

Electronic scientific and practical journal

INTELLECTUALIZATION OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

#7(8) (2021)
August '21



WWW.SMART-SCM.ORG

ISSN 2708-3195

DOI.ORG/10.46783/SMART-SCM/2021-7(8)

ISSN 2708-3195





Electronic scientific and practical publication in economic sciences

ISSN 2708-3195

DOI: [https://doi.org/10.46783/smart-scm/2021-7\(8\)](https://doi.org/10.46783/smart-scm/2021-7(8))

Released 6 times a year

№ 7(8) (2021)
August 2021

Kyiv - 2021

Founder: Viold Limited Liability Company

Editor in Chief: Hryhorak M. Yu. – Doctor of Economics, Ass. Professor.

Deputy editors-in-chief: Koulyk V. A. – PhD (Economics), Professor.
Marchuk V. Ye. – Doctor of Tech. Sci., Ass. Professor.

Technical editor: Harmash O. M. – PhD (Economics), Ass. Professor.

Executive Secretary: Davidenko V. V. – PhD (Economics), Ass. Professor.

Members of the Editorial Board:

SWIEKATOWSKI Ryszard – Doctor of Economics, Professor (Poland);

POSTAN M. Ya. – Doctor of Economics, Professor;

TRUSHKINA N. V. – PhD (Economics), Corresponding Member of the Academy;

KOLOSOK V. M. – Doctor of Economics, Professor;

ILCHENKO N. B. – Doctor of Economics, Ass. Professor;

SOLOMON D. I. – Doctor of Economics, Professor (Moldova);

ALKEMA V. H. – Doctor of Economics, Professor;

Henryk DŹWIGOŁ – PhD (Economics), Professor (Poland);

SUMETS O. M. – Doctor of Economics, Ass. Professor;

STRELCOVÁ Stanislava – PhD (Economics), Ass. Professor, (Slovakia);

RISTVEJ Jozef (Mr.) PhD (Economics), Professor, (Slovakia);

ZAMIAR Zenon – Doctor of Economics, Professor, (Poland);

SMERICHEVSKA S. V. – Doctor of Economics, Professor;

GRITSENKO S. I. – Doctor of Economics, Professor;

KARPENKO O. O. – Doctor of Economics, Professor;

PATKOVSKYI S. A. – Business practitioner.

The electronic scientific and practical journal is registered in international scientometric data bases, repositories and search engines. The main characteristic of the edition is the index of scientometric data bases, which reflects the importance and effectiveness of scientific publications using indicators such as quotation index, h-index and factor impact (the number of quotations within two years after publishing).

In 2020, the International Center for Periodicals (ISSN International Center, Paris) included the Electronic Scientific and Practical Edition "Intellectualization of Supply Chain Management" in the international register of periodicals and provided it with a numerical code of international identification: ISSN 2708-3195 (Online).

Recommended for dissemination on the Internet by the Academic Council of the Department of Logistics NAU (No. 7 of February 26, 2020). Released 6 times a year. Editions references are required. The view of the editorial board does not always coincide with that of the authors.

t.me/smart_scm
facebook.com/Smart.SCM.org
twitter.com/ScmSmart

DOI: [https://doi.org/10.46783/smart-scm/2021-7\(8\)](https://doi.org/10.46783/smart-scm/2021-7(8))
e-mail: support@smart-scm.org

