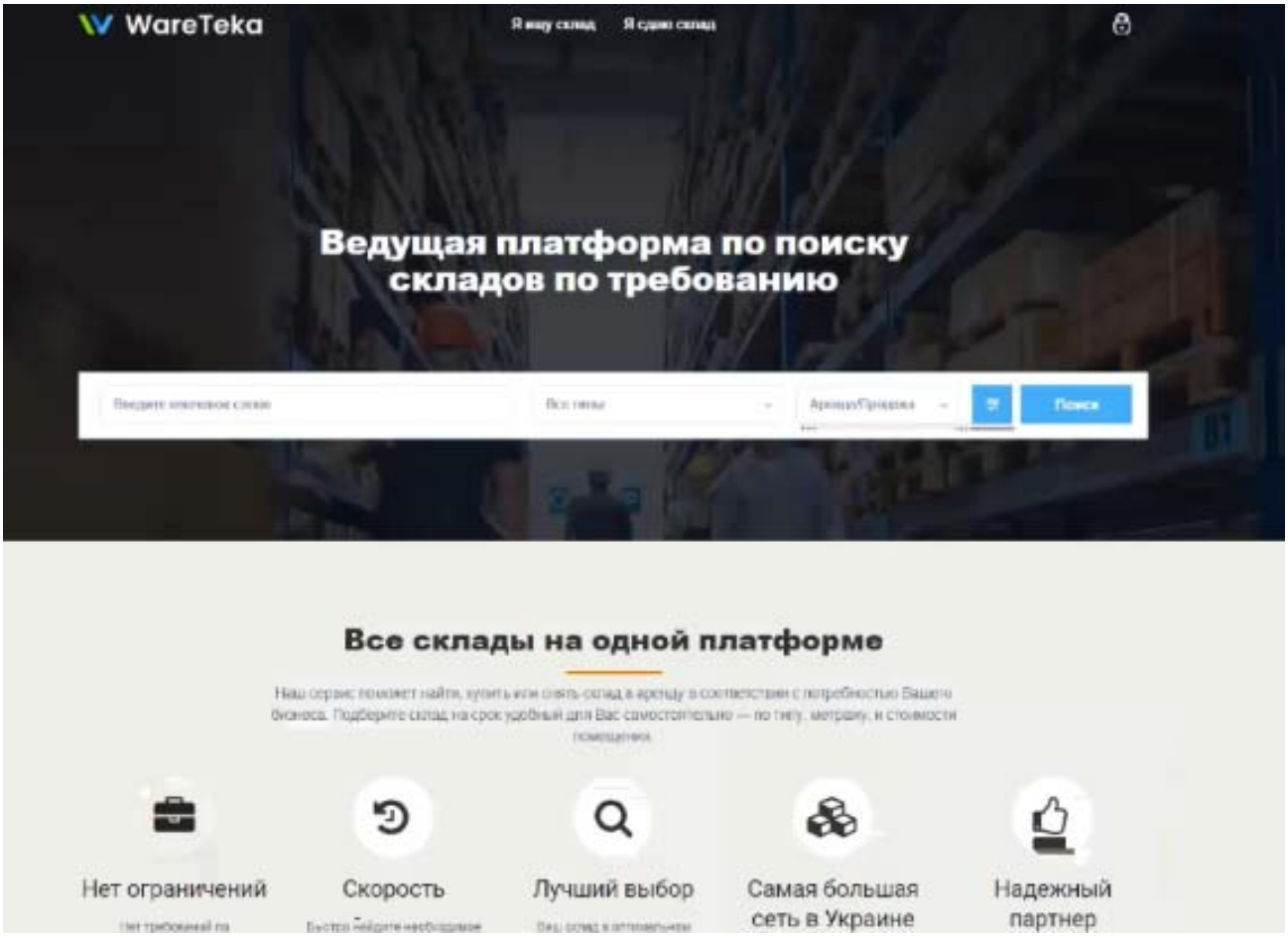

Figure 4 – Ware Teka online platform interface in the second updated product of 2020

Figure 5 – Ware Teka online platform interface when looking for a warehouse in Ukraine

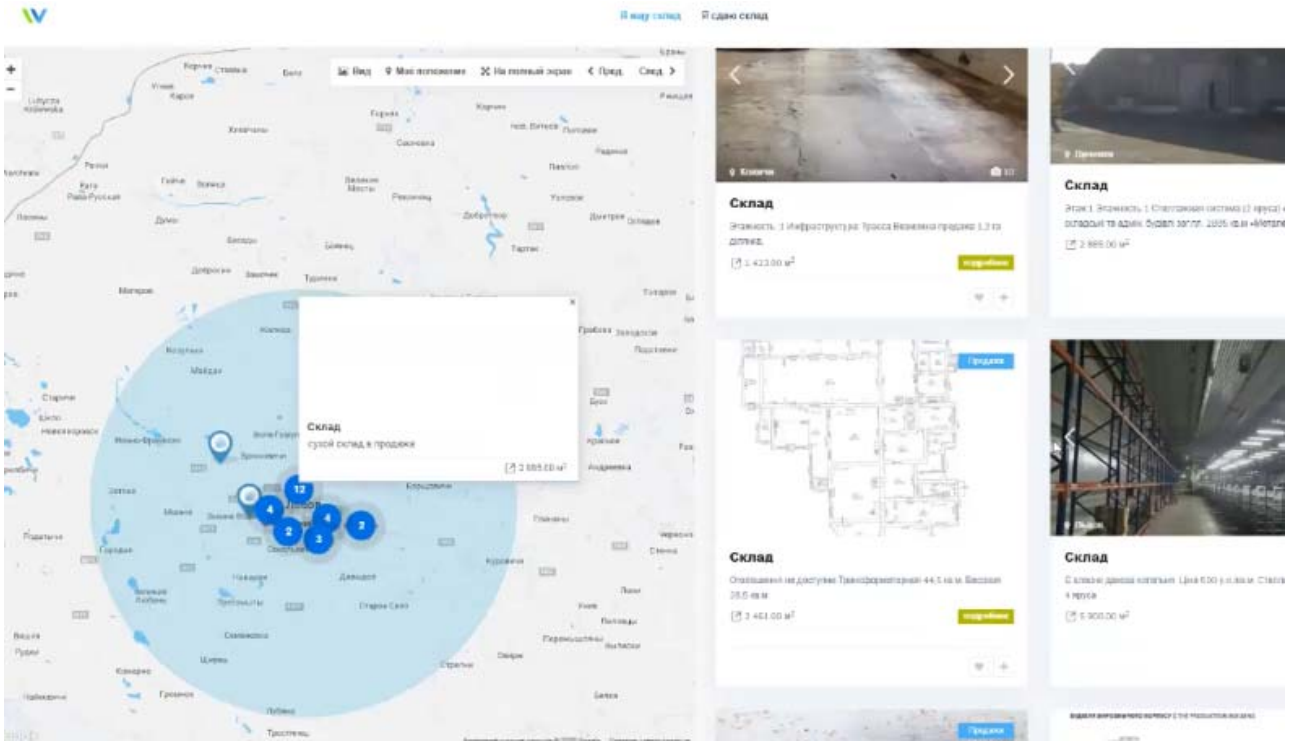

Figure 6 – Ware Teka online platform interface when searching for warehouse in Lviv region of Ukraine, 30 km radius from Lviv city

Also on the Ware Teka platform is a new «Urgent lease» service, where the warehouse and services needed today for tomorrow and payment can be made by card through the platform (fig. 7).

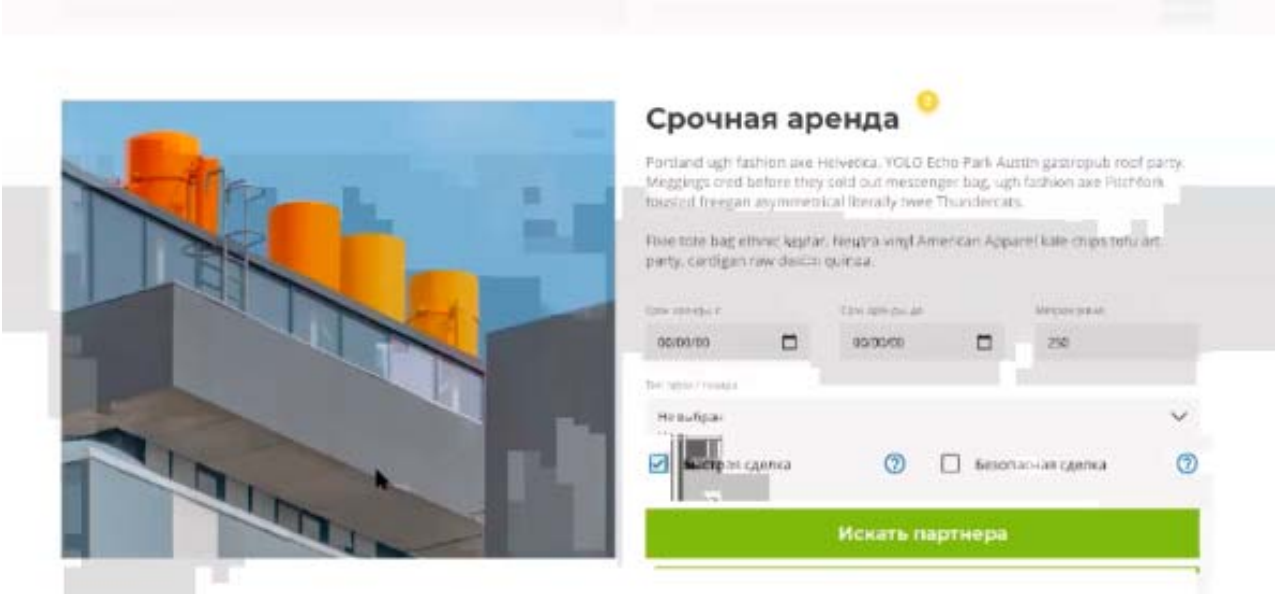

Figure 7 – Ware Teka Urgent Rental Service

Conclusions. Thus, the results of the analysis of automation of the processes of transportation and distribution indicate the need to introduce the developed world logistics technologies in the Ukrainian market of transport services on the basis of their adaptation to market conditions of uncertainty and coordination with existing software products. On this basis, the main tasks of the study were solved. A positive effect was found when implementing the digitization of logistics processes of transportation and distribution on the example of existing companies. The processes of consolidation of transport services in logistics are investigated. The relevance of using a collaborative economy, marketplaces and big data in implementing innovations in logistics and their examples and the positive productive effect are proved. A study of transport and warehouse exchanges was carried out, which showed that warehouse exchanges have just started to develop in the Ukrainian market in their global understanding and perspective direction of research.

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51-56
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UPDATING THE IMPLEMENTATION OF LEAN LOGISTICS IN A CHANGING ENVIRONMENT

Volodymir Davidenko, Ristvej Jozef, Strelcová Stanislava. «Updating the implementation of lean logistics in a changing environment». *The article is devoted to the analysis of the possibilities of implementing Lean Logistics in an unstable competitive environment. The article sets out the theoretical and practical aspects of the lean enterprise. The concept of Lean Production and its main goals are considered. The classical characteristic of the Lean Production concept to the main types of losses is highlighted. The concept of Lean Logistics is proposed as a Lean Production tool. The content of the concept of Lean Logistics is disclosed. The main reasons leading to the occurrence of logistic losses are considered. The analysis of basic tools and methods that can be applied in Lean Logistics. The possibilities of obtaining benefits from Lean Production tools, when applied in a logistics strategy, are considered. Lean Production methods used in logistics are proposed. The economic benefits of implementing Lean Logistics tools are presented. Recommendations for further research are provided.*

Keywords*: lean manufacturing, lean logistics, losses, types of logistics losses, value creation flows, logistics strategy.*

Володимир Давіденко, Ristvej Jozef, Strelcová Stanislava. «Актуалізація впровадження економною логістики в умовах мінливого середовища». *Стаття присвячена аналізу можливостей запровадження Lean Logistics в умовах нестабільного конкурентного середовища. У статті викладені теоретичні і практичні аспекти ощадної діяльності підприємства. Розглянуто*

51-56
v.1 (2020)
https://smart-scm.org

концепціюLean Production та її основну мету. Висвітлено класичну характеристику концепції Lean Production до основних видів втрат. Запропоновано поняття Lean Logistics, як інструмент Lean Production. Розкрито зміст поняття Lean Logistics. Розглянуто основні причини, що призводять до виникнення логістичних втрат. Проведено аналіз базових інструментів та методів, які можуть бути застосовані в Lean Logistics. Розглянуто можливості отримання переваг від інструментів Lean Production, при їх застосуванні в логістичній стратегії. Запропоновано методи Lean Production що застосовуються в логістиці. Наведено економічні переваги від запровадження інструментів Lean Logistics. Надано рекомендаці подальших досліджень.

Ключові слова: *ощадне виробництво, ощадна логістика, втрати, види логістичних втрат, потоки створення цінностей, логістична стратегія.*

Владимир Давиденко, Ristvej Jozef, Strelcová Stanislava. «Актуализация внедрения бережливой логистики в условиях изменяющейся среды». *Статья посвящена анализу возможностей внедрения Lean Logistics в условиях нестабильной конкурентной среды. В статье изложены теоретические и практические аспекты бережливой деятельности предприятия. Рассмотрена концепция Lean Production и ее основные цели. Освещена классическая характеристика концепции Lean Production к основным видам потерь. Предложено понятие Lean Logistics, как инструмент Lean Production. Раскрыто содержание понятия Lean Logistics. Рассмотрены основные причины, приводящие к возникновению логистических потерь. Проведен анализ базовых инструментов и методов, которые могут быть применены в Lean Logistics. Рассмотрены возможности получения преимуществ от инструментов Lean Production, при их применении в логистической стратегии. Предложены методы Lean Production применяемые в логистике. Приведены экономические преимущества от внедрения инструментов Lean Logistics. Предоставлено рекомендации дальнейших исследований.*

Ключевые слова: *бережливое производство, бережливая логистика, потери, виды логистических потерь, потоки создания ценностей, логистическая стратегия.*

Introduction. The economical level of management in the enterprises with a high level of production organization is a prerequisite for awareness of each employee, their area of responsibility in the overall chain of value creation of the final product, in accordance with the requirements of all stakeholders. The concept of Lean Production is a tool that allows you to achieve a high level of production system and, as a result, increase production efficiency. In all industries, the concept of "savings production" is a recognized strategy of industrial development and is gaining a leading position on the market. Lean Production is a modification and consolidation of the experience of the Toyota Production System - TPS [4].

The beginning of the development of the TPS system is considered to be the need to restore industrial capacity and enter the international market. As a result of the formation of a conceptually new type of production with a special approach to motivating the entire vertical organizational structure, with significant technological and organizational solutions, the tools of the Lean Production concept were developed, building a special system of mutually interested suppliers and sales. The transition to a general understanding and borrowing of the experience of TPS, identified a new productive direction in the formation of the concept of Lean Production [3].

The current state of reformatting of competitive approaches - struggle for consumers and minimization of expenses acquires special urgency of introduction of this concept. Such approaches are key tools in the implementation of the Lean Production concept, and aim to explore the possibilities of implementing the Lean Logistic concept.

The concept of Lean Logistics is improvement of operations at all levels and optimize supply chains by reducing costs, and is achieved through better inventory and

material management, as well as eliminating unnecessary steps by minimizing inventory and transportation.

Thrifty logistics allows to achieve a high level of organization of processes, eliminates unnecessary costs and helps to develop successfully in today's competitive environment. Thanks to the introduction and maintenance of cost-effective logistics, delivery is carried out in the shortest possible time, and the necessary raw materials and products do not accumulate in intermediate stocks.

Analysis of recent research and publications. Given the urgency of the conditions of operation of enterprises, there is a need to explore the possibility of using cost-effective logistics.

The interest of researchers in the problems of theory and practice of the implementation of savings logistics is observed in the works of Ukrainian and foreign scientists, in particular Jim Wumek, D.J. Bauersox, Jeffrey Liner, Michael L. George, R. Brayley, Michael Vader, Masaaki Imai, A.M. Gadzhinsky, OS Vikhansky, KA Gordeeva and other scientists. Scientists focused on identifying the main tools of savings production, analysis and evaluation of the implementation of savings logistics, highlighting ways to implement the studied approaches in enterprises. However, despite the considerable research of issues related to the methods of cost-effective logistics, they need constant study. Theoretical generalizations from these aspects are necessary for understanding of processes of management of the investigated tools, their characteristics.

The purpose and objectives of the study. The purpose of the article is to investigate the relevance of the introduction of cost-effective logistics in terms of restrictions on the functioning of enterprises.

Basic material and results. Lean Production is a special approach to enterprise management, which allows you to improve the quality of work by reducing losses, ie those processes that reduce efficiency. The main goal is to build a production that can quickly respond to consumer demands and make a profit for the company, with any change in the market situation, creating a perfect production system, reducing intermediate stocks and more.