тел.: (063) 593-30-41
<https://smart-scm.org>

Contents

INTRODUCTION	5
<p>HRYPHORAK M.Yu. Doctor of Science in Economics, Associate Professor, Head of Logistics Department of National Aviation University (Ukraine), DZWIGOL Henryk. PhD DSc, Associate professor, Professor - Organization and Management Silesian University of Technology in Gliwice (Poland), KWILINSKI Aleksy Ph.D., Doctor of Economics, Professor, The London Academy of Science and Business (London, United Kingdom), TRUSHKINA N.V. PhD (Economics), Associate Professor, Senior Research Fellow, Regulatory Policy and Entrepreneurship Development Institute of Industrial Economics of the National Academy of Sciences of Ukraine (Ukraine), OVDIENKO O.V., PhD student, Assistant of Logistics Department of National Aviation University (Ukraine)</p> <p><i>ON THE APPLICATION OF THE CONCEPT OF CIRCULAR ECONOMY TO ENSURE BALANCED SUSTAINABLE DEVELOPMENT OF THE NATIONAL LOGISTICS SYSTEM IN UKRAINE</i></p>	
	6 – 25
<p>VOLOVYK O.I. Senior Lecturer of Logistics Department, National Aviation University (Ukraine), TSAPENKO O.A. Student of Logistics Department of National Aviation University (Ukraine)</p> <p><i>ANALYSIS OF PROFESSIONAL REQUIREMENTS FOR A MODERN LOGISTICIAN</i></p>	
	26 – 35
<p>MARCHUK V.Ye Doctor of Engineering, Associate Professor, Professor of Logistics Department National Aviation University (Ukraine), SAVCHENKO L.V. PhD of Technical Sciences, Associate Professor, Associate Professor of Logistics Department of National Aviation University (Ukraine), HARMASH O.M., PhD of Economics, Associate Professor, Associate Professor of Logistics Department of National Aviation University (Ukraine)</p> <p><i>MANAGEMENT OF REVERSE LOGISTICS IN THE SUPPLY CHAIN</i></p>	
	36 – 46
<p>KULIK V.A., PhD (Economics), Professor, Professor of Logistics Department National Aviation University, Honored Worker of National Education of Ukraine, Honorary employee of aviation transport of Ukraine (Ukraine), SEMERIAHINA M. M., Senior Lecturer of Logistics Department, National Aviation University (Ukraine), RISTVEJ Jozef PhD (Economics), Professor, Vice-Rector University of Zilina (Slovakia), ZAHARCHUK A.P. Assistant of the Logistics Department of National Aviation University (Ukraine)</p> <p><i>POLYCENTRIC MANAGEMENT OF THE GLOBAL SUPPLY CHAIN INTEGRATION</i></p>	
	47 – 56
<p>DAVYDENKO V.V., PhD of Economics, Associate Professor, Associate Professor of Logistics Department of National Aviation University (Ukraine), KARPUN O.V. PhD in Economics, Associate Professor, Associate Professor of Logistics Department National Aviation University (Ukraine), ZAMIAR Zenon Dr. hab. Inż, Professor, Vice-Rector the International University of Logistics and Transport in Wroclaw (Poland), KOSTIUCHENKO L.V. PhD in Economics, Associate Professor, Associate Professor of Department of National Aviation University (Ukraine)</p> <p><i>STRATEGIC MANAGEMENT OF THE ENTERPRISE IN THE CONDITIONS IN THE INSTABILITY OF THE MARKET ENVIRONMENT</i></p>	
	57 – 63

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 discuss 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.

HRYHORAK Mariia
Chief Editor

UDC 330.1:339.9:502/504

DOI: [https://doi.org/10.46783/smart-scm/2021-7\(8\)-1](https://doi.org/10.46783/smart-scm/2021-7(8)-1)

JEL Classification: L91, M41, P51, Q20.

Received: 08 June 2021

Hryhorak M.Yu. Doctor of Economics, Associate Professor, Head of Logistics Department
National Aviation University (Ukraine)

ORCID – 0000-0002-5023-8602

Researcher ID – AAK-2963-2021

Scopus author id: – 57208222758

Dzwigol Henryk Habilitated Doctor in Economics, Professor, Silesian University of
Technology (Gliwice, Poland)

ORCID – 0000-0002-2005-0078

Researcher ID – N-5498-2019

Scopus author id: –

Kwilinski Aleksy Ph.D., Doctor of Economics, Professor, The London Academy of Science
and Business (London, United Kingdom)

ORCID – 0000-0001-6318-4001

Researcher ID – B-7526-2017

Scopus author id: – 57204068618

Trushkina Nataliia PhD (Economics), Associate Professor, Senior Research Fellow,
Regulatory Policy and Entrepreneurship Development Institute of Industrial Economics of the
National Academy of Sciences of Ukraine (Ukraine)

ORCID – 0000-0002-6741-7738

Researcher ID – C-1441-2018

Scopus author id: –

Ovdiienko O.V. PhD Student, Assistant of Logistics Department of National Aviation
University (Ukraine)

ORCID – 0000-0003-2770-4895

Researcher ID –

Scopus author id: –

ON THE APPLICATION OF THE CONCEPT OF CIRCULAR ECONOMY TO ENSURE BALANCED SUSTAINABLE DEVELOPMENT OF THE NATIONAL LOGISTICS SYSTEM IN UKRAINE

*Hryhorak Mariia, Dzwigol Henryk, Kwilinski Aleksy, Trushkina Nataliia, Ovdiienko Oksana. "On
the application of the concept of circular economy to ensure balanced sustainable development of the*

national logistics system in Ukraine". The evolution and preconditions of formation, challenges and factors for circular economy development are investigated in the article. Were analyzed and generalized the existing scientific approaches to the definition of "circular economy", which are conditionally systematized into 9 groups: section of economy, paradigm, strategy, model, system, ecological opportunity, recycling technology, tool of "green" economy, type of economic activity. It is proposed to consider the term "circular economy" from such aspects as: the modern paradigm of logistics systems' development; sustainable development strategy; sustainable business model of the national economy; economic model based on industrial waste recycling technology; logistics flow management tool, which is based on an integrated approach (integration of system, process, situational, functional); activities aimed at implementing a closed cycle of logistics flows to increase the level of the national economy environmental security.

Were was accomplished a statistical analysis of the national logistics system development in consideration of the environmental component. It was established that the "green" transformation of Ukrainian logistics system in a circular economy is not effective enough. This is due to the limited amount of funding for environmental protection and insufficient development of the industrial waste recycling system. These issues require the development of a set of appropriate institutional measures and the adoption of radical logistics decisions based on European best practices.

Keywords: national economy, logistics system, circular economy, sustainable development, strategy, paradigm, waste recycling, statistical analysis, conceptual approaches, systematization, effect.

Григорак Марія, Джвігол Хенрик, Квілінський Олексій, Трушкіна Наталія, Овдієнко Оксана. **"Щодо застосування концепції циркулярної економіки для забезпечення збалансованого сталого розвитку національної логістичної системи в Україні".** У статті досліджено еволюцію та передумови становлення, виклики та чинники розвитку циркулярної економіки. Проаналізовано й узагальнено існуючі наукові підходи до визначення поняття «циркулярна економіка», які умовно систематизовано за 9 групами: розділ економіки, парадигма, стратегія, модель, система, екологічна можливість, технологія рециклінгу, інструмент «зеленої» економіки, вид господарської діяльності.

Запропоновано термін «циркулярна економіка» розглядати з таких позицій, як: сучасну парадигму розвитку логістичних систем; стратегію збалансованого сталого розвитку; стійку бізнес-модель національної економіки; економічну модель, яку засновано на технології рециклінгу промислових відходів; інструмент управління логістичними потоками, який ґрунтується на комплексному (інтеграція системного, процесного, ситуаційного, функціонального) підході; діяльність, яку спрямовано на реалізацію замкнутого циклу логістичних потоків задля підвищення рівня екологічної безпеки національної економіки.

Виконано статистичний аналіз розвитку національної логістичної системи з урахуванням екологічної складової. Встановлено, що «зелена» трансформація логістичної системи України в умовах циркулярної економіки відбувається недостатньо ефективно. Це пов'язано з обмеженим обсягом фінансування сфери охорони навколишнього природного середовища та недостатнім розвитком системи рециклінгу промислових відходів. Ці питання вимагають розроблення комплексу відповідних інституційних заходів і прийняття кардинальних логістичних рішень з урахуванням передового європейського досвіду.

Ключові слова: національна економіка, логістична система, циркулярна економіка, сталий розвиток, стратегія, парадигма, рециклінг відходів, статистичний аналіз, концептуальні підходи, систематизація, ефект.