In the classical concept of Lean Production, the main types of losses include [2]:

- unnecessary movements of equipment and operators, leading to an increase in time and cost;
- unnecessary movements that lead to delays, damage, etc .;
- technological shortcomings that do not allow to implement in the product all the requirements of the consumer;
- unsold products that require unnecessary costs for accounting, storage, etc .;
- non-finished products, which are waiting in line for processing and thus increase the cost;
- any defects that lead to additional costs;
- surpluses of finished products, which increase the cost of storage.

Today, "savings logistics" meets the key requirements of all activities - improving the efficiency of logistics processes, given the limited resources. "Savings logistics" defines not only short-term measures to reduce transport, technological and human costs, but also - the optimization of logistics business processes to eliminate redundant functions and procedures that create additional work and, consequently, costs but do not create additional value.

Among the main reasons for such shortcomings are the inefficient organization of logistics processes, labor and outdated technologies, as well as the inability to implement a program to increase operational efficiency based on the principles of "economical production". To ensure success in improving operational efficiency, it is necessary to significantly improve the skills of production organization and disseminate

51-56
v.1 (2020)
https://smart-scm.org

effective programs throughout the organization.

Enterprises that actively implement lean logistics tools consider it as a process of management of material and information flows, as well as human resources based on their optimization by minimizing costs. In practical terms, lean logistics is a tool for the most rational organization of flow processes with minimal costs of labor, material and information resources.

Due to the principle of strategic management of the enterprise, lean logistics should be considered as a strategic direction that allows the management of tangible and intangible flows in the supply process, by the most effective way to optimize costs and streamline the process of production, sales and related services both within one enterprise and for a group of enterprises [1].

The Lean Logistics implementation process should have a consistent strategy, which should rationally begin with the implementation of the 5S strategy.

It helps to maintain the organization and transparency of production processes, allows to increase the efficiency of the enterprise, improve working conditions, increase productivity, reduce the risk of downtime, reduce financial losses. As a result, there is an ability to get the following benefits:

- reducing the number of defective products;
- improving the quality of manufactured products;
- standardization and unification of jobs;
- reduction of time for performance of separate technological operations.

In parallel, it is necessary to build a chain of domestic consumers and suppliers. Chains of internal consumers and suppliers need to be transformed into a sequence of processes. This will make it possible to create flows of value creation, both for internal and external consumers. These flows need to be extended to suppliers, which will minimize one-time supply volumes with the maximum approximation to the real needs of the process. Thus, there is a gradual process of introduction of the tool "Just in time" that allows to make production precisely in time and in the necessary quantity.

This sequence of actions will ensure high quality and reduce costs. Focusing its efforts on eliminating the causes of unnecessary costs, the enterprise builds a form of efficient business, which applies not only to production but also to other processes of the enterprise.

Continuous improvement of business processes of the enterprise and quality management, allows to increase production efficiency. The Andon and Poka-yoke systems allow to inform staff about problems that have arisen in a particular place. To do this, it is necessary to identify the main critical (risky) criteria of logistics processes, the levels of event alarms and develop response procedures depending on the degree of the problem. This approach can provide the following benefits:

- provide a quick response to problems;
- timely identify and get rid of iterative difficulties;
- gradually get rid of bottlenecks of the enterprise;
- develop an employees' sense of responsibility;
- increase motivation in order to improve quality;
- stabilize the production process.

It is also advisable to consider the methods of lean production which is used in logistics.

1. The organization of cargo transportation is a complex logistical process that concerns many key aspects of the activities not only of the carriers themselves, but also of other entities that ensure their organization and control. According to experts' survey, transportation costs range from 40 to 60% of the total price of products. Reducing the level of these costs is one of the most important tasks of transport logistics [5]. To solve this problem of lean production,

51-56
v.1 (2020)
https://smart-scm.org

there is an offer to use a flow method. The essence of the method is that it is necessary to rethink the methods of work, types of equipment and tools used, so that nothing interferes the continuous flow [2].

2. The structure of information flows is the most important for logistics. To manage material and financial flows, it is effective to use information systems (EPR-systems). It is necessary to develop a single system of automation of information flows instead of an isolated information system of each department of the company. This can be done by applying the flow method from the concept of lean production.

3. For effective management of the warehouse control system, it is necessary to have all products ordered for a specific consumer after confirmation of payment. In addition, it is necessary to organize the work in such a way that the products could be delivered from the customs warehouse or from the supplier directly to the warehouse of the recipient [5]. Thus, the reduction of costs for loading and unloading operations, warehousing, storage, transportation and elimination of the risk of illiquidity is achieved.

4. The process of delivery of goods from production center to the consumer, or from the logistics center to outlets for further sale to customers. The main task is to ensure the availability of products in the warehouses of consumers, with a minimum level of stocks and minimum transport costs for order processing and their delivery. The solution of this problem may be the application of the principle of extraction, which is part of the basic principles of lean production. Extraction is a method of production management, in which next operations signalize about their needs to previous ones [2].

With the perfect use of Lean Logistics tools, firstly the enterprise must get the economic effect, namely:

- optimal reduction of transportation costs;
- reduction of the passage of goods in the logistics chain;
- reduction of stocks at all stages of promotion of material flows;
- reduction of costs for cargo operations.

Due to the low research capacity of the Lean Logistics concept, there is a need for further search of effective tools based on the processes of the Lean Production concept.

Conclusion. In order to solve the problem of mass implementation and effective use of Lean concepts, it is necessary to actively encourage enterprises to spread the ideas of quality improvement through the development and further support of those who create this network. If one company develops a method that works, it must be disseminated so that all other stakeholders can use it as well. The participation of companies in the large-scale Lean distribution process should be considered as an investment in creation a culture of quality that in turn will be an investment in the company's future ability to accumulate profits.

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DIGITAL TRANSFORMATIONS OF LOGISTICS CUSTOMER SERVICE BUSINESS MODELS

Hryhorak Mariia, Trushkina Natalia, Tadeusz Popkowski, Molchanova Kateryna. «Digital transformations of logistics customer service business models». *The article presents the results of expert surveys conducted by international organizations as a method of empirical research to identify current problems, features and trends of customer-oriented logistics services to consumers in the context of digital space. The statistical analysis of the indicators characterizing the level of use of information and communication technologies at management of mutual relations with consumers at the Ukrainian enterprises is executed. The key barriers that hinder the digital transformation of the logistics service have been identified, which are conditionally classified into 6 groups: trading, transport, marketing, information, organizational and financial and economic. The content structure of CRM-system implementation as a customer relationship management tool is proposed. The expediency of the complex approach application to digital transformation of consumers*

logistic service on the basis of customer orientation is substantiated and the formula of an estimation of synergetic effect from its realization is offered.

***Keywords**: logistics service, customer orientation, customer experience, digital economy, digital technologies, CRM-system.*

Марія Григорак, Наталія Трушкіна, Tadeusz Popkowski, Катерина Молчанова. «Цифрові трансформації бізнес-моделей логістичного обслуговування споживачів». *У статті викладено результати експертних опитувань, проведених міжнародними організаціями, як методу емпіричних досліджень для визначення сучасних проблем, особливостей і тенденцій клієнтоорієнтованості логістичного обслуговування споживачів у контексті цифрового простору. Виконано статистичний аналіз показників, що характеризують рівень використання інформаційно-комунікаційних технологій при управлінні взаємовідносинами зі споживачами на українських підприємствах. Виявлено ключові бар'єри, що стримують цифрову трансформацію логістичного сервісу, які умовно класифіковано за 6 групами: ринкові, транспортні, маркетингові, інформаційні, організаційні, фінансово-економічні. Запропоновано змістовну структуру впровадження CRM-системи як інструменту управління взаємовідносинами з клієнтами. Обґрунтовано доцільність застосування комплексного підходу до цифрової трансформації логістичного обслуговування споживачів на засадах клієнтоорієнтованості та запропоновано формулу оцінювання синергетичного ефекту від його реалізації.*

***Ключові слова:** логістичне обслуговування, клієнтоорієнтованість, клієнтський досвід, цифрова економіка, цифрові технології, CRM-система.*

Мария Григорак, Наталия Трушкина, Tadeusz Popkowski, Катерина Молчанова. «Цифровые трансформации бизнес-моделей логистического обслуживания потребителей». *В статье изложены результаты экспертных опросов, проведенных международными организациями, как метода эмпирических исследований для определения современных проблем, особенностей и тенденций клиентоориентированности логистического обслуживания потребителей в контексте цифрового пространства. Выполнен статистический анализ показателей, характеризующих уровень использования информационно-коммуникационных технологий при управлении взаимоотношениями с потребителями на украинских предприятиях. Выявлены ключевые барьеры, сдерживающие цифровую трансформацию логистического сервиса, которые условно классифицированы по 6 группам: рыночные, транспортные, маркетинговые, информационные, организационные, финансово-экономические. Предложено содержательная структура внедрения CRM-системы как инструмента управления взаимоотношениями с клиентами. Обоснована целесообразность применения комплексного подхода к цифровой трансформации логистического обслуживания потребителей на основе клиентоориентированности и предложено формулу оценки синергетического эффекта от его реализации.*

***Ключевые слова:** логистическое обслуживание, клиентоориентированность, клиентский опыт, цифровая экономика, цифровые технологии, CRM-система.*

Introduction. The key vector of digital transformation should be aimed at increasing the requirements for the level of logistics services, the emergence of new criteria for service quality, in other words, the formation of a customer-oriented approach to customer relationship management. This is confirmed by the various international analytical centers researches. According to a survey of 13 thousands customers, conducted by Accenture Digital [1], 2 out of 3 consumers change service providers due to low quality of service. According to Gartner [2], 9 out of 10 companies today compete primarily in terms of "quality of customer service".

According to the IDG Communications Inc. company's report, prepared on the basis of the more than 700 top managers opinions,

was found that the digital transformation is a means of improving customer service (46% of respondents). A survey of 528 managers and specialists on strategic management of digital transformations, conducted by the consulting company Altimeter-Prophet, showed that the main efforts are aimed at improving the system of contacts with consumers (54% of experts).

According to a survey conducted by the e-consulting agency Econsultancy, among the most important characteristics for success in the digital economy is customer orientation (58% of respondents). That is, more than half of respondents believe that customer focus is an effective tool for doing business using digital technologies. At the same time, when forming a customer-oriented approach to customer service, companies face a number of problems, including: barrier to functional disconnection of data exchange (52% of respondents); non-compliance of corporate culture with customer requirements (39%); lack of technological platforms to manage data (35%); inability of IT departments to maintain communication with customers (28%); insufficient competence in data analysis (28%); focusing organizations on sales, not on the consumer (28%), etc. [3].

Thus, the problems of transformation of the customer relationship management system based on the formation of a customer-oriented approach in the context of digitalization remain relevant and require further research.

Literature and researches review. The generalization of the scientific literature indicates the relevance of various aspects of the logistics customer service problem in the context of digitalization of enterprises' business processes.

According to scientists [4], the key problem is strategic marketing transformation or strategic CRM. Investing in technology without understanding the expectations, preferences and values of consumers without attracting customers and a positive customer experience (the basis of the so-called "consumer age") - the wrong strategy that cannot give the desired result. In contact with customers, it is not just the question of tools that becomes fundamental, but how individual tools can solve customers' problems, meet their needs and train customers and manufacturers. It is this strategy that creates a unique consumer value, and the company becomes a "system integrator" in its formation.

According to D. Kuzin [5], the customer-centric approach and use of the consumer network is one of the main characteristics of the fourth industrial revolution. This is due to the development of the economy of shared consumption, when it is not the ownership of a product that is important, but its joint use (the so-called "organizational consumer") with the help of digital information and communication technologies. This challenge is due to fundamental changes in the marketing system and marketing technologies.

In [6] it is noted that new business models become customer-centric (customer centric), which completely determines their structure: from the value proposition aimed at meeting customer needs, timely delivery (just-in-time) and cash flow (income), which are created during the use of products. PwC analysts note that the new business models are focused on generating additional revenue from digital solutions that optimize customer interaction and logistics services.

Foreign and domestic scientists pay considerable attention to defining the essence and content of the "customer orientation" concept from different scientific points of view [7-18]; to study of the CRM-system features and its differences from other information systems [19-23]; applied aspects of the digital technologies application in the activities of enterprises (including to improve the management system of relations with consumers) and the development of scientific and methodological approaches to assessing the effect of their implementation [24-26].

57-75
v.1 (2020)
https://smart-scm.org

At the same time, the versatility, multifacetedness and debatability of certain issues on the selected topic necessitate further research. And especially the solution of this problem is actualized in modern conditions of digital economy rapid development.

Aim and objectives. The purpose of this article is to study the features and identify key barriers that hinder the effective development of customer relationship management in a digital economy; substantiation of a comprehensive approach to the digital transformation of logistics customer service on the basis of customer orientation.

To achieve this goal used general scientific methods of analysis and synthesis, generalization, structural and logical, statistical, economic and mathematical methods, expert surveys and evaluations.

Results, analysis and discussion. International experience shows that the priority tasks of the digital strategy of enterprises include customer experience and improving its quality. According to Simpler Media, it has been found that of the 325 audience managers, 79% identify DCX (Digital Customer Experience) as an extremely important tool for their organizations. PwC, together with experts from the British economic research institute Oxford Economics, proved that investing in digital transformation primarily improves the quality of customer service (40% of respondents). For many global companies, digitalization of business, according to an IDC study, primarily means meeting consumer expectations (52% of respondents).

As a result of a survey of 1,155 managers of manufacturing companies in 26 countries around the world, conducted by PwC Strategy & [27], found that "Digital Champions" are continuously strengthening and improving their digital product offerings and access to customers. They have succeeded in building an understanding of customer needs and strive to take customer requirements into account when creating attractive and personalized solutions, improving traditional products through services, software, data analysis and the added value of engaging broad partner networks. More than 50% of Digital Champions' revenue comes from digitally advanced products and services. It is projected that investment in new technologies and digital ecosystems could contribute to a 15% increase in revenue over the next 5 years. The study found that 68% of Digital Champions respondents have mastered customer service programs that offer personalized products and services, while 63% take advantage of more complex value chains.

The main goals of the digital transformation, according to 100 IT managers of large companies in the financial, telecommunications, oil and gas and other sectors of the economy, are to increase customer satisfaction (58% of respondents); cost reduction (54%); entering new markets, expanding the range of products and services (33%).

An expert survey of 700 representatives of more than 300 Russian companies from 15 industries, conducted in 2018 by "Komanda-A Management" company [28], revealed that the most important area of digital transformation is digital customer service (65,6% of respondents). Channels and tools of client communications include: e-mail (86% of respondents); websites (78%); social networks, messengers (60%); mobile applications (38,5%); SMS (38,5%); chatbots (25%). Only 6,2% of experts called omnichannel fully implemented tools in their company. The majority (75%) to some extent doubt the completion of this process, and 18,8% admit the lack of omnichannel.

Table 1

57-75
v.1 (2020)
https://smart-scm.org

Comparative analysis of existing assessment methods digital maturity and transformation of business processes at the enterprises

Name	Description
1	*2*
Digital Maturity Model by company Deloitte	Assessing digital capabilities in 5 key dimensions: relationships with consumers who consider the company as their digital partner (Customer); strategy that provides new competitive advantages (Strategy), Digital Technology, the use of digital technologies in operational processes (Operations), Organizational Culture
Index of digital maturity of enterprises	There are 5 major areas of evaluation: strategy and business model; consumers; organizational culture and staff; operational processes; information technologies
Industry Maturity Index 4.0 Acatech, developed by the National Academy of Sciences and Technology of Germany	The index is formed in 5 functional areas: development; production; logistics; service; marketing and sales. In the context of these areas, corporate processes are analyzed
Index of digital maturity of enterprises	Areas in which the level of digital maturity can be assessed: clarification, formation of a unified strategy of digital transformation; analysis and evaluation of the effectiveness of applied software services and platforms; assessment of the digital marketing level and communications; participation in the software development process; introduction of Agile IT; analysis, evaluation, audit of digital processes; level of organizational culture; the level of innovation potential of the enterprise; assessment of equipment and systems and their further modernization; study of the competitive environment
Digital Maturity Index, developed by consulting company Gartner	To calculate the index, it is proposed to use 9 criteria: the level of omni-(multi) channel in working with consumers; development of the channels themselves; the degree of use of new business models; the degree of change in value chains; the level of education of new values with the help of digital resources; the degree of significance of these values for the organization; degree of information technology support; the ability and readiness of the organization to conduct digital business; priority of digitalization in the company's strategy
Digital Transformation Index, which was developed by the analytical agency Arthur D. Little	Has the following areas of evaluation: Strategy & Governance; Products & Services; Customer Management Operations & Supply Chain; Corporate Services & Control; Information Technology; Workplace & Culture
Digital Transformation Index proposed by the MIT Center for Digital Business and Capgemini Consulting	According to the results of the analysis of more than 400 large companies from different industries, 3 key areas of digital transformation have been identified: Transforming Customer Experience; Transforming Operational Processes; Transforming Business Models
Digital Business Aptitude by company KPMG	Includes 5 areas of assessment: Vision & Strategy; Digital Talent); Digital First Processes; Agile Sourcing & Technology; Governance. A feature and advantage of this model is a diagnostic tool for self-assessment, which is freely available

57-75
v.1 (2020)
https://smart-scm.org

End of the Table 1

1	2
The model "Digitization Piano)", that was developed by Global Center for Digital Business Transformation at the initiative of companies IMD and Cisco	There are 7 Transformation Categories, which are the most important elements of the value chain of the organization: Business Model; Structure; People; Processes; IT Capability; Offerings; Engagement Model. A feature of this model is to determine the gap between the current and required levels in each direction
Index of digital conversion changes proposed by the company Ionology	Includes 5 blocks: Strategy & Culture; Staff & Customer; Process & Innovation; Technology; Data & Analytics
Index of strategic transformations in the digital transformation process, proposed by the Russian company Komanda-A (KMDA)	Includes 6 main areas: customer-centric (digital customer service, omnichannel, digital marketing and communications); collaboration (representation of business as an ecosystem, creation and development of a platform for interaction with partners); data (extensive use of analytical tools, use of data to adapt products and services, behavioral marketing); innovation (innovation culture within the company, the formation of a system of continuous improvement and development); value (definition and construction of a value proposition management system); staff (new approaches to attracting and developing employees based on digital culture and thinking)
Digital Strategy of the United Kingdom, adopted in 2014	The strategy is based on the concept of "digital by default". A standard for providing digital services has been created, which includes 18 different criteria, one of which is understanding the needs of customers

Compiled by the authors on the basis [29, p. 43; 30, p. 48].