Григорак Мария, Джвигол Хенрик, Квилинський Алексей, Трушкина Наталья, Овдиенко Оксана. **"О применении концепции циркулярной экономики для обеспечения сбалансированного устойчивого развития национальной логистической системы в Украине".** В статье исследована эволюция и предпосылки становления, вызовы и факторы развития циркулярной экономики. Проанализированы и обобщены существующие научные подходы к определению понятия «циркулярная экономика», которые условно систематизированы по 9 группам: раздел экономики, парадигма, стратегия, модель, система, экологическая возможность, технология рециклинга, инструмент «зеленой» экономики, вид хозяйственной деятельности.

Предложен термин «циркулярная экономика» рассматривать с таких позиций, как: современную парадигму развития логистических систем; стратегию сбалансированного устойчивого развития; устойчивую бизнес-модель национальной экономики; экономическую модель, основанную на технологии рециклинга промышленных отходов; инструмент управления логистическими потоками, основанный на комплексном (интеграция системного, процессного, ситуационного, функционального) подходе; деятельность, которая направлена на реализацию замкнутого цикла логистических потоков для повышения уровня экологической безопасности национальной экономики.

Выполнен статистический анализ развития национальной логистической системы с учетом экологической составляющей. Установлено, что «зеленая» трансформация логистической системы Украины в условиях циркулярной экономики происходит недостаточно эффективно. Это связано с ограниченным объемом финансирования сферы охраны окружающей среды и развитием системы рециклинга промышленных отходов. Эти вопросы требуют разработки комплекса соответствующих институциональных мероприятий и принятия кардинальных логистических решений с учетом передового европейского опыта.

Ключевые слова: национальная экономика, логистическая система, циркулярная экономика, устойчивое развитие, стратегия, парадигма, рециклинг отходов, статистический анализ, концептуальные подходы, систематизация, эффект.

Problem statement. The aggravation of modern environmental problems in the global world is mainly due to the use of the traditional economic model, which is no longer effective from an environmental point of view. Therefore, achieving a balanced sustainable operation of logistics systems at different levels requires launching both organization-managerial and green technologies, as well as innovative business models aimed at reducing the negative impact on the environment. This is in compliance with the concept of green growth proposed by the Organisation for Economic Co-operation and Development and the European Green Deal, which provides the solution of climatic problems, the reduction of greenhouse gas emissions, the the share of renewable energy sources increase. Ukraine has also joined the implementation of the European Green Deal.

As international experience shows, increasing the level of environmental safety of the national economy can be achieved by introducing conceptually new management tools based on integrated approaches (integration of system, process, situational, functional), concepts of "lean" production, sustainable development [1; 2].

Cirrently, leading scientists are conducting scientific discussions on the

"green growth" concept implementation in order to preserve the environment and improve the economic activity of enterprises. The desire of companies to form an ecological image of consumers has contributed to the development of the sustainable logistics concept [3], which includes "green" components and considers economic, social and environmental activities in the context of logistics management.

Therefore, at present it is necessary to look for innovative tools and introduce qualitatively new approaches to the formation and development of logistics systems. The circular economy is one of the priority tools as one of the key instruments for developing and implementing the overall business strategy nowadays.

Analysis of recent research and publications. The term "green economy" was first mentioned in 1989 in a report by a group of leading economists for the government of the United Kingdom of Great Britain and Northern Ireland [4]. This concept became widespread during the global economic crisis of 2008-2009. Thus, in 2009 the UN Environment Program (UNEP) published a report "Global Green New Deal", which considered the goals, objectives, elements, incentives and directions of domestic policy, aimed at developing a green economy. The

green economy was mostly defined as a practical approach to achieving sustainable development.

Currently, the concept of green economy is being actively discussed by scientists, experts, businesses and non-governmental organization (NGOs). UNEP experts [5] formulate a green economy as an economy that improves human well-being and social justice and at the same time significantly reduces environmental risks and environmental deficits. According to this concept, the priorities of the green economy are, on the one hand, the support and restoration of natural capital; use of renewable energy and low-carbon technologies for fossil fuels; improving the efficiency of resource and energy use; formation of responsible behavior of city residents; transition to low-carbon mobility; and on the other hand, creating new jobs and improving social justice.