At the same time, 17,2% note that the digital channel is a fundamentally important factor for customers. 59,4% answered that for them the digital channel is important along with other factors, and for 23,4% of respondents the digital channel is unimportant.

Currently, many methods have been developed to assess the digital maturity of enterprises, one of the components of which is a customer relationship management system (Table 1).

A study by PwC Strategy & [27] shows that in order to implement the business model, Digital Champions has focused on the formation and development of the following platforms:

– omnichannel trading platform - multi-channel trading and marketing platform for products and services (42% of respondents);

– product platform as a service - the product is sold through the platform in a model with a pay per use system (23%);

– customer service quality platform - offers highly individualized products or services (33%);

– comprehensive solutions for customers - includes products from many partners (24%);

– open platform - others person have the opportunity to build their own digital business models (10%).

Digitalization of business processes of enterprises significantly affects the digital transformation of the state economy. There are a lot of different indicators for evaluation the level of development of the country's digital economy. Some of them are described in the Table 2.

57-75
v.1 (2020)
https://smart-scm.org

Table 2

Indicators for evaluation the level of development of the country's digital economy

Name	Description
Networked Readiness Index (NRI)	The NRI, also referred to as Technology Readiness, measures the propensity for countries to exploit the opportunities offered by information and communications technology (ICT). It is published in collaboration with INSEAD (European Institute of Business Administration), as part of their annual Global Information Technology Report (GITR). The report is regarded as the most authoritative and comprehensive assessment of how ICT impacts the competitiveness and well-being of nations
UNCTAD B2C E-commerce Index	The UNCTAD B2C E-commerce Index, which measures an economy's preparedness to support online shopping, has expanded its coverage to include 152 economies. The index is calculated as the average of four indicators: account ownership at a financial institution or with a mobile-money-service provider (% of population ages 15+); individuals using the Internet (% of population); Postal Reliability Index; Secure Internet servers (per 1 million people)
Global ICT Development Index (IDI)	The IDI is an index published by the United Nations International Telecommunication Union based on internationally agreed ICT indicators. This makes it a valuable tool for benchmarking the most important indicators for measuring the information society. The IDI is a standard tool that governments, operators, development agencies, researchers and others can use to measure the digital divide and compare ICT performance within and across countries. The ICT Development Index is based on 11 ICT indicators, grouped in three clusters: access, use and skills
E-Government Development Index (EGDI)	The EGDI presents the state of E-Government Development of the United Nations Member States. Along with an assessment of the website development patterns in a country, the EGDI incorporates the access characteristics, such as the infrastructure and educational levels, to reflect how a country is using information technologies to promote access and inclusion of its people

Compiled according to data: [31 - 34]

In 2019 Ukraine had rank 67 of NRI from 121 countries (for comparison top 3 countries are Sweden, Singapore and Netherlands). In accordance with UNCTAD B2C E-commerce index, in 2019 Ukraine had rank 52 from 152 countries (top 3 countries are Netherlands, Switzerland and Singapore).

The last IDI rating was published in 2017 and Ukraine had rank 79 from 176 countries. The EGDI rank of Ukraine in 2018 was 82 from 180 countries. The DESI is calculated only for EU member states but methodology of this index could be implemented in Ukraine.

Based on statistical analysis, it has been established that in the last decade the problems of using information and communication technologies in the management of relations with consumers have also become relevant at Ukrainian enterprises. Thus, according to the State Statistics Service of Ukraine, the number of enterprises in which the website provided personalized content for regular customers increased by 95,9% in 2011-2018, and the implementation of proposals for the possibility of production in accordance with customer requirements is insignificant decreased by 1,1% (Table 3).

The number of enterprises in which the website provided customer service opportunities increased in 2018 compared to 2016 by 15,5%. The number of enterprises that purchased programs for customer relationship management increased by 26,5% [39, p. 11, 15; 26, p. 11, 15; 41, p. 11, 15].

During 2011-2018, there was a tendency to increase the number of enterprises that used automated data exchange for: sending or receiving transport documentation (consignment notes) in 4,3 times; receiving orders from the client – 2,8 times; sending or receiving information about products – 2,5 times (Table 4).

Table 3

Website features when using the Internet

Years	Number of businesses that had a website	*Of these,* the companies in which the website provided:	
		proposals for the ability to manufacture products in accordance with customer requirements	personalized information content within the website for regular / repeat customers
2011	15962	4581	2330
2013	16916	4742	2648
2014	13485	3849	1903
2015	18323	4639	2635
2016	15608	4603	4118
2017	16240	4567	4018
2018	22331	4531	4565

Compiled according to data: [35, p. 18; 36, p. 18; 37, p. 15; 38, p. 11; 39, p. 11, 12; 40, p. 11; 41, p. 11].

During the study period, the number of enterprises engaged in regular electronic exchange of information increased for: delivery of final products to customers by 98.5%; formation of production plans or forecasting of consumer demand - by 87.8% (Table 5).

Table 4

Objectives of automated data exchange

Years	Businesses that have used automated data exchange for the following purposes:		
	receiving orders from the customer	sending or receiving product information	sending or receiving transport documentation
2011	13005	15038	6398
2013	14669	16031	8683
2014	19703	21139	12337
2015	22161	23702	14057
2016	26290	27551	17594
2017	31187	32026	22021
2018	36998	37226	27561

Compiled according to data: [35, p. 19; 36, p. 19; 37, p. 16; 38, p. 12; 39, p. 13; 40, p. 12; 41, p. 12].

Table 5

Directions of electronic data exchange

Years	Enterprises that carried out regular electronic exchange of information in the following areas:	
	formation of production plans or forecasting consumer demand	delivery of final products to customers
2011	3840	4331
2013	4020	4894
2014	3874	4525
2015	5206	6088
2016	5803	6830
2017	6469	7663
2018	7211	8597

Compiled according to data: [35, p. 209; 36, p. 20; 37, p. 17; 38, p. 13; 39, p. 14; 40, p. 13; 41, p. 13].

57-75
v.1 (2020)
https://smart-scm.org

The number of enterprises that used social media to receive customer feedback or provide answers to their questions increased by 106.4% in 2014-2018, and to attract customers to innovative product development - by 97.2% (Table 6).

Table 6

The purpose of using social media in enterprises

Years	Businesses that have used social media to:	
	receiving customer feedback or answering their questions	involvement of clients in development or innovation of products and services
2014	4002	2647
2015	5497	3703
2016	6089	3963
2017	6871	4388
2018	8260	5221

Compiled according to data: [37, p. 19; 38, p. 15; 39, p. 14; 40, p. 14; 41, p. 14].

However, despite the positive trends of increasing the number of domestic enterprises that implement information technology in the organization of logistics processes, as a result of own research [42-46] it was proved that the effective digital transformation of logistics customer service is hindered by many barriers that can be systematically systematized in 6 groups:

$$X = \begin{cases} X_1(x_{11}, x_{12}); \\ X_2(x_{21}, x_{22}, x_{23}); \\ X_3(x_{31}, x_{32}, x_{33}, x_{34}, x_{35}); \\ X_4(x_{41}, x_{42}, x_{43}); \\ X_5(x_{51}, x_{52}, x_{53}, x_{54}, x_{55}); \\ X_6(x_{61}, x_{62}) \end{cases} \quad (1)$$

where

X_1 – *trading:* constant fluctuations in market conditions (x_{11});instability of consumer demand for finished products (x_{12}); X_2 – *transport:* untimely delivery of goods due to breakdown or unforeseen downtime of vehicles (x_{21}); unpreparedness of cargo in needed time (x_{22});loss of cargo due to unfavourable transportation conditions (x_{23}); X_3 – *marketing:* insufficient consideration of the peculiarities of service to different categories of consumers depending on the specifics of enterprises (x_{31}); imperfection of contract activities of enterprises (x_{32}); inefficient use of marketing communication tools (x_{33});lack of the generally accepted concept of "customer orientation" (x_{34}); insufficient application of a customer-oriented approach to customer logistics (x_{35}); X_4 – *information:* lack of a unified approach to the definition of the categorical-conceptual apparatus (for example, "digital economy", "digital transformation", "logistics service", etc.) (x_{41}); lack of knowledge and skills in the digital economy (x_{42}); insufficient use of digital technologies and electronic platforms to manage customer relationships (x_{43}); X_5 – *organizational:* lack of a clearly defined strategy for digital transformation, vision of the digital future of the company and

57-75
v.1 (2020)
https://smart-scm.org

shortcomings of management (x_{51}); inability to manage organizational change (x_{52}); lack of a digital strategy for customer relationship management (x_{53}); low level of employee involvement (x_{54}); lack of qualified and competent personnel that would meet modern requirements of digitalization of the economy (x_{55}); X_6 – *financial and economic:* late payment for shipped products (x_{61}); insufficient amount of investment and financial resources (x_{62}).

To eliminate the above barriers, it is advisable to implement effective customer relationship management tools. Among them is the CRM-system (Customer Relationship Management), which implements a customer-oriented approach to logistics service and customer service. The essence of this system is the rational management of relationships with customers, i.e. attracting new customers, transforming neutral customers into loyal customers, the formation of business partners from regular customers (*Table 7*). McKinsey & Company research shows that the share of companies in the EU that use CRM systems is 33%.

Table 7

Characteristics of the main CRM-systems

Name	Description
1	2
AmoCRM	Its functionality allows you to build interaction with the customer at all stages of sales. The program generates orders, systematizes and organizes all orders from customers, creates a calendar plan for the sales department. The system has the following capabilities: agreements and contacts for sales management; sales funnel for reports; tasks and reminders; sales analysis. The interface is adapted for a smartphone.
Bitrix24	Optimization of work within the company's staff. Employees respond more quickly to various tasks and customer questions.
Salesforce	Accounting for industry specifics of the client. A convenient set of analytical tools allows you to track the traffic of potential customers and analyze the effectiveness of sales. The system is able to evaluate the marketing strategy of the business and provide suggestions for its improvement. This is a universal CRM, which is suitable for enterprises of different types of economic activity.
1	2 *End of the Table 7*
Zoho	Focused more on the business owner. The program is able to process information about interaction with the customer, and on this basis generates statistical reports on sales. Takes into account the activity of buyers and tracks the sources of traffic on the site.
Fresh Office	This is a platform that facilitates access to various information in a "single window". The system automatically keeps records, records all transactions and monitors the status of accounts. Possibility of warehouse accounting of business. The software automates the movement of goods in the warehouse / between warehouses. All document flow is integrated into a single system.

Compiled by the authors.

Based on the analysis and generalization of special literature [19-23] it is established that scientists and specialists understand CRM-system as: information technology, which provides functionality to automate the full cycle of relationships with customers and provides the necessary tools to manage the areas of marketing, sales, service; strategy, which provides for the creation in the company of such mechanisms of interaction with customers, in which their needs are the highest priority for the company; the key goal

57-75
v.1 (2020)
https://smart-scm.org

of implementing a CRM strategy is to create a single ecosystem for attracting new and developing existing customers; technology – specialized software that automates business processes, procedures and operations that implement the company's CRM strategy (Fig. 1).

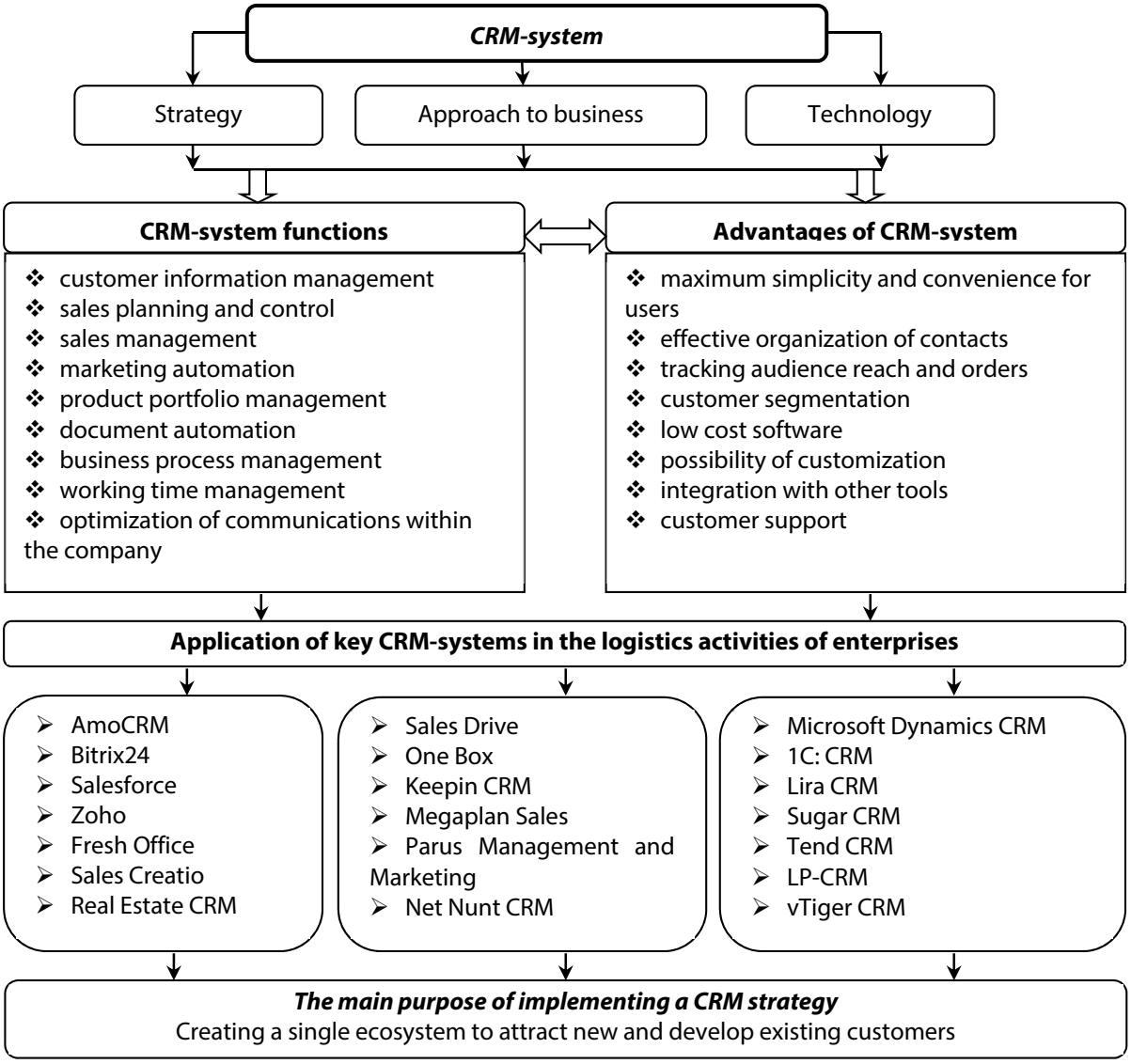

Figure 1. Features of CRM-system implementation as a tool of customer relationship management *(proposed by authors)*

For digital transformation of consumers logistic service in the conditions of economy digitalization it is expedient to introduce the complex approach (Fig. 2).

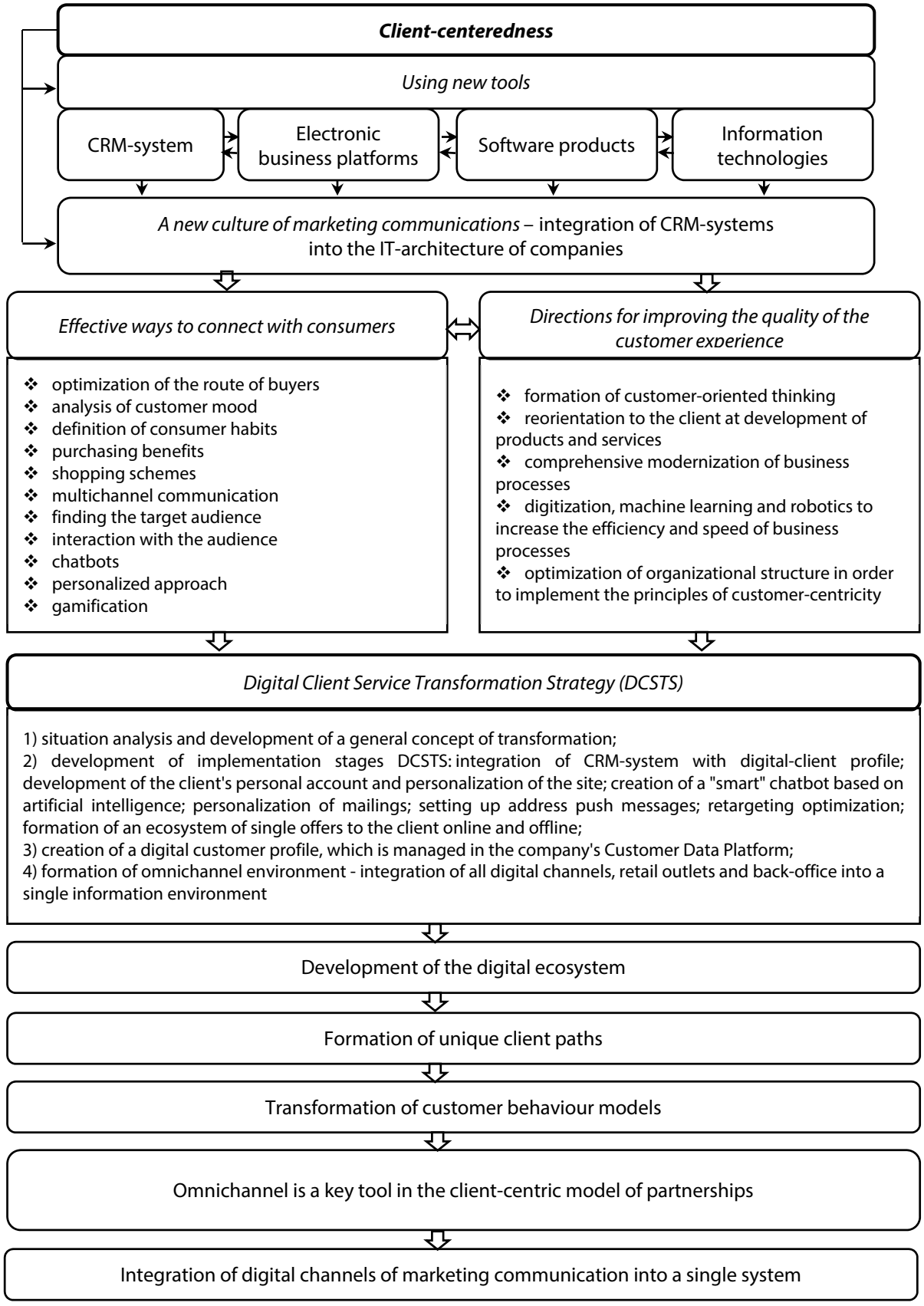

Figure 2. A comprehensive approach to the digital transformation of customer service logistics on the basis of customer orientation *(proposed by authors)*

According to PwC Strategy & [27], the integrated Customer Solutions ecosystem has a number of advantages, including: higher revenue from initiatives to increase customer satisfaction across all channels by offering individualized solutions; obtaining greater marginal profit as a result of optimal use of internal capabilities and an expanded partner network; great maneuverability by managing a flexible affiliate network; continuous connectivity of operational activity for increase of efficiency and reduction of expenses.

According to the Technical Assistance Research Program, the average return on investment in quality service for industrial enterprises is 100%, banking institutions - up to 170%, retail enterprises - up to 200% [47, p. 16].

The results of research by foreign scholars [48] show that a 5% increase in the number of loyal consumer companies is accompanied by an increase in profits from 25 to 85% depending on the type of economic activity. According to the calculations of J. Coleman [49], the implementation of strategies, methods and systems to increase customer loyalty helps to increase the company's profitability by 25-100%. At the same time, with the correct implementation of loyalty programs, sales volumes increase by 15%, the marketing effect by 20%, and the level of brand loyalty by 23%. [50, p. 12].

American researchers [6] found that a 1% increase in the customer satisfaction index leads to a 3% increase in company capitalization. The average cumulative effect of the increase in profitability (by 11,5% over five years) is from 1% of the annual increase in the consumer satisfaction index.

According to expert estimates [51], the cost of acquiring a new consumer is 5-10 times higher, and the return of a lost consumer is 50-100 times higher than the cost of maintaining a satisfied consumer. It is proved that according to the Pareto principle, 80% of the company's profit comes from 20% of regular customers, and the cost of attracting a new customer is 5 times higher than the nominal cost of maintaining the existing one. An increase in turnover from existing customers by 10% leads to an increase in the company's shareholder value by 15,5% [52].

According to the consulting agency "PRCA" [5], in 2018 the average percentage of the marketing budget of companies to promote products and related services online is about 16% and will increase annually by 10%. PwC's Global Digital IQ Survey found that: 54% of transport and logistics executives believe that investing in digital technology can increase revenue; 16% - profit; 11% - to improve the quality of customer service. 64% of respondents say that over the next 5 years, changes in customer behaviour will lead to breakthrough transformations in their business [52].

According to the forecasts of the international analytical agency Gartner, by 2020 the customer service may outperform such indicators as price and product quality. Personalization, according to analysts at the international consulting firm McKinsey, already allows global players to increase revenue by 5-15%. According to Gartner, in 2019, companies in many countries have increased their investment in personalized marketing by 50%. According to Gartner Research, by 2025, companies that use more than 4 digital channels to interact with customers will be 300% more efficient than single- and dual-channel competitors. And the number of multi-channel consumers will double in 2025. At the same time, the cost of maintenance can be significantly reduced by redistributing requests to digital channels.

Digital transformation of logistics service in the system of logistics management of enterprises will help to obtain a synergistic effect:

57-75
v.1 (2020)
https://smart-scm.org

$$E = \sum_{ij=1}^{n} E_1(y_{11}, y_{12}, y_{13}, y_{14}, y_{15}) + E_2(y_{21}, y_{22}, y_{23}) + E_3(y_{31}, y_{32}, y_{33}) \to max \quad (2)$$

where E_1 – *economic effect:* y_{11} – increase in average profitability from the organization of logistics activities by 15-20%; y_{12} – increase in consumer retention by 5%; y_{13} – reduction of time for execution of current operations by 25-30%; y_{14} – increase the accuracy of forecasting shipments to 99%; y_{15} – reduction of costs for sales, marketing and customer support by 10-15%;

E_2 – *social effect*: y_{21} – optimization of work of employees of the enterprise; y_{22} – increasing the speed of processing consumer orders and the level of information security; y_{23} – reduction of time spent on the organization of information exchange between the enterprise and economic contractors;

E_3 – *environmental effect* – reduction of negative impact on the environment as a result of; y_{31} – improving the conditions of transportation and storage of products; y_{32} – application of the concept of industrial waste management in the context of the circular economy; y_{33} – implementation of "green" technologies in industrial production.

Conclusion. The transformation of the logistics activities of the enterprise is closely interrelated with the development of the digital economy. Full customer orientation is achieved through the organization of accumulation, structuring and exchange of information, and a high level of competitiveness in the digital economy is impossible without a customer-oriented approach to logistics service. Customer relationship management is becoming a priority in the context of business digitalization. In today's digital environment, the role and importance of improving the quality of logistics services using a customer approach is growing. This approach means building all business processes around customer needs and is seen as a tool for creating value for consumers and using digital technologies to enhance the customer experience.

The key trends in the digital transformation of customer service logistics on the basis of customer-centricity include: personalization of products, experience and communication using digital technologies; transition to flexible management methods; formation of a qualitatively new marketing structure of enterprises (the emergence of specialists in consumer preferences and data processing); ensuring multichannel in marketing communications; introduction of chatbots as one of the most effective ways to provide instant customer support; application of a comprehensive approach to the organization of logistics services, the essence of which is to modernize the corporate culture of communication in the company, maintaining a friendly atmosphere of communication and digital interaction with consumers through online channels; implementation of CRM-system. This will increase the level of customer satisfaction with service and quality of logistics services by about 3%; support regular and attract new customers through the implementation of loyalty programs; improve the level of organizational culture as a result of using the client's approach to personnel management; optimize costs for the organization of logistics activities; increase sales and profitability of sales.

Prospects for further research are to develop an organizational and economic mechanism for managing relationships with consumers in the context of marketing strategy of enterprises in a digital economy.

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THE IMPACT OF E-COMMERCE DEVELOPMENT ON LOGISTIC SERVICE IN UKRAINE: PERSPECTIVES AND CHALLENGES

Tetiana Gorokhova, Leila Mamatova. «The impact of e-commerce development on logistic service in Ukraine: perspectives and challenges». *The article considers the current state of the world market of logistics services. The main priority areas of using certain types of logistics services in the world and in Ukraine are identified. The object of research is the process of digitalization of logistics services through the influence of e-commerce. Analysis of the current state of logistics services in the world and in Ukraine, revealed a trend of active investment in innovative logistics services and stimulating the need for distribution services is growing much faster than in the current cycle due to demand for goods purchased online, especially food. The article considers the essence and features of the logistics activities of e-commerce. The main components of logistics functions are studied and the main tasks of e-commerce logistics activity are determined. The structure of connectivity of trade and technological process operations in e-commerce enterprises is considered. The strengths, weaknesses, opportunities and risks of the development of electronic commerce of logistics services are also identified. The impact on the development of logistics services through global changes in the world and prospects for development in Ukraine, with an emphasis on marketing tools to promote services. The positive and negative factors influencing the development of e-commerce of Ukrainian enterprises are analyzed and singled out. Authors identified further opportunities for the development of logistics services through the use of e-commerce, namely the development of modern technologies and Internet availability, which will change the consciousness of consumers and the growth of online users, rapid business growth and the formation of new market segments, cost-effectiveness of advertising channels to the target audience. The authors determine that e-commerce in Ukraine is in a state of active development and has great potential. E-commerce has advantages over traditional forms of business, as it provides an opportunity to increase productivity. E-commerce has a low barrier to market entry, including global. As a result, it significantly reduces the cost of the business and increases the efficiency of its management. Authors identified the main trends in the development of e-commerce: increasing the activity of Internet users, their adaptation and loyalty to online shopping, trust in Internet services and resources, which are rapidly expanding their range. Authors determined that the main problem of e-*

76-90
v.1 (2020)
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commerce in Ukraine is inadequate legislative regulation of their activities, incentives and regulations. There is growing competition in online formats where established online sales giants have formed, so not all retailers can easily switch from one format to another, and it is determined that such companies need discounts on rental in the warehouse segment in order to be able to ensure their livelihood.

***Keywords**: logistics, logistics services, E-commerce, business, entrepreneurship, innovation, strategy, trade, digitalization, market.*

Тетяна Горохова, Лейла Маматова. «Вплив розвитку e-commerce на логістичні сервіси в Україні: перспективи та виклики». *У статті розглянуто сучасний стан світового ринку логістичних послуг. Визначено основні пріоритетні напрямки використання певних видів логістичних послуг в світі та Україні. Об'єктом дослідження є процес діджиталізації логістичних сервісів через вплив розвитку e-commerce. Аналіз діяльності сучасного стану логістичних послуг в світі та Україні, дозволив виявити тенденцію активного інвестування в інноваційні логістичні послуги та стимулювання потреб в дистриб'юторських послугах зростає набагато швидшими темпами, ніж в поточному циклі через попит на товари придбані онлайн, особливо продукти харчування. У статті розглянуто сутність та особливості логістичної діяльності підприємства електронної торгівлі. Досліджено основні складові логістичних функцій та визначено основні завдання логістичної діяльності електронної торгівлі. Розглянута структура зв'язність операцій торговельно- технологічного процесу в підприємствах електронної торгівлі. Також визначено сильні, слабкі сторони, можливості та ризики розвитку електронної комерції логістичних послуг. Визначено вплив на розвиток логістичних послуг через глобальні зрушення в світі та перспективи розвитку в Україні, з акцентом на маркетингових інструментах просування послуг. Проаналізовано та виокремлено позитивні та негативні фактори впливу на розвиток електронної торгівлі підприємств України. Визначено подальші можливості розвитку логістичних послуг через використання e-commerce, а саме розвиток сучасних технологій та доступності Інтернету, що впливатиме на зміну свідомості споживачів та відповідно ріст онлайн користувачів, стрімкі темпи зростання бізнесу і відповідне формування нових сегментів ринку, економічна ефективність впливу за допомогою рекламних каналів на цільову аудиторію. Визначено, що основною проблемою електронної торгівлі в Україні є не відповідно законодавче регулювання їх діяльності, стимулюючих та регулюючих нормативно-правових актів. Зазначено зростання конкуренції в онлайн форматах де сформувались уже сталі гіганти онлайн продажів, тому не всі рітейлери можуть легко перейти від одного формату до іншого та визначено, що такі компанії потребують знижок на оренду в складському сегменті, для того, щоб мати змогу забезпечити свою життєдіяльність.*

***Ключові слова:** логістика, логістичні послуги, e-commerce, бізнес, підприємництво, інновації, стратегія, торгівля, діджиталізація, ринок.*

Татьяна Горохова, Лейла Маматова. «Влияние развития e-commerce на логистические сервисы в Украине: перспективы и вызовы». *В статье рассмотрено современное состояние мирового рынка логистических услуг. Определены основные приоритетные направления использования определенных видов логистических услуг в мире и Украине. Объектом исследования является процесс диджитализации логистических сервисов из-за влияния развития e-commerce. Анализ деятельности современного состояния логистических услуг в мире и Украине, позволил выявить тенденцию активного инвестирования в инновационные логистические услуги и стимулирование потребностей в дистрибьюторских услугах возрастает гораздо более быстрыми темпами, чем в текущем цикле через спрос на товары, приобретенные онлайн, особенно продукты питания. В статье рассмотрены сущность и особенности логистической деятельности предприятия электронной торговли. Исследованы основные составляющие логистических функций и определены основные задачи логистической деятельности электронной торговли. Рассмотрена структура связность операций торгово-технологического процесса на предприятиях электронной торговли. Также определены сильные, слабые стороны, возможности и риски развития электронной коммерции логистических услуг. Определено влияние на развитие логистических услуг через глобальные сдвиги в мире и перспективы развития в Украине, с акцентом на маркетинговых*

инструментах продвижения услуг. Проанализированы и выделены положительные и отрицательные факторы влияния на развитие электронной торговли предприятий Украины. Определены дальнейшие возможности развития логистических услуг через использование e-commerce, а именно развитие современных технологий и доступности Интернета, который будет влиять на изменение сознания потребителей и соответственно рост активных пользователей, стремительные темпы роста бизнеса и соответствующее формирование новых сегментов рынка, экономическая эффективность воздействия с помощью рекламных каналов на целевую аудиторию. Определено, что основной проблемой электронной торговли в Украине не в соответствии законодательное регулирование их деятельности, стимулирующих и регулирующих нормативно-правовых актов. Указано рост конкуренции в онлайн форматах где сформировались уже стали гиганты онлайн продаж, поэтому не все ритейлеры могут легко перейти от одного формата к другому и определено, что такие компании нуждаются в скидках на аренду в складском сегменте, для того, чтобы иметь возможность обеспечить свою жизнедеятельность.

Ключевые слова: *логистика, логистические услуги, e-commerce, бизнес, предпринимательство, инновации, стратегия, торговля, диджитализация, рынок.*

Problem statement. Existing tasks of economic growth in the country require not only increasing the competitiveness of domestic goods in international markets, taking into account price and quality, but also ensuring effective interaction of domestic enterprises with foreign partners in global and regional supply chains, creating conditions for barrier-free movement of goods in international logistics corridors, development of cross-border cooperation and search for opportunities to obtain a synergy effect by increasing the added consumer value and reducing the total costs of participants in network cooperation, global partnerships, geoeconomic alliances and networks.

That is why, the availability of possible logistics systems in the country stimulates decision-making in accordance with the investment of infrastructure facilities at the national, regional and local levels in order to ensure their sustainable socio-economic development.

Analysis of recent studies and publications. The research of logistics, logistics flow management processes are devoted to the work of such scientists as V. Kozlov, P. Levkovets, M. Moroz, V. Nikolaychuk, M. Aucklander, A. Laughter, Yu Wu, M. Go, K.-H. Jan, S.-H. Huang. The works of scientists are devoted to the issue of electronic commerce of logistics processes as P. Voronova, P.Duz, V.O. Lazareva, M.E., Ponomareva, B. Martin, R. Becker, M. Keenan, and others.

At the same time, the issues of digitalization implementation and development of e-commerce model on the development of logistics services and analysis of the situation in Ukraine and the world are not given due attention, and the logistics potential of Ukraine from the point of view of e-commerce is not enough research.

The research aim is to is to analyze the current state and development trends of the global market of logistics services, the impact on the development of global changes in the world and prospects for development in Ukraine with an emphasis on marketing tools to promote services.