In the last decade, leading academics have studied attentively a new concept of economic development, called "circular economy". According to the concept's supporters, circular growth will help overcome the climate crisis and contribute to the development of an inclusive green economy. The definition of this type of economy was formulated in the study of the experts from Oxford University in 2019 [6], based on a series of interviews conducted with participants in the Platform for Accelerating the Circular Economy (PACE). Respondents generally agreed that a closed-cycle economy is a regenerative type of economy that aims to preserve the greatest possible value of products, their components and materials, whose growth is not stimulated and does not depend on the use of limited resources. In essence, this type of economy is seen as a new trajectory of society on the path of sustainability.

The evolutionary development of the circular economy took place in three main stages [7]: Stage I (1970-1990) - work with waste; Stage II (1990-2010) - environmental efficiency strategies; Stage III (approximately

2010 - present) - maximum conservation in an era of resource depletion.

The transition from industrial to post-industrial society in the 60's of XX century, which is based on technological progress and innovative model of development, led to the emergence of the concept of circular economy in the scientific literature. The concept of circular economy was put forward in 1966 by the American economist Kenneth Boulding and had a pronounced ecological character: "... human must find his place in the cyclical ecological system ..." [8]. Later, the concept began to acquire a more economic character [9].

Analysis of literature sources showed that the vast majority of researchers [7; 10; 11] uses while describing the basic principles of the circular economy the particle "re" (from Latin means "again", "once more"), which characterizes the basic essence of the circular economy. The circular economy was originally based on three main principles, called "3R": Reduce – Reuse – Recycle. But over time, they transformed into "9R": Rethink – Reduce – Reuse – Repair – Refurbish – Remanufacturing – Repurpose – Recycle – Recover.

A significant number of scientific publications are devoted to the identification of factors that hinder the development of the circular economy [12; 13; 14]. In [11] it is noted that the implementation of the circular economy concept in practice may be prevented by the following barriers:

- cultural (environmental culture of companies, lack of interest and awareness of consumers, activities based on a linear economy, interest in the chain of creation of the final value);
- regulatory (limited closed procurement, lack of global consensus, prohibition of laws and regulations);
- market (low quality materials, standardization, high investment value, limited funding of circular business models);
- technological (ability to supply high-quality refurbished products, insufficient scale of designed solutions demonstration,

lack of necessary data on the influence of factors).

N. Batova, E. Shershunovych, I. Tochytska [15] identified and systematized 5 groups of barriers to the development of a circular economy: socio-cultural, legislative, informational, technological and economic.

Socio-cultural barriers hinder the development of a circular economy given the differences in values and the level of environmental responsibility of society. Legislative barriers are demonstrated in the form of restrictions imposed by current legislation. Insufficient awareness of consumers and producers about the essence and principles, advanced experience and best practices of the circular economy create information barriers. Economic barriers are due to many factors, including the cost of circular innovations; lack of a clear methodology for assessing the economic efficiency of enterprises that use secondary resources; effective mechanisms of financial support and preferences from the banking system and the public sector. Technological barriers to the introduction of a circular economy are characterized by the lack of a clear logistics infrastructure of the system of collection, extraction and processing of secondary resources; lack of demonstration projects to work with new technologies, and as a consequence, concern about the quality of products made from secondary raw materials and waste [15].

The study and generalization of the scientific literature shows that over the last decades of development of this scientific field, scientists have not come to a common and unambiguous interpretation of the term "circular economy". Many conceptual approaches to the consideration of the ecological component of the national economy are now proposed. This is due to the large number of established scientific schools, which have their own characteristics and approaches to theoretical and applied aspects of the development of concepts of green and circular economy. However, all the proposed formulations of the term "circular

economy", as a rule, are generally accepted and have a broader meaning, without taking into account the specifics of the logistics systems functioning at different levels.

Objectives statement. The purpose of this article is to study the peculiarities of the national logistics system development considering the environmental component and justification of the need to develop the concept of a circular economy in Ukraine.

The methodological basis of the study is the scientific works of foreign and Ukrainian scientists on the problems of green economy, circular economy, environmental management, logistics management, formation and operation of logistics systems.

The research was conducted using general scientific methods: analysis and synthesis - to summarize existing theoretical approaches and provisions, scientific achievements on the development of the circular economy and greening of logistics systems, clarification of the terminology; classification - to systematize scientific approaches to the definition of "circular economy", which are proposed by various scientific schools; statistical analysis and comparison - to analyze the development of the national Ukrainian logistics system considering the environmental component; structural and logical generalization - to clarify the wording of the term "circular economy".