Research objectives:

The processes of globalization and intensification of changes in the world, the growing impact of variability of environmental factors encourage businesses to seek more effective tools to operate in order to increase profitability, taking into account social levers. One of such directions is logistic service. The main task of logistics is to ensure the timely execution of orders and meet the needs of all stakeholders. The tool for the rational use of logistics elements is its marketing component, ie a set of measures to

promote these services. The objective importance of e-commerce, as a factor influencing the sustainable development of logistics services through a large area and extremely long transport communications, is gaining momentum in the world. The processes of European integration of Ukraine and the introduction of world standards in the economic sphere require the country to meet modern consumer needs at a qualitatively new level, so it is important to research and implement in the logistics system more effective and modern strategic solutions to promote logistics services, including e-commerce as one of the potentially influential components of Ukraine's economy.

In 2017, global logistics spending amounted to 8.2 trillion dollars USA (according to studies of 190 countries) [2]. According to experts, the projected annual growth in the capacity of the global market for logistics services in 2018 is (4.1-5)% due to the acceleration of world trade. Political uncertainty in a number of regions of the world and the continuation of trade protectionism policy are the risks that accompany development of the logistics services market in 2018 [1]. The global 3PL services market annually shows positive growth dynamics. If in 2014 the capacity of the 3PL services market increased by 157 billion dollars US compared to 2013 and amounted to 750 billion dollars USA, then in 2016 and in 2018 the global revenue of 3PL reached 902.2 billion dollars. The annual growth rate of the 3PL global market is expected to be up to 5% by 2024. In particular, in 2020 the global market capacity of 3PL is planned to exceed $ 962 billion, and by 2024 the capacity of the 3PL market will reach about 1 billion US dollars [2].

It should be noted that in the period 2010-2014, Ukraine rose in the ranking of the development of logistics flows from 102 place to 61. However, from 2014 to 2018, it lost 5 steps. Experts mostly attribute this fall with the occupation of Crimea and the war in Donbass.

From the main indicators of the rating from 2014 to 2018, Ukraine worsened its position in terms of customs work quality - loss of 20 positions, quality and development of infrastructure - loss of 48 positions, in international maritime transport - loss of 1 position. The improvement was observed only in the field of logistics services quality - Ukraine rose by 11 positions [3].

In 2018, according Logistics Performance Index by World Bank, Ukraine ranked 66th out of 160 countries, gaining 2.83 points and rising 14 places in the overall standings. Ukraine is located in the rating between Serbia and Egypt, and in the post-Soviet space was third after Estonia (3.31 points and 36th place) and Lithuania (3.02 points and 54th place). In total, the ranking includes five areas in which research has been conducted. In the section "customs procedures" Ukraine scored 2.49 points, on infrastructure - 2.22 points, on international transportation of goods - 2.83 points, on logistics competence - 2.84 points, on cargo tracking - 3.11 points, on delivery time - 3.42 points.

Leadership in the ranking in Germany with a total LPI Score of 4.2 points. It is followed by Sweden, Belgium, Austria and Japan. The second five are opened by the Netherlands, followed by Singapore, Denmark, Great Britain and Finland [4].

Thus, the presence of these trends in the development of logistics services indicates the need for comprehensive support and opportunities for further development of logistics priority components in each region, given certain strong positions in the country, as evidenced by the growth of the global logistics market (Fig. 1, Fig. 2).

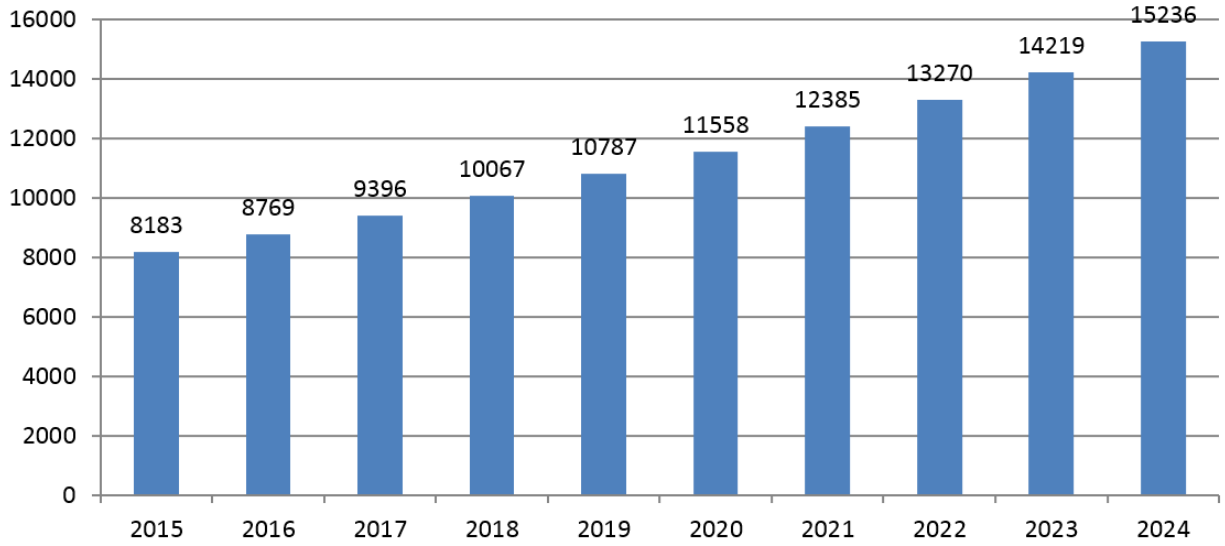

Figure 1. World logistics market, billion dollars
(Source: Trade Market Group)

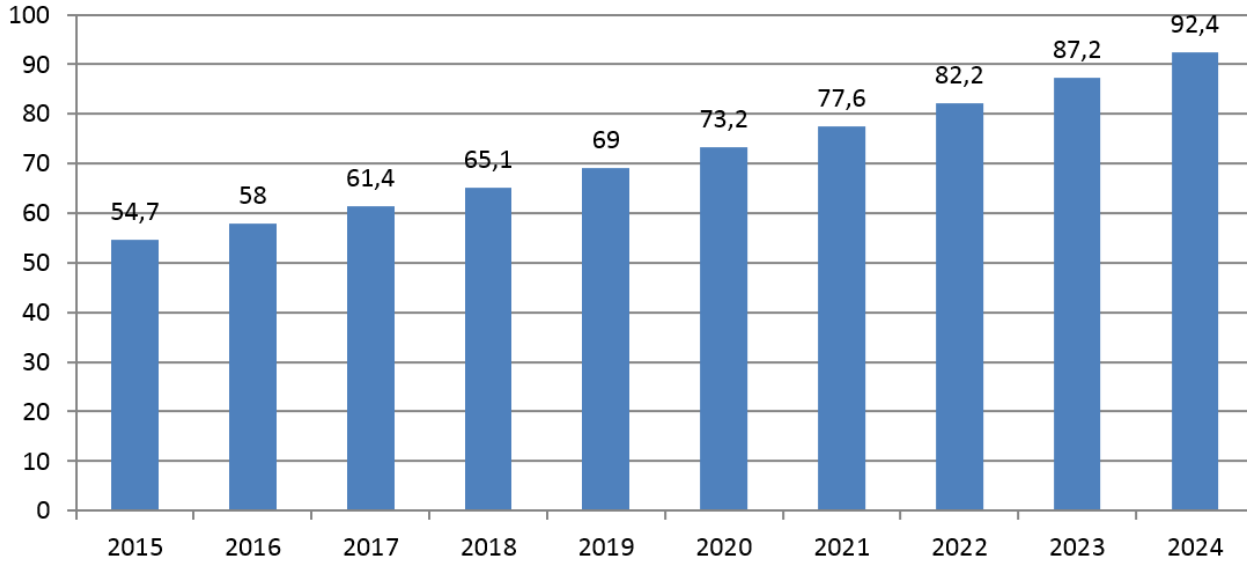

Figure 2. World logistics market, billion tons
(Source: Trade Market Group)

An important factor in the growth of demand for logistics services was the development of e-commerce. In the last decade, e-commerce has become a real engine of development, both in the world and in Ukraine, and e-commerce and improved new digital models will give additional work to logistics companies otherwise, it is hoped that e-commerce will keep the same orders.

E-commerce is a concept that characterizes the process of buying, selling or exchanging products, services and information through the global computer network Internet. Currently, e-commerce is present in almost all types of commercial activities. An example of e-commerce or e-trade can be a business process that uses mobile devices and communication tools, e-publishing, consulting, etc. The content of e-commerce, by definition, characterizes the transactions between business partners. Some experts believe that this definition is narrow and does not fully describe the essence. Therefore, we have defined the concept of "E-business", which is more general and broad. E-business, according to

76-90
v.1 (2020)
https://smart-scm.org

experts, covers not only the purchase and sale of goods and services, but also customer service, cooperation with business partners, transactions within the organization.

Fulfillment also plays an important role in this system. It is convenient for the owner of the goods to use the services of a remote warehouse, from where it is possible to send the formed set to the address of the end consumer at any time by the command from the marketplace. This service is becoming even more popular as the number of small sellers who can not physically be present in warehouses, picking and sending orders, etc. is growing. They do not need to buy goods from manufacturers in trucks to fully operate in the market.

Finally, modern online business requires an international customer delivery service (cross-board). We are talking about the ability to send parcels to end customers just from abroad.

Here in the chain involved several logistics:

- the first to form orders and send them, for example, from China.

- then the goods pass through the Ukrainian customs and, finally, go through Ukraine, until the customer picks up the parcel at a post office or receives a courier from the delivery service at the last mile. However, we have reduced the threshold value of goods for import without paying duty (from 150 to 100 euros). But this fact is unlikely to stop the development of the service. Over the last year, the volume of cross-border purchases has increased more than 10 times.

In the modern e-commerce you can't work without additional services. Order tracking is a must service in e-commerse process. Most customers want to know where his product is and how the order is fulfilled. Thus, if it is possible to track the movement of parcels in real time, it significantly improves the quality of service. According to statistics, 42% of buyers refused to receive the goods or canceled the order if the delivery time was, in their opinion, too long. 60% of customers want to know the date of receipt of the parcel in advance. And as many as 75% of buyers consider it possible to track the execution of an order online.

The global e-Commerce market in 2019 grew to $ 3.5 trillion, online retail sales in 2016-2019 grew by an average of 20% per year, while retail sales increased by only 3.5% per year. Accordingly, the market is growing due to online commerce, while the share of online sales in retail will increase from 10.5% in 2016 to 16.4% in 2019.

If this trend continues, the volume of the global e-Commerce market will exceed the volume of traditional retail by 2036. As consumers gain confidence that they will have a good online shopping experience, they search the Internet for higher quality products at lower prices. Already, more than 50% of online shoppers in the Middle East, Africa, Europe and Latin America choose products on foreign sites, according to a PayPal survey (Fig.3).

For example, North America's 1,000 largest online stores sell $ 143 billion worth of merchants outside the United States. At the same time, Amazon's share in these international sales was 44%. 67% of retailers believe that cross-border e-commerce is the most important source of future growth for their company. 52% agree with the statement that international e-commerce "suits them because it gives a lot of international customers" [5].

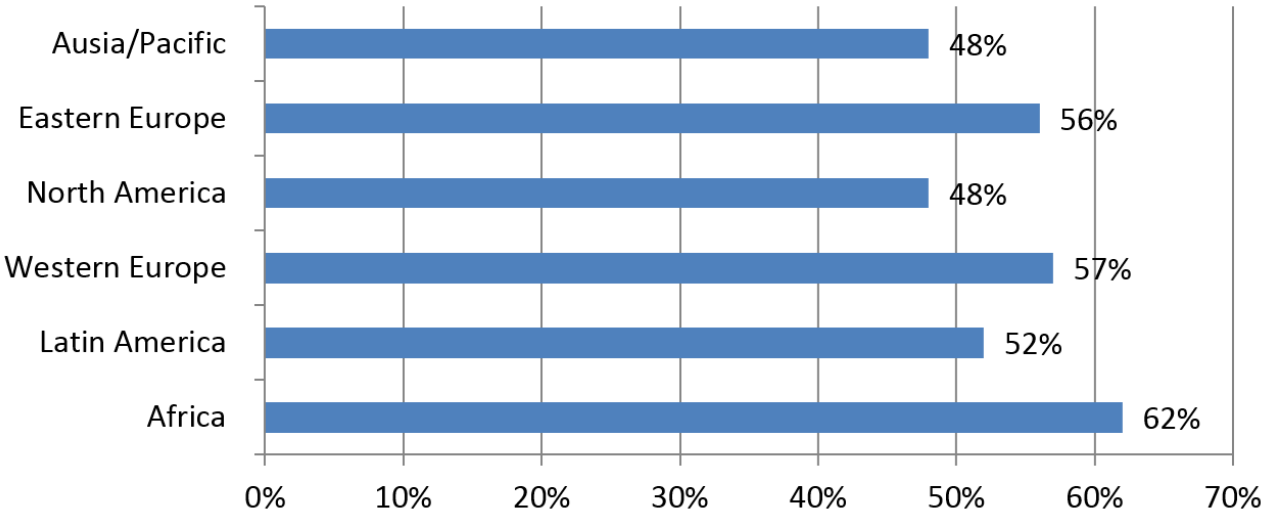

Figure 3. Portion of consumer shopping on retail websites outside of their country
(Source: Internet Retailer research)

In 2018 the Ukrainian e-commerce market grew by 30%, showing the second result in Europe in terms of growth, and in 2019, according to the EVO group analyse, which combines marketplaces Prom, Bigl and a number of other projects, the e-commerce market grew by 17% to UAH 76 billion (data for 11 months). The size of the average check of one purchase decreased by 7-10%, and the cost of delivery increased to 5-15% of the value of the goods.

In 2020, EVO Group experts expect even less growth: by about 15% - up to UAH 87.2 billion.

2019 was marked by the active actions of major players in online retail to open their offline outlets. The largest international online retailer AliExpress has opened the first "brick" store outside China in Madrid's Intu Xanadu shopping center. The point of sale works on the principle of combining physical and online sales. The company opened the store together with D.Phone, a Chinese seller of mobile phones and accessories. The store has an area of 740 square meters and was divided into five different zones, where you can buy about 1,000 products from more than 60 brands.

In Ukraine, on November 2019, Rozetka opened its 10th store, a new offline outlet of Ukraine's leading online supermarket - and the first in Brovary. There are six outlets in the retailer's offline network in Kyiv (Main Post Office, Smart Plaza Politech, Stepana Bandera Avenue, Kyoto Street, Dekabristov Street, Aladdin Shopping Center), and three more in Odessa. In addition to traditional shops and mobile distribution points, Rozetka together with the postal operator Justin began to develop a network of mini-offices, where you can also pick up the goods ordered in the online supermarket, as well as receive a number of additional services. Currently, there are 26 mini-branches of this format: in all cities with a population of millions, as well as in Chernihiv. You can read more about the features of the partner offices of Rozetka and Justin here.

It is worth noting that the new for our market service for the selection of tours Rozetka Travel also received its physical representation. In late December, the first such point appeared in the Kiev store Rozetka, which is located near the metro station "Pochayna". In the future, it is planned to open offline outlets in other Rozetka stores.

On November 2019, the marketplace of Ukrainian brands Shoppingmall.com.ua also opened its first offline store under the Love & Live brand on the ground floor of Lavina Mall. On an area of 84 square meters. m presented more than 500 models of Ukrainian brands of

76-90
v.1 (2020)
https://smart-scm.org

fashion clothing and footwear Love & Live and Katarina Ivanenko. The opening of the facility was made possible by the company's investment of $ 400,000, which is aimed at increasing online sales and opening an offline store. In early October, the book online store Yakaboo opened its first offline store in the Main Post Office at vul. Khreshchatyk, 22, created for the 15th anniversary of the company. According to the Yakaboo blog, in the store you can buy top sales and new Yakaboo, as well as pick up your order from the site yakaboo.ua.

In 2019, food delivery services developed rapidly in Ukraine. On February 2019, Uber officially announced the launch of its Uber Eats food order in the Ukrainian capital. Later, the service became available in Lviv, and in December Uber Eats started working in Odessa.

By 2022, 67% of all online shopping in the world is projected to be through marketplaces. Over the last three years in Ukraine, all market leaders have become partially or completely marketplaces; every fifth of the top twenty e-commerce storefronts.

For example, the share of Kasta marketplace sales reached 40% of the company's total turnover after the company changed its business model in 2017-18, adding a marketplace and introducing a permanent catalog on the site. In parallel with the launch of the marketplace, the company also developed other areas, building a holistic eco-system. Already now Kasta unites two fulfillment centers, which process about 25,000 orders a day, a courier service with more than 100 branches in the 41st settlement of the country, the financial company KastaPay (payments, loans, CashBack), contact- center (50+ operators), production and other areas.

Another clear trend in 2019 was the increase in logistics capacity by companies. As the market develops, the speed of delivery of goods to the final consumer, control of the supply chain and reduction of logistics costs can play a key role in competition.