Statistics for Ukraine include: GDP at fixed 2010 prices; total costs (capital investments and current costs) for environmental protection, including in the field of transport and warehousing; budget expenditures for environmental protection; general expenses for protection of atmospheric air and climate, including in the sphere of transport and warehousing; investments in equipment and installations related to integrated environmentally friendly technologies; emissions' volumes of pollutants into the atmosphere from mobile sources of pollution; the amount of carbon dioxide emissions into the atmosphere from road transport; volumes of generated and utilized industrial waste.

These data are taken in the sections "Environment", "Transport", "Activities of enterprises" on the website of the State Statistics Service of Ukraine, as well as in the statistical compilations "Environment of Ukraine", "Activities of economic entities".

Main material of the research. In the scientific literature there are different views on the interpretation of the category "circular economy". As a rule, scientists identify it with the concepts of "circle economy", "cyclical economy", "renewable economy", "closed cycle economy", "green economy" and so on. A number of researchers think that the circular economy is a new stage in the development of the concept of sustainable development and the green economy in particular. On the other hand, much less often, it is considered as an independent direction in economic theory, which originated in the 1970s of XX century [16; 17]. E. Mishenin, I. Koblyanska [18] emphasize that the circular economy is not an analogue of the "green economy", but acts as an integral part of it, as well as a way to achieve sustainable development.

The following are the main interpretations of the concept of "circular economy", which are proposed by representatives of various scientific schools:

- sustainable development strategy aimed at improving the efficiency of materials and energy use [10];
- economic system based on business models that replace the concept of "end of life care" with reduction, alternative reuse, recycling and recovery of materials in the processes of production / distribution and consumption, thus functioning at the micro level (products, companies, consumers), meso-levels (eco-industrial parks) and macro-levels (city, region, nation and beyond) in order to achieve sustainable development, which means the formation of a quality environment, economic prosperity and social justice for the benefit of generations [11];
- complex multilevel system, the principles of organization of which differ

significantly from the traditional linear economy [15];

- global economic model that separates economic growth and development from the consumption of resources [19];
- policy strategy aimed at reducing resource shortages and diminishing pollution [20];
- activities for the production, distribution and consumption of goods, which is based on the principles of saving various resources and materials, "waste-free economy" [21];
- way to solve problems of sustainable development of resources [22];
- implementation of a closed cycle of material flows in the economic system [23];
- the path to sustainable development [24];
- method of continuous economic development without creating significant environmental and resource problems [25];
- new trend, the basis of the "Fourth Industrial Revolution" [26];
- holistic concept that encompasses the actions of "reduction, reuse and processing" in the process of production, circulation and consumption [27];
- model of economic development with maximum use of resources and environmental protection [28];
- simple but convincing strategy aimed at reducing both the cost of primary materials and the production of waste by closing the economic and environmental cycles of resource flows [29];
- mutually beneficial philosophy according to which a "prosperous" economy and a "healthy" environment can coexist [30];
- space to address growing resource issues; the concept of separating the direct use of resources from economic growth [31];
- model of production and consumption of goods through closed material flows, which absorb the external effects associated with the receipt of primary resources and waste generation (including pollution) [32];

- solving a number of problems, such as waste generation, resource shortages and sustainable economic benefits [33];
- recovery or regenerative production system; integrated waste management process [34];
- economy that increases people's well-being and ensures social justice, significantly reducing risks to the environment [35];
- regenerative system in which the cost of resources and losses, emissions and leakages of energy are minimized by slowing down, closing and narrowing the material and energy cycles [36];
- economic model in which both the results and the actual processes of resource supply and production are planned and organized in such a way as to maximize human well-being and the efficiency of ecosystems [37];
- economic activity aimed at energy saving, regenerative environmentally friendly production, circulation and consumption [38];
- one of the tools for solving environmental problems to ensure a stable environmental future [39];
- philosophy of reusing and profiting from what was previously considered unnecessary and discarded within the triad of the traditional linear economy [40];
- economy based on the recovery of resources, the transition to the use of renewable energy sources and the processing of secondary raw materials [41];
- integral part of the expanded concept of "green" economy; the next stage of development of the "green" economy [42];
- sustainable development initiative, which aims to reduce linear material and production flows in the systems of production and consumption of society through the application of material cycles, renewable and cascading energy flows to the linear system [43];
- economic model, which is based on the principles of circular functioning of closed

technological and biological cycles; an instrument of the green economy for the purpose of achieving sustainable development and achieving key goals [44].