Table 1

Rating of visits top Ukrainian online markets for the period 2018-2020

Online market	Number of visits, million people		
	2018	**2019**	**4 months of 2020**
rozetka.com.ua	572.12	700.48	160.13
allo.ua	101.58	137.5	6.38
citrus.ua	78.78	115.59	3.16
comfy.ua	68.78	87.72	4.65
makeup.com.ua	84.06	86.27	6.94
foxtrot.com.ua	51.75	51.75	4.33
kasta.ua	53,03	64.45	1.69
f.ua	49.93	52.74	2.61
moyo.ua	39.83	39.11	2.86
epicentrk.ua	72.5	57.24	29.18
apteka911	41.0	21.68	24.76

Source: developed by the authors based on data of RETAILERS COMPANY

Analyzing the data of RETAILERS COMPANY, a rating of the most visited online platforms in Ukraine is formed (the company counts the number of unique users who visited the e-shop site at least once a month). According to RETAILERS COMPANY (table. 1), Rozetka remains the undisputed market leader among online platforms. In second place - Allo, which bypassed Citrus. Analyzing the dynamics of 2018-2019, we can see a decrease in the growth rate of the e-commerce market. This tendency is associated with an increase in the cost of delivery. But for 4 months of 2020, we see a sharp increase in visits to online pharmacies, this is due to demand against the background

of the COVID19 pandemic, as well as the seasonal increase in respiratory diseases. The projected decline in online selling in 4 months in 2020 compared with the analog period of 2019 is also due to a decline in the purchasing power of the population due to quarantine measures.

Due to the rapid development of e-commerce in Ukraine, according to the Kyiv Warehouse Market Report, the main trend in the capital market can be considered increased demand for flexible warehouses (storage and maintenance). In addition, the demand for warehouse real estate was caused mainly by the growth of retail sales, which in turn gave impetus to the growth of the number of omnichannel stores.

In particular, the new logistics service Justin, which has been developing the Fozzy Group since mid-2018, began to master the direction of international delivery from Amazon, eBay, Aliexpress and other online stores. As part of this project, Justin plans to work closely with logistics giants: American UPS, Chinese SF Express and Polish InPost [6].

Similarly, in 2019, a network of mini-branches Meest Express was developed, which began operating in retail chains Cosmo, ECO Market, ATB and others. In June alone, 163 branches were opened and 27 post offices were installed. As of July 2019, the network had 2,736 points for receiving and sending parcels, including 131 branches, 2,049 mini-branches and 556 post offices. The geography of network coverage continues to expand. In this project, Meest also cooperates with well-known consumer networks Podorozhnyk, ZhZHUK, PlusMarket, KF.UA, Ukrtelecom service centers, as well as with OKKO gas stations.

Nova Poshta Group of Companies, which manages approximately 5,700 branches across Ukraine, plans to open another 1,000 branches in 2020. And build 6 more innovative terminals in five years. Currently, such terminals are in Kyiv, Khmelnytsky and Lviv. In 2020, automatic processing of parcels will start in Kharkiv and Dnipro [6].

In addition, in 2020 the company is going to launch direct air delivery from Lviv to Kyiv. It will be recalled that on October 10, the company launched a new service for commercial use - "Air Delivery" on the route Lviv-Dnipro-Lviv.

Nova Poshta also became a partner of Ukrainian online retailer Rozetka for delivery to Moldova. Delivery abroad is provided by Nova Poshta Moldova. Goods are delivered from warehouses in Kiev, so the cost of the order starts from 156 lei (8 euros), delivery time - from three working days [6].

Finally, the logistics operator Zammler Group has opened an office at Boryspil Airport to provide more flexible and efficient freight management for its customers. This is a new stage in the implementation of the strategy of the international logistics operator for the development and intensification of air cargo, to all countries of the world, and above all, in the United States, China, the UAE, India and Germany. Now the company can quickly process additional customer requests, prepare cargo for shipment and respond quickly to various unplanned situations [6, 14].

The COVID-19 was also the impetus for the development of logistics services, as well as an interconnected element of warehousing services. Many representatives of the industrial real estate sector have taken a wait-and-see attitude, which is likely to mean a reduction in rental activity and an increase in vacancies in 2020. However, the probability of negative absorption in the industrial market is minimal. Warehousing services are now more in demand than ever before, which will allow most logistics and warehousing operators to stay afloat throughout the crisis. The main factor determining the high vacancy is the new proposal, which must be put into operation by 2021.

In Ukraine, under quarantine, the consumer market is being reformatted towards online shopping. Currently, the greatest demand is recorded in companies in the areas of grocery retail, pharmaceutical

distribution and e-commerce. So, today grocery retail and its logistics are now experiencing a "peak" of sales, which according to market players, 40% - 50% higher than sales in the New Year season, which is usually peak (it is predicted that this trend will decline, after all, the consumer's purchasing power will decline in a crisis and the consumer basket will become more budget-friendly). Segments such as HoReCa and retailers, which sell most of their sales offline (mostly fashion retailers), are experiencing a sharp drop in sales today. Due to quarantine measures and the closure of the mall, such companies suffer significant losses. Stores that generate their sales in physical locations try to redirect the consumer to their websites for online shopping. It is worth noting that in online formats there is a lot of competition, where already established giants of online sales have formed, so not all retailers can easily switch from one format to another. Such companies need discounts on rent in the warehouse segment, in order to be able to ensure their livelihood.

Today there is an additional demand from grocery retailers, pharmaceutical companies and e-commerce. Such companies are looking for additional space for the next 6-12 months. For example, the Art Factory "Platform" provided free online retailer Rozetka with an area of 10,000 square meters for their use as warehouse space. In addition, e-commerce operators generally do not need large areas, as goods in warehouses are not delayed for long-term storage, but are packaged to order for home delivery to consumers. In addition, there is a growing demand for the services of logistics operators serving all of the above sectors.

The spread of COVID-19 and related quarantine measures will increase the share of e-commerce in the overall structure of commercial real estate. As in the last ten years, e-commerce will once again become a catalyst for demand and lead to shifts and changes in the warehouse real estate market over the next cycle. E-commerce will stimulate demand for the format of so-called incity warehouses, urban warehouses. During 2020, agreements may be concluded for the acquisition of former industrial facilities in the city for conversion into warehouses, as there are already several examples on the market of the acquisition of such facilities for warehouse redevelopment. As for the existing warehousing projects at the development stage, the construction has not been canceled yet, and the planned new proposal should enter the market in the announced timeframe [7].

Also, authors assume that market players will try to use the moment of panic and deteriorating economic situation to purchase land for the development of their built-to-suit projects at more favorable or reduced prices.

Demand for goods purchased online, especially food, will stimulate the need for distribution services at a much faster rate than in the current cycle. For example, over the past few weeks, supplies from abroad to Ukraine have not stopped, but have risen significantly. We are seeing a trend where retailers are trying to fill their warehouses with imported goods at the "old" purchase price due to rising exchange rates. At the same time, some companies have found themselves in a difficult situation precisely because of the closure of public services responsible for obtaining the appropriate licenses, uninterrupted work at the state customs border and other services.

The authors analyzed and identified positive and negative factors influencing the development of electronic commerce of enterprises and logistics structures of Ukraine (table 2).

76-90
v.1 (2020)
https://smart-scm.org

Table 2

Positive and negative factors influencing the development of electronic commerce of enterprises and logistics structures of Ukraine

Opportunities	Threats	Advantages	Disadvantages
1	2	3	4
- growth of online customers; - development of modern technologies and availability of the Internet affects the change of consumer consciousness; - development of new market segments; - a rapid growth of business; -impact on the target audience through advertising channels is more cost-effective.	- rivalry - high level of competition in the market. The company competes globally, unlimited in space and time limits; - insufficient information security for information storage; - influence of macrofactors: economic, political and cultural environment; - unfair competition. Companies that do not play by the rules of the market can negatively affect the development of e-commerce in general	- development of e-commerce without material restrictions (does not require a certain territory); - ordering and selling an online resource reduces the time and physical movement of market participants; - e-commerce has no time limits (availability of information at any time and in any place); - availability of information; - e-commerce leads to the speed of information	- safety of activity. Regulatory and legal support of e-commerce is in a state of development, security is becoming a problem for the seller and consumer; - the lack of direct physical connection between the consumer and the seller reduces the possibility of receiving discounts; - significant delivery times. E-commerce companies do not have their own logistics system and cooperate with transport companies that work on their own schedule and do not take into account the approximate dates of the
	due to the possibility of losing the credibility of consumers.	processing, ordering and delivery; - fast communication between supplier and consumer; - flexible market segmentation; - availability of goods or services.	companies. In this case, delivery is carried out from several days to several weeks and the agreed delivery dates between the company and the end consumer are violated; - limit of marketing tools for advertising these services; - lack of opportunity to motivate the client to choose, due to limited personal contact.

Source: developed by the authors

Summary. The research of the logistics services current state on the world market and in Ukraine, allowed to determine the main priority areas of use of certain types of logistics services, and the trend of active investment in innovative logistics services. The priority of logistics services is to stimulate the need for distribution services, which is growing much faster due to the demand for goods purchased online, especially food.

The development of modern technologies and the availability of the Internet affects the consciousness of consumers and, accordingly, forms an increase in the number of online users, forms a platform for rapid business growth and the formation of new market segments, cost-effectiveness of advertising channels to the target audience.

Omnichannel logistics is an integrated channel for collecting and ensuring an increase in the number of orders, a perfect management process, improving trade efficiency. The development of E-commerce is the main priority of inclusion in the supply chain of large online stores in the world, the use of warehousing and transport capacity of the country in the process of express delivery from China to Europe and the CIS.

E-commerce of Ukraine is in a state of active development and has great potential for its development. E-business has advantages over traditional forms of business, as it provides an opportunity to increase productivity. E-commerce has a low barrier to

market entry, including global. As a result, it significantly reduces the cost of business and increases the efficiency of its management. Thus, e-commerce in Ukraine is actively developing and gaining momentum. Among the main trends in the development of e-commerce are: increasing the activity of Internet users, their adaptation and loyalty to online shopping, trust in Internet services and resources, which are rapidly expanding their range. However, the main problem of e-commerce in Ukraine is an urgent problem in the legislative regulation of their activities, incentives and regulations. At present, the main task of the state is to adapt the legal framework to world standards in order to increase the efficiency of not only e-trade but also e-commerce in general.

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91-98
v.1 (2020)
https://smart-scm.org

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THE BASIC TERMINOLOGY OF THE MODERN MILITARY LOGISTICS

Lesia Kostiuchenko, Solomon D.I. «The basic terminology of the modern military logistics». *The article reveals the content of the military logistics basic terms. Different approaches to the construction of conceptual foundations, structure and functionality of this area are considered. The meaning of the term "logistics of the defense sector" is substantiated. The spheres and functionality of military logistics are outlined. The conditions for the integration of logistics and medical support systems, which are able to provide support to all components of the defense forces and the civilian population of the country, have been studied. The research is based on the main strategic goals of the state in the framework of defense reform: the National Security Strategy of Ukraine to ensure Ukraine's integration into the European Union and the formation of conditions for NATO membership. Approaches to structuring definitions and concepts of modern military logistics taking into account the military-political realities of Ukraine are offered. The term "military logistics" is proposed to be interpreted in two ways: first, as a practical activity (a means of implementing operational, tactical or strategic tasks of the defense sector in real resources and time); secondly, as a scientific field aimed at developing models for optimizing the logistics processes of the state defense sector.*

Keywords*: military logistics, logistics support of the defense sector, the subject of military logistics, the rule of military logistics, the field of military logistics, the functions of military logistics, the parameters of military logistics.*

Леся Костюченко, Solomon D.I. «Базова термінологія сучасної військової логістики». *У статті розкрито зміст основних базових термінів військової логістики. Розглянуто різні підходи до побудови концептуальних основ, структури та функціоналу даного напряму. Обґрунтовано зміст терміну «логістичне забезпечення оборонного сектору». Окреслено сфери та функціонал військової логістики. Досліджено умови інтеграції систем логістики і медичного забезпечення, спроможних надати підтримку усім компонентам сил оборони та цивільного населення країни. Зокрема, дослідження ґрунтуються на основних стратегічних цілях держави в рамках оборонної реформи: Стратегії національної безпеки України щодо забезпечення інтеграції України до Європейського*

91-98
v.1 (2020)
https://smart-scm.org

Союзу та формування умов для вступу в НАТО. Запропоновано підходи до структурування визначень і понять сучасної військової логістики з урахуванням військово-політичних реалій України. Термін «військова логістика» пропонується трактувати двояко: по-перше, як практичну діяльність (засіб реалізації оперативно-тактичних чи стратегічних завдань оборонного сектору в режимі реальних ресурсів і часу); по-друге, як наукову сферу спрямовану на розробку моделей оптимізації процесів матеріально-технічного забезпечення об'єктів оборонного сектору держави.

Ключові слова: *військова логістика, логістичне забезпечення оборонного сектору, предмет військової логістики, правило військової логістики, сфери військової логістики, функції військової логістики, параметри військової логістики.*

Леся Костюченко, Solomon D.I. «Базовая терминология современной военной логистики». *В статье раскрыто содержание основных базовых терминов военной логистики. Рассмотрено различные подходы к построению концептуальных основ, структуры и функционала данного направления. Обосновано содержание термина «логистическое обеспечение оборонного сектора». Очерчено сферы и функционал военной логистики. Исследовано условия интеграции систем логистики и медицинского обеспечения, способных предоставить поддержку всем составляющим сил обороны и гражданского населения страны. В частности, исследования основываются на основных стратегических целях государства в рамках оборонной реформы: Стратегии национальной безопасности Украины касательно обеспечения интеграции Украины в Европейский Союз и формирования условий для вступления в НАТО. Предложено подходы к структурированию определений и терминов современной военной логистики с учетом военно-политических реалий Украины. Термин «военная логистика» предлагается определять двояко: во-первых, как практическую деятельность (средство реализации оперативно-тактических или стратегических задач оборонного сектора в режиме реальных ресурсов и времени); во-вторых, как научную сферу, направленную на разработку моделей оптимизации процессов материально-технического обеспечения объектов оборонного сектора государства.*

Ключевые слова: *военная логистика, логистическое обеспечение оборонного сектора, предмет военной логистики, правило военной логистики, сферы военной логистики, функции военной логистики, параметры военной логистики.*

Introduction. Modern military-political Ukrainian realities require the formation of a single effective logistics system of the defense forces. The main strategic goals of our country in the framework of defense reform are outlined in the Strategic Defense Bulletin of Ukraine and correspond to the National Security Strategy of Ukraine to ensure Ukraine's integration into the European Union and the formation of conditions for NATO membership. Therefore, they must correlate with NATO's logistics guidelines, standards and instructions. That's why it's very important to systematize the basic terminology of modern military logistics.

Analysis of recent researches and publications. The formation of an effective defense policy, planning and resource management system using modern Euro-Atlantic approaches, as well as the creation of a unified logistics and healthcare system capable of supporting all components of the defense force, are among the five main strategic goals of defense reform [1; 9]. These strategies take a position equivalent to the strategies: 1) joint leadership of the defense forces according to the principles and standards adopted by NATO member states; 2) operational (combat, special) capabilities of the defense forces, necessary for a guaranteed repulse of armed aggression, state defense, peacekeeping and international security; 3) professionalization of the defense forces and the creation of the necessary military reserve [1].

According to [8], the defense forces are: "The Armed Forces of Ukraine, the State Service for Special Communications and Information Protection of Ukraine, the State Special Service for Transport, etc. which

91-98
v.1 (2020)
https://smart-scm.org

formed in accordance with the laws of Ukraine, military formations, as well as law enforcement and intelligence agencies, in terms of involving them in the implementation of state defense tasks".

Ukraine is pursuing a defense reform aimed at acquiring and maintaining the necessary level of defense capabilities for the country's defense, effectively responding to threats and challenges to national security, enhancing the interoperability of Ukraine's armed forces with units of NATO and EU member states to perform common missions. In general, the logistics of NATO countries are focused on two groups of tasks: first, the efficient organization of the transportation and regrouping of troops; secondly, ensuring that troops are kept on alert. NATO agreed definition of logistics reads as the «science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, the aspects of military operations which deal with: design and development, acquisition, storage, transport, distribution, maintenance, evacuation and disposition of materiel; transport of personnel; acquisition or construction, maintenance, operation and disposition of facilities; acquisition or furnishing of services; and medical and health service support» [5, p.103]. We think that the term "materials" in the first subparagraph includes equipment in its widest sense including vehicles, weapons, ammunition, fuel, etc.

The concept of military logistics, as a term, correlates with the concept of logistics management set out in such publications [4; 6; 7], etc. In particular, the principles of logistics management which set out in [4; c. 56 - 66.] can be effectively adapted in the planning and organization practice of the state defense forces logistics support.

The purpose and objectives of the study. As the results of the analysis of modern publications have shown, today in the domestic scientific literature there are practically no works devoted to fundamental research of basic terminology on military logistics. So there is a need to systematize concepts and terms in this area, which is the purpose of this research.

Basic material and results. Implementation of an effective policy of resources planning and management in the defense sector requires constant monitoring, comprehensive analysis of real and potential resource opportunities of Ukraine. It allows the development of the optimal distribution system of resources between the objects of the defense sector, taking into account the introduction of modern energy-saving technologies.