M. Guryeva [44] proposes to group approaches to the interpretation of the concept of "circular economy" for the period of its formation as follows: the global economic model (2004); activity (2007); new trend 4.0 (2013); economic model (2015); production system (2016); economic activity, tool (2017); philosophy, economics (2018).

Based on the above, the existing scientific approaches to the definition of the term "circular economy" can be conditionally classified into 9 groups (Table 1).

Based on the generalization of the terminology on the selected topic and in accordance with various scientific concepts, it is proposed to consider the circular economy as an innovative approach to the organization of logistics processes, based on closed resource movement with minimal waste loss and maximum involvement of secondary resources in production systems [45].

Authors provide approach to the formulation of the term "circular economy", as a result of research [46-62], which consists in considering this concept from 6 positions:

- modern paradigm of logistics systems development;
- sustainable development strategy;
- stable business model of the national economy;
- economic model based on industrial waste recycling technology;
- logistics flow management tool, which is based on a comprehensive approach (integration of system, process, situational, functional);
- activities aimed at implementing a closed cycle of logistics flows to increase the level of environmental security of the national economy.

Table 1 - Theoretical approaches to the concept of "circular economy", which are proposed by representatives of various scientific schools

Classification group	Scientific approach
Section of the economy	Closed cycle economics
	A resource-based economy
Paradigm	Philosophy of management
	The concept of economic development
Strategy	Sustainable development strategy
Model	Economic model in the context of globalization
System	Economic system with a closed cycle, which is based on R-principles
	Regenerative production system
Environmental opportunity	Alternative to the traditional linear economy
Recycling technology	Use of production waste
	Recycling
Tool	Tool of the "green" economy
	Tool for solving environmental problems
Activity	Economic activity
	Business activity
	Activities aimed at preserving the environment

Source: author's development

The analysis shows that many companies around the world are already aware of the need to manage in a "new way", the transformation of economic models and the use of circular economy. Thus, 44% of companies in the top 100 on Fortune Global have chosen a strategy for the development of a circular economy. The leaders in this are the FMCG (Fast moving consumer goods) sector and the automotive industry. The transition to a circular model of the economy in companies in these areas of economic activity will help to reduce raw material costs, expand markets, improve brand reputation and dialogue with customers, increase their loyalty, create a competitive business model and more.

At the same time, the oil industry, financial services and health care are not yet so widely practiced in a closed cycle. Meanwhile, according to the report The Circularity Gap, which is presented annually at the World Economic Forum in Davos, only 9% of the materials in the world economy are reused.

It should be noted that analysis of the development trends of the circular economy in the European Union, shows that each

country has national characteristics of the implementation of this concept. For example, according to the Ecobusiness Group, Germany, with a strong industrial economy, has formed the basis of a circular economy through material flows and the availability of materials. The Netherlands has formed the basis on innovations in materials and business models. Finland is the first country in the world to develop a national roadmap for the transition to a circular economy. Scotland became the first country to join the Circular Economy 100 Club (CE100), created at the initiative of the Ellen McArthur Foundation, to stimulate cooperation and innovation for the development of the circular economy.

In the ranking of the circular economy in 2018, Germany ranks first in the number of patents related to the circular economy, more than twice ahead of France, which is on the second place (1260 patents against 542). The United Kingdom and Germany are the leaders in terms of "investment in the development of a circular economy".

Among the programs for financing innovative projects in Europe, there are many circular projects that provide them with large amounts of funding. Thus, one of the largest

investors in circular economy projects is the European Investment Bank (EIB). The EIB provides advisory assistance by assessing the possibilities of financing a specific circular project and selecting the best loaning terms. Projects that are too small to handle as stand-alone investment loans can be supported through intermediary credits.