The integration of logistics and medical support systems capable of supporting all components of the defense forces and the civilian population on the respective territories will allow building approaches to effective medical care [3]. The implementation of such a structured comprehensive reform of the national health sector should be based on the World Health Organization norms and standards.

Given the above, military logistics are: first, practical activity – a means of implementing operational, tactical or strategic tasks of the defense sector in real terms and time; secondly, the scientific sphere involves in the development of models for optimizing the logistics processes of state defense sector.

Thus, military logistics is an integral part of the effective organization of the joint state defense forces leadership processes, aimed at organizing, planning, regulating, coordinating, controlling, accounting and analysis of logistics (material, personnel, information, financial, service) flows in order to achieve the goals of the defense sector logistics system.

Logistical support of military operations requires the temporary establishment of a routes and nodes capable network of delivering forces to support operations. This, according to Dre Kerstiens, a major of the Netherlands Land Forces (Joint Forces Operations) [2], is mainly a problem of "Earth".

However, in our opinion, it is not necessary to focus on the geographical coordinates of the end points (consumers) locations and ignore all possible methods of delivery ("air", "water", mixed).

For the sake of objectivity in further research, "logistics of military operations" will be defined by a broader concept – "logistics of the defense sector", which expands the research scope.

So the logistics of the defense sector is a logistics activity aimed at determining the consumer needs parameters, finding sources, organizing delivery and controlling the results in varying degrees conditions of uncertainty (peacetime, warfare, etc.) and possible change in the geographical location of collateral. At the same time, consumers of logistics support for the defense sector are:

- units of the armed forces;
- weapons and equipment locations;
- divisions of the organization of storage, transportation, maintenance, use and utilization of the weapon, equipment and property;
- medical units;
- power supplies;
- training grounds, etc.

The subject of the defense sector logistical support is the number and equipment (by material and technical means) of the rear and force objects in the combat zone.

The implementation of logistics support for the defense sector is based on the achieved fulfillment of such conditions [2]: a) creation of temporary transport infrastructure (routes and nodes networks) which capable of optimally delivering logistics items to consumers; b) the achievement of the condition (restriction) that the number and equipment of combat zone forces is not greater than real needs by the situation (location and redeployment area); c) a clearly structured sequence of forces for 4 R (right forces, right equipment, right time, right place") is the basic rule of military logistics.

In general, the military logistics activities include 5 areas [2]:

1) design – designing process and development, acquisition, storage, transportation, distribution, care, evacuation and location of weapons and equipment;

2) transport – transportation of personnel, delivery of material and technical resources;

3) supply (sourcing) – search for sources, acquisition, construction, maintenance, operation and location of facilities;

4) service – the provision of various services;

5) medical – logistical support of medical units.

According to NATO School [2], military logistics is divided into two types: collective and multinational.

Collective logistics involves the realization of NATO's and national logistics capabilities (facilities) through the use of common processes and structures.

Multinational Logistics involves: a) identification of a leading country in the field of logistics, its role as a logistics expert and the role of other participating countries; b) creation of a multinational joint logistics unit; c) organization of logistical support of operations by the contractor's forces and means.

If one considers that logistics comprises both the building up of stocks and capabilities and the sustainment of weapons and forces, then it is clear that a distinction can be made between two important aspects of logistics: the first one dealing with production and the second one with consumption [5, p.104]. The following definitions of these aspects enjoy widespread acceptance within the NATO logistics community which is clearly demonstrated in Figure 1: Production Logistics (also known as: acquisition logistics and Consumer Logistics (also known as: operational logistics).

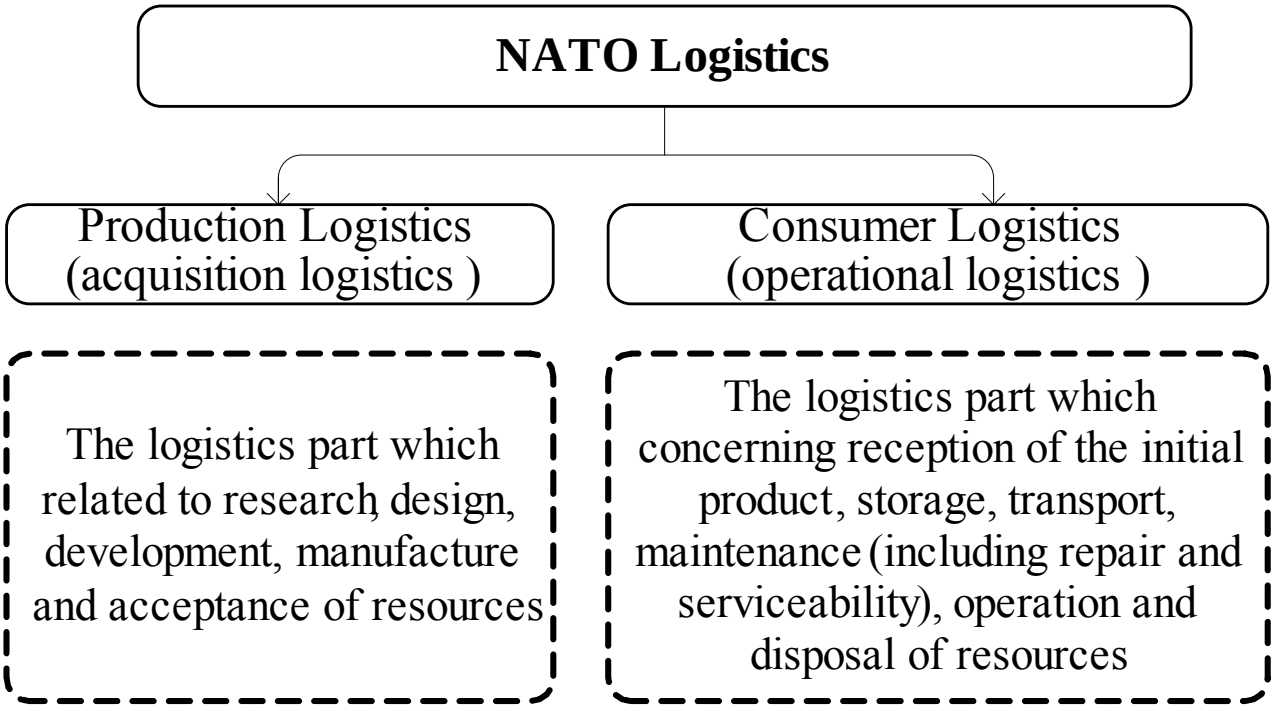

Figure 1. The aspects of the NATO logistics
Source: developed by the author on the basis of [5, p.104]

As specified in Figure 1, production logistics includes: standardization and interoperability, contracting, quality assurance, procurement of spares, reliability and defense analysis, safety standards for equipment, specifications and production processes, trials and testing (including provision of necessary facilities), codification, equipment documentation, configuration control and modifications.

Consumer logistics includes stock control, provision or construction of facilities (excluding any material element and those facilities needed to support production logistic facilities), movement control, reliability and defect reporting, safety standards for storage, transport and handling and related training. There are some definitions which explain the meaning of some military logistics terms in NATO Logistics Handbook (Table. 1) [5].

Examining the essence of military logistics as a logistical support of the defense sector, it is worth to consider its functionality. So the main functions of military logistics according to NATO School are the following [2]: delivery; logistical support; service; maintenance and repair of equipment; obtaining, planning and further movement of resources; relocation and transportation; provision of oil products; providing medical care; concluding agreements; support for the country on whose territory the joint forces are stationed.

This functional is implemented through the implementation of parameters the so-called "5 D"[2]:

1) Destination – determining the need parameters;

2) Distance – determining the level communication routes (LOC) state;

3) Demand (requirement) – determining the degree of the need importance;

4) Duration – determining the required operational reliability and the need to invest for security purposes;

5) Dispersal – detecting the threat of LOCs (by connection) or MSRs (main supply routes).

91-98
v.1 (2020)
https://smart-scm.org

Table 1

Definition of some terms according to the NATO Logistics Handbook

Term	Definition	Source in [5]
Multinational Logistics	The overarching term for the different modes to logistically support operations other than purely national, such as Multinational Integrated Logistic Support, Role Specialization Support and Lead Nation Logistic Support.	MC 319/1
National Logistic Support.	A nation takes full responsibility for procuring and providing logistic support to her forces. This support can be provided on a solely national basis and/or through bilateral or multilateral agreements with other nations, NATO or other organizations as appropriate.	AAP-6
Mutual Support.	That support which units render each other against an enemy, because of their assigned tasks, their position relative to each other and to the enemy, and their inherent capabilities.	AAP-6

Source: [5].

An integral condition for the implementation of the functions and rules described above is the constant calculations of the optimal logistics components of the military presence zone. This condition can actually be considered the purpose of military logistics.

For example, the authority to manage military logistics is vested in the NATO commander over the rear and organizations, including the National Support Elements (NSE), which allow him to synchronize, prioritize and integrate the logistics functions required to carry out a joint mission. It doesn't confer authority on nationally owned resources held by the NSE, except in cases agreed to the delegation or in accordance with NATO principles and policies. In essence, NATO's command structure coordinates need and controls logistics for operations, and Partner countries have the physical capacity to provide their own logistics. Such cooperation begins at the planning stage, common tasks and solutions and information needs are identified, and only then resource allocation planning is carried out [8].

Conclusion. Based on the above study of basic terminology in military logistics, we can draw the following conclusions:

1) Military logistics is the sphere of the joint leadership activities of the state defense forces, aimed at the organization, planning, regulation, coordination, control, accounting and analysis of logistics flows in order to achieve the logistics system goals of the defense sector;

2) The system of military logistics includes subsystems: a) planning of logistics activities, b) logistics of the defense sector, c) logistics management or logistics facilities management;

3) Logistics support of the defense sector is built on the principle of "the basic rule of military logistics" – a sequence of forces for 4 R ("right forces, right equipment, right time, right place");

4) Military logistics activities include five areas: design, transport, supply (sousing), service and medical;

5) The military logistics functional is implemented through the execution of parameters: destination, distance, dispersal, duration, demand;

6) The purpose of military logistics is the constant controlling and reengineering of processes aimed at optimizing the logistics components of the military presence zone

A more detailed study of the structure, objects, subjects and other components of

the military logistics system, as well as the tools for implementing the functionality will be continued in future studies and presented in next publications.

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99-109
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TRENDS AND PROSPECTS OF DEVELOPMENT OF THE GLOBAL AND NATIONAL AIR TRANSPORT MARKETS

Sergiy Lytvynenko, Iryna Panasiuk "Trends and Prospects of the Development of the Global and National Air Transport Markets". *The article identified the preconditions for the development of the world economy which included the processes of globalization and internationalization. The role of air transport in the world economy is emphasized because its weight grows every year, because it provides the development of tourism, international programs and cooperation between individual regions of the world. There has been an increase in the number of multinational corporations, increasing the mobility of business passengers what is very important for the airlines. The critical analysis of scientific publications made it possible to state that in Ukraine and abroad the development of the air transportation market was studied by many scientists and their contribution to solving a number of scientific problems related to identifying prospects and opportunities for international and national air transportation markets as well as with the optimization of air carriers is important. However, it was found that insufficient research on recent trends and prospects for the development of global and national air transport markets is in the face of new challenges including the outbreak of coronavirus infection COVID-19. It was found that air passenger traffic in the global market has grown steadily in recent years by 7-8% every year and a quarter of sales depend on the regularity of air transportation of which 70% of this type of business determine the vectors of market expansion. The analysis of aviation accidents revealed that they have a very significant impact on the performance of the carrier whose aircraft suffered them. This applies to both reputational and purely financial losses. The problems with the Boeing 737 Max type also became a serious challenge for the aviation industry due to a number of incorrect design decisions of the world's leading aviation concern and attempts to save on the training of pilots of this type of aircraft. It is noted that modern passengers are trying to minimize the time spent on travel, the trend of fragmentation of the holiday period is growing rapidly. As a result of the analysis of the domestic air transportation market, it was revealed that during 2019 there was an expansion of the market in general, as well as the activities of foreign airlines, travel from Ukraine to Europe and other parts of the world increased rapidly. A radical change in market trends was observed in mid-March 2020, when due to the spread of the COVID-19 coronavirus in the world, quarantine*

99-109
v.1 (2020)
https://smart-scm.org

was introduced and regular flights were stopped. The national air carrier Ukraine International Airlines has declared a two-stage period of resumption of work after the end of quarantine. The authors found signs of hybridization of the airline's business models at the first stage of the restart and the transition to the airline's business model which has features of both point-to-point models and obvious features of the model of low-cost carriers. Whereas in the second stage the transition to a partial network model with low-cost models is most likely followed by the emergence of a new already stable hybrid business model based on network principles but with stable features of a low-cost airline.

***Keywords**: tendencies, prospects, global market, world market, national market, air transportation, airline.*

Сергій Литвиненко, Ірина Панасюк «Тенденції та перспективи розвитку глобального та національного ринків авіаційних перевезень». *У статті було визначено передумови розвитку світової економіки, які включали процеси глобалізації та інтернаціоналізації. Наголошено на ролі авіаційного транспорту у загальносвітовому господарстві, що саме він забезпечує розвиток туристичної сфери, міжнародних програм та співпрацю між собою окремих регіонів світу. Відзначено зростання кількості транснаціональних корпорацій, підвищення рухливості бізнес-пасажирів, що є дуже важливим для авіакомпаній. Проведений критичний аналіз наукових публікацій дав можливість стверджувати, що в Україні та за кордоном питанням розвитку ринку авіаційних перевезень займалися чимало науковців, а їх внесок у вірішення проблеми, є вагомим. Проте, було виявлено, що недостатньо досліджені останні тенденції та перспективи розвитку глобального та національного ринків авіаційних перевезень в умовах появи нових викликів, зокрема спалаху коронавірусної інфекції COVID-19. При аналізі авіаційних катастроф виявлено, що вони дуже суттєво впливають на успішність функціонування перевізника, літак якого зазнав їх. Серйозним викликом став для авіаційної індустрії і проблеми із типом Boeing 737 Max через цілу низку невірних конструктивних рішень та намаганням зекономити на підготовці пілотів цього типу літака. Відзначено, що сучасні пасажири намагаються звести до мінімум час, що затрачується на переміщення, набуває поширення тенденція щодо дроблення відпускного періоду. В результаті аналізу вітчизняного ринку авіаперевезень виявлено, що впродовж 2019 року мало місце розширення ринку загалом, а також діяльності на ньому іноземних авіакомпаній, стрімко збільшилися подорожі з України до Європи та у інші частини світу. Кардинальна зміна тенденції розвитку ринків відзначена у середині березня 2020 року, коли через поширення у світі короновірусу COVID-19 було запроваджено карантин та припинилися регулярні рейси. Національний авіаційний перевізник авіакомпанія «Міжнародні авіалінії України» задекларувала двохетапний період відновлення роботи після закінчення карантину. При цьому авторами виявлено ознаки гібридизації бізнес-моделей авіакомпанії на першому етапі рестарту та перехід до бізнес-моделі авіакомпанії, яка має ознаки, як point-to-point моделі, так і очевидні ознаки моделі низькобюджетних перевізників. Тоді як на другому етапі найбільш імовірним є перехід до часткової мережевої моделі із ознаками лоукост моделей, а після цього поява нової вже сталої гібридної бізнес-моделі за мережевими принципами але із стійкими ознаками низькобюджетного авіаперевізника.*

***Ключові слова:** тенденції, перспективи, глобальний ринок, світовий ринок, національний ринок, авіаційні перевезення, авіакомпанія.*

Сергей Литвиненко, Ирина Панасюк «Тенденции и перспективы развития глобального и национального рынков авиационных перевозок». *В статье были определены предпосылки развития мировой экономики, которые включали процессы глобализации и интернационализации. Отмечено роль авиационного транспорта в общемировом хозяйстве, что именно он обеспечивает развитие туристической сферы, международных программ и сотрудничество между собой отдельных регионов мира. Отмечен рост количества транснациональных корпораций, повышение подвижности бізнес-пассажиров, что очень важно для авиакомпаний. Проведенный критический анализ научных публикаций позволил утверждать, что в Украине и за рубежом вопросам развития рынка авиационных перевозок занимались многие ученые, а их вклад в решение проблемы, является*

99-109
v.1 (2020)
https://smart-scm.org

весомым. Однако, было обнаружено, что недостаточно исследованны последние тенденции и перспективы развития глобального и национального рынков авиационных перевозок в условиях появления новых вызовов, в том числе вспышки коронавирусной инфекции COVID-19. При анализе авиационных катастроф обнаружено, что они очень существенно влияют на успешность функционирования перевозчика, самолет которого потерпел их. Серьезным вызовом стали для авиационной индустрии и проблемы с типом Boeing 737 Max сваязанные с целым рядом неверных конструктивных решений и попыткой сэкономить на подготовке пилотов этого типа самолета. Отмечено, что современные пассажиры пытаются свести к минимум время, затрачиваемое на перемещение, распространяется тенденция дробления отпускного периода. В результате анализа отечественного рынка авиаперевозок выявлено, что в течение 2019 имело место расширение рынка в целом, а также деятельности на нем иностранных авиакомпаний, стремительно увеличились путешествия из Украины в Европу и в другие части света. Кардинальное изменение тенденции развития рынков отмечено в середине марта 2020 года, когда из-за распространения в мире короновирусу COVID-19 был введен карантин и прекратились регулярные рейсы. Национальный авиационный перевозчик авиакомпания «Международные авиалинии Украины» задекларировала двухэтапный период восстановления работы после окончания карантина. При этом авторами выявлены признаки гибридизации бизнес-моделей авиакомпании на первом этапе рестарта и переход к бизнес-модели авиакомпании, которая имеет признаки, как point-to-point модели, так и очевидные признаки модели низкобюджетных перевозчиков. Тогда как на втором этапе наиболее вероятным является переход к частичной сетевой модели с признаками лоукост моделей, а затем появление новой уже постоянной гибридной бизнес-модели, сформированной по сетевым принципам, но с устойчивыми признаками низкобюджетного авиаперевозчика.

Ключевые слова: *тенденции, перспективы, глобальный рынок, мировой рынок, национальный рынок, авиационные перевозки, авиакомпания.*

Introduction. Today we are witnessing the processes of globalization and internationalization which are spreading more and more in the world economy. Even developing countries and countries with economies in transition are actively involved in international trade and the international division of labor. Air transportation is especially important because it provides the development of tourism, international programs and cooperation between individual regions of the world. Destinations to which access was previously impossible or significantly limited are gradually opening up while airlines' profits have been rising until recently. There is a tendency to increase the number of multinational corporations as well as other international companies which stimulates among other things increased demand for business trips abroad. This segment of passenger air transportation is very important for airlines as tickets are often purchased spontaneously at high classes with the need to provide additional services on board and consequently at high prices.

Literature and researches review. Many scientists in Ukraine and abroad dealt with the development of the air transportation market, in particular T. Akimova, T. Gabrielova, M. Grigorak, V. Zagorulko, V. Koba, L. Litvinenko , S. Mizyuk, A. Novikova, S. Petrovskaya, I. Sadlovskaya, K. Sydorenko, G. Yun and others. They have made a significant contribution to solving a number of scientific problems related to the definition of prospects and opportunities for the development of international and national air transportation markets as well as with the optimization of activity of air carriers.

In their own scientific publication [1] S. Smerichevsky and I. Mykhalchenko emphasize that the processes of globalization, liberalization and informatization have led to the dynamic development of the world air transportation market. In addition, the authors talk about the spread of hub and low-budget models of the

carrier as well as the intensification of various integrations between carriers.

Scientists T. Gavrilko and A. Gavrilenko in [2] focuses on transformational changes in the world market of aviation services. It is emphasized that the key factors that will affect the dynamic development of the air transportation market will be the growth rate of the world economy, job creation, meeting future demand for air transportation, providing services to meet the needs of passengers, maintaining the image of aviation as the most environmentally friendly and safe type of transport.

The scientific work of O. Sarkisova and A. Tokar [3] is devoted to the analysis of air transportation in Ukraine. The authors come to the conclusion about the significant monopolization of the domestic market, the disproportionate development of land infrastructure as well as the weak competitiveness of a significant number of domestic airlines.

A series of scientific works is devoted to the analysis of global patterns of development of the world market of air transportation and its separate aspects. O. Lozhachevska, K. Sydorenko and S. Sidenko [4-6].

Scientists V. Koba and O. Koba in [7] came to the conclusion that it is necessary to further harmonize the aviation legislation of Ukraine with the requirements of ICAO and EU legislation, upgrade the aircraft fleet as well as strengthen and expand the infrastructure of airports on a new technical basis.

Therefore, according to the results of critical analysis of scientific publications, it can be argued that the latest trends and prospects of global and national air transport markets in the context of new challenges including the outbreak of coronavirus infection COVID-19 are insufficient.

Aim and objectives. The purpose of this article is to identify trends and prospects of the development of global and national air transport markets in the face of new challenges and the impact of man-made factors.

Results, analysis and discussion. The global air transportation market is one of the main elements of the world economy which plays an extremely important role in strengthening relations between countries. Due to the opening of borders and the spread of liberalization trends there are significant changes in the functional aspect of air carriers. The key to the successful development of airlines is a quick and easy adaptation to new conditions, consolidating its position on the world stage, a high level of competitiveness and financial stability.

Air transport is the basis of the modern global economy. Its services are used annually by more than 3 billion passengers and about 100 million tons of cargo are transported. According to economic experts, it provides jobs for 10 million people and brings in more than 1 trillion USA to the world GDP annually. According to the latest data up to 60% of the population on the African continent is employed in tourism.

International organizations such as ICAO (International Civil Aviation Organization), IATA (International Air Transport Association), WTO (World Trade Organization) and World Bank periodically analyze the state and dynamics of the air transport market, review its regulatory system with subsequent publication of activity reports of each separate subject. There is a close relationship between the nature of air traffic growth and economic trends in the dynamics of demand for them. By this we mean that the demand for them depends on the welfare of the population, their purchasing power and the level of development of a particular country. It is well known that the greatest demand for air travel is influenced by changes in wages, commercial activities and trade which determine the predisposition of the population to travel. It is also important to monitor the level of inflation, unemployment and the level of growth of gross domestic

99-109
v.1 (2020)
https://smart-scm.org

product (GDP) per capita which is a direct indicator of the development of the state.

The annual economic effect of the global air transportation market is more than 700 billion USA dollars. Passenger traffic has grown steadily in recent years by 7-8% every year. And 25% of sales of companies depend on the regularity of air transportation of which 70% of this type of business determine the vectors of market expansion. On the agenda is the task of achieving maximum mobility in the airspace, improving the design of aircraft and proper and regular inspection. Considerable attention in aviation is paid to aviation safety. Analyzing the biggest catastrophes of 2018-2020 [8] (Table 1) it should be noted that the reasons for their occurrence are completely different – from terrorist acts to structural errors of the aircraft and crew errors.

Table 1

The biggest plane crashes (2018-2020 years)

Year	Place of the plane crash	Type of the plane	Country of the aircraft owner	Reasons of the crash	Number of victims
1	2	3	4	5	6
2018	Indonesia	Boeing 737 Max	Indonesia	Crashed from hitting the water off the west coast of Iava	185
2018	Cuba	Boeing 737	Cuba	Crashed after takeoff	104
2018	Syria	An-26	Russia	A military transport plane crashed during landing	39
2018	Russia	An-148	Russia	Missing from radar screens through a few minutes after taking off from Domodedovo airport	71
2019	Russia	SSJ-100	Russia	Made a hard landing at the airport and caught fire	41
2019	Ethiopia	Boeing 737	Ethiopia	Accident after takeoff near Bishoft (Debre-Zeit)	157

99-109
v.1 (2020)
https://smart-scm.org

End of the Table 1

1	2	3	4	5	6
2019	Iran	Boeing 707	Iran	The cargo plane failed brake on the runway and crashed into city buildings on the outskirts of Tehran	16
2019	Kazakhstan	Fokker-100	Kazakhstan	The plane crashed during takeoff	15
2020	Iran	Boeing 737	Ukraine	The plane caught fire in the sky and crashed near Tegeran	176

Source: grouped by authors according to [8]

Aviation accidents have a very significant impact on the success of the carrier whose aircraft suffered it. Even if we talk about the example of the downing of a Boeing 737 aircraft in Iran when the carrier is clearly not to be blamed, Ukraine International Airlines has suffered considerable both reputational and purely financial damage. The situation with the Boeing 737 Max is complicated which is an example of a number of incorrect design decisions of the world's leading aviation concern and an attempt to save on the training of pilots for this type of aircraft.

It is important to emphasize that for many countries, progress in the development of the transport sector including aviation has become a major vector of international tourism. Since today is the time of dominance of the service sector, it is especially important to ensure the welfare of the nation.

As of today, the following trends are observed:

1. Liberalization of legal and economic spheres of regulation of international air services.
2. Awareness of the negative impact on the environment.
3. Transformation of outdated business models of air carriers in commercial aviation.

As modern passengers try to minimize the time spent on travel, the trend towards fragmentation of the holiday period is growing rapidly. At this time special tariffs are offered for tourists namely inclusive tours and excursions which encourages the widespread use of low-cost airlines.

During 2019 passenger and cargo transportation was provided by 29 domestic airlines which performed a total of 79.7 thousand commercial flights (against 77.1 thousand for the same period in 2018). The air transportation market in Ukraine showed positive dynamics in 2019. During this period passenger traffic was provided by 18 domestic airlines among which the leader was Ukraine International Airlines. It is followed by Azur Air Ukraine, SkyUP, Wind Rose and Bukovyna (which has been operating since November 2018). The above-mentioned air carriers perform 97% of the total volume of domestic passenger traffic [9].

During the 2019 year 10 domestic airlines operated international scheduled passenger traffic to 45 countries of the world. During this period Ukrainian airline began operating flights on nine new international routes which are connected by air: Kherson and Bourgas; Zaporizhya with Barcelona; Dnipro with

99-109
v.1 (2020)
https://smart-scm.org

Bodrum; Odesa with Rimini; Kharkiv with Paris, Sharjah and Rimini; Boryspil with the cities of Sanya and Catania [9].

There was an expansion of activities in the Ukrainian market of foreign airlines in 2019. Thus 6935.9 thousand passengers used their services, in 2019 foreign airlines operated flights on 15 new routes: from Bremen, Billund and Genoa to Kyiv (Zhulyany); from Manchester, Paphos, Dublin and Bodrum to Kyiv (Boryspil); from Copenhagen and Riga to Lviv; from Milan, Krakow and Baku to Kharkiv; from Rome, Baku and Krakow to Odessa. In total in 2019 year 39 foreign airlines (including three new ones) from 36 countries of the world performed regular passenger transportation to Ukraine [9].

Transportation of goods and mail was performed in 2019 by 20 domestic airlines. The leaders of cargo transportation were: ATP SE "Antonov", airlines "International Airlines of Ukraine", "ZetAvia", "Maximus Airlines" and "Uzhmashavia". Commercial flights of domestic and foreign airlines served 19 Ukrainian airports and airfields [9].

In the period 2018-2019 Ukrainians rapidly increased their travels to Europe and other parts of the world. The question of the trend of feminism which has had a positive impact on the aviation industry is relevant. Namely, with the increase in the number of women in management and at work in general, the number of business trips and accordingly income increases.

International tourist arrivals are due to air transport and depend on connections with global markets. Internationalization of all spheres of public life, the 4th industrial revolution, total informatization and scientific research lead to the emergence of new business models, market strategies and methods of consumer satisfaction. Gradually introducing innovations can achieve a significant increase in demand and less damage to the environment what is very important today. Having analyzed the above it is appropriate to state the existing as of early 2020 transparent development of the aviation industry and globalization which we see in the manifestation of this area.

Everything has changed with the active spread of the COVID-19 coronavirus in the world. All in mid-March 2020 domestic and foreign airlines will cease to operate due to the fact that most countries around the world declare quarantine indefinitely. At this time only special flights are operated which are designed to return to the countries of their citizens. National carriers, first of all, Ukraine International Airlines and SkyUP have actively joined the process of returning Ukrainians to their homeland.

Despite the partial lifting of restrictive measures and the possible resumption of international flights from June 15 it should be noted that only a relatively small part of the flights will be resumed. Thus Ukraine International Airlines stated that it was taking all possible measures to reduce costs and generate revenue from one-time flights and was forced to reduce 900 highly professional employees while declaring a desire to keep the company and key personnel including flight [10].

In accordance with its own resumption strategy [10] Ukraine International Airlines plans to operate so-called international medium-haul point-to-point flights at the initial stage of the restart which will last until April 2021 – plans to operate so-called international medium-haul point-to-point flights that are provided mainly by non-transit passenger flows and to resume domestic flights.

That is at the first stage of the restart that the airline actually abandons the network principle of organization of work thus becoming a point-to-point carrier. It was believed that this business model of aviation business was a thing of the past and could not provide a purely competitive position to any airline in the target market, but under current conditions it is designed to ensure a relatively painless transition to the second phase of restart for the leading national carrier.

99-109
v.1 (2020)
https://smart-scm.org

In the second stage of the restart, the airline plans to restore the minimum international network, including long-haul flights, necessarily after the organization of key feeder routes [10]. That is the second stage of the restart which is scheduled for April 2021 involves a partial and gradual restoration of the airline's network business model. It should be noted that at the beginning of the resumption of scheduled flights the airline plans to use up to 14 of its own aircraft with a further increase in their number to 28 aircraft. At the same time, the airline's fleet currently has 35 aircraft. The airline also said that the long-haul fleet would be reduced based on the needs of the first phase of recovery. This is a prerequisite for survival in the current difficult conditions. Only after the completion of the second phase of the restart and the planning of a complete restoration of the route network a decision will be made on the need to expand the fleet of wide-body aircraft taking into account the demand.

In addition, the airline "International Airlines of Ukraine" stated that in order to work effectively on the changed market after the pandemic air, a number of changes are being introduced in the base product [10]. In particular, the airline plans to significantly simplify its tariff policy by washing away a significant number of intermediate tariffs. This will significantly simplify the process of tariff planning and revenue management of the airline in the first and second stages of the restart minimizing the cost of these business processes.

The airline also plans to reduce the capacity of business class cabins in aircraft, increase the share of direct sales through its own site as well as implement a full cycle service on the site which will allow passengers to make changes to the reservation [10].

It is obvious that Ukraine International Airlines understands that only minimizing costs at this stage can ensure the possibility of continued existence. The airline is based on the model of low-cost airlines in the plane of minimizing costs so at the first stage of the restart we can talk about creating a temporary forced hybrid business model of the airline which has both point-to-point model and low-cost model.

The target model of the airline at the first stage of the restart provides to maximize the utilization of the fleet and reduce unit costs while conditions must be created to maintain significant transit potential [10]. It is worth noting that the problem of relatively weak utilization of the fleet for Ukraine International Airlines compared to the world's leading airlines has always occurred, the carrier has solved it as it could in recent decades. However today this aspect has become one of the key not only for the success of market development, but also for the survival of an airlines in a crisis caused by the spread of the world coronavirus COVID-19.

Preservation of transit potential is a strategic task of the airline and should be partially implemented during the second stage of the restart in the transition from the model of point-to-point carrier to the model of partial network carrier. At the same time the features of the low-cost carrier model at Ukraine International Airlines will obviously be preserved during the second stage of the restart. During the transition from the second stage of the restart with the return to a full-fledged network business model of the airline it is the possibility of establishing a full-fledged transit will be a key factor in the success of the carrier in the market. It is possible that even after the second stage of the restart Ukraine International Airlines will retain some of the features of a budget airline thus forming its own business model based on network principles, but with the characteristics of a low-cost airline.

Conclusion. Thus the analysis of trends and prospects for global and national air transportation markets suggests that the opening of borders and the spread of liberalization trends have led to changes in the business models of airlines and the key to

99-109
v.1 (2020)
https://smart-scm.org

their successful development was quick and easy adaptation to new conditions, concentration on target market segments, ensuring a high level of competitiveness and financial stability. In general over the last 5 years has been noted the sustainable development of the world economy what has ensured a stable growth of air passenger traffic on the world market by an average of 7-8% annually.

Analyzing the trends in aviation security we note the different nature of the occurrence of catastrophic situations in 2018-2020. Terrorist acts and significant design errors in Boeing 737 Max aircraft as well as inadequate training of pilots on this type of aircraft became a serious threat.

It is noted that the development of the aviation sector has become one of the key vectors of international tourism. Special tariffs for tourists, namely inclusive tours and excursion offers are actively spreading.

It is established that the national market of air passenger transportation in 2016-2019 grew rapidly. Only in 2019 Ukrainian air carriers started operating flights on nine new international routes and foreign carriers opened 15 new routes during this period. During the period 2018-2019 the number of trips of Ukrainians to Europe and other parts of the world increased extremely rapidly. Thus at the beginning of 2020 there were positive trends in the volume of traffic in the international and national air transport markets.

One of the biggest challenges in recent decades for the international and national air transport markets has been the worldwide spread of the COVID-19 coronavirus and the announcement of indefinite quarantine. During the quarantine period only special flights are performed which return their citizens to the countries. Due to the quarantine measures there is a rapid increase in threats to air carriers. In particular the leader of the domestic market – the airline "International Airlines of Ukraine" declared a two-stage restart which includes significant staff reductions, drastic cost reductions, attempts to maximize fleet utilization and increase the share of direct sales, significant simplification of tariff policy. In the first stage of the restart the airline actually abandons the network principle of organization of work declaring that it becomes a point-to-point carrier. However, according to the authors, a temporary forced hybrid business model of Ukraine International Airlines is currently being created which has the features of both a point-to-point model and a low-cost model. It is obvious that the features of the low-cost model in the airline will remain during the second stage of the restart and therefore the hybrid nature of the model will remain in this period, but it will be a model that includes features of network and low-cost carrier. The authors suggest that even after the second stage of the restart the airline's business model will be formed according to network principles, but with the characteristics of a low-cost airline.

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