Another major investor is the European Fund for Strategic Investments (EFSI), which provides investment in research and innovation, as well as supports small and medium-sized businesses. Within the framework of "InnovFin - EU Finance for Innovators", high-risk projects are financed provided that technological innovations are available in the circular project. In addition, all EU programs are complemented by investment at the national level through various instruments offered by national, regional and / or local development agencies

(eg Teknologian Keskus, operating under the Ministry of Industry and Trade in Finland, Invitalia in Italy, Dutch Entrepreneurship Agency, etc.).

If to consider Ukraine, we can note that the "green" transformation of the national logistics system in a circular economy is not effective enough. Thus, according to the Ministry of Finance of Ukraine, the share of budget expenditures on environmental protection is insignificant, its' level in 2019 was only 0.7% of total state budget expenditures. This, in turn, does not meet the Sustainable Development Goals of 2016-2030. The share of total expenditures on environmental protection in total GDP is also negligible and amounted to 4.2% in 2019 (Table 2).

Table 2 – Financial and economic indicators of development of the sphere environmental protection in Ukraine

Year	GDP in fixed prices 2010 p., mln UAH	Total expenditures on environmental protection		Budget expenditures on GDP	
		mln UAH	share in the amount of GDP, %	mln UAH	share in the total budget expenditures, %
2010	1079346,0	13128,1	1,2	2872,4	0,8
2011	1138338,0	18490,4	1,6	3890,7	0,9
2012	1141055,0	20514,0	1,8	5297,9	1,1
2013	1140750,0	20377,9	1,8	5594,2	1,1
2014	1066001,0	21925,6	2,1	3481,7	0,7
2015	961821,0	24591,1	2,6	5529,7	0,8
2016	985299,0	32488,7	3,3	6255,4	0,7
2017	1010173,0	31492,0	3,1	7349,3	0,7
2018	1043272,0	34392,3	3,3	8242,1	0,7
2019	1037299,1	43735,9	4,2	9731,1	0,7

Source: compiled according to data [63, p. 195, 198].

Analysis of statistical data shows that the share of current expenditures on air protection and climate change issue decreased in 2000-2020 by 4.9 percentage points or from 13.4 to 8.5% of total current

expenditures on environmental protection. The share of current costs of waste management increased by 29.2 percentage points or from 10.7 to 39.9% (Table 3).

Table 3 - Dynamics of current expenditures for environmental protection

Year	Total volume, mln UAH	Including on			
		protection of atmospheric air and climate change issues		waste management	
		mln UAH	share, %	mln UAH	share, %
2000	2618,4	350,4	13,4	279,2	10,7
2001	2903,7	305,1	10,5	327,4	11,3
2002	3080,1	416,2	13,5	402,9	13,1
2003	3361,9	444,7	13,2	477,1	14,2
2004	4152,2	606,5	14,6	746,7	18,0
2005	5313,6	877,4	16,5	925,5	17,4
2006	5172,4	826,7	16,0	1330,2	25,7
2007	6610,3	1141,9	17,3	1768,9	26,8
2008	8444,6	1349,9	16,0	2315,2	27,4
2009	8032,7	1035,2	12,9	1928,3	24,0
2010	10366,6	1314,8	12,7	2599,6	25,1
2011	12039,4	1475,4	12,3	3865,9	32,1
2012	13924,7	1341,5	9,6	4756,2	34,2
2013	14339,1	1415,8	9,9	4844,3	33,8
2014	13965,7	1238,6	8,9	5417,0	38,8
2015	16915,5	1519,8	9,0	6801,9	40,2
2016	19098,2	1760,6	9,2	6719,6	35,2
2017	20466,4	2104,3	10,3	7508,2	36,7
2018	24318,0	2897,7	11,9	8830,2	36,3
2019	27480,2	2963,9	10,8	10227,1	37,2
2020	28092,6	2375,8	8,5	11197,1	39,9

Source: compiled on the basis of information materials of the State Statistics Service of Ukraine

The share of total expenditures on environmental protection in the field of transport and warehousing decreased in 2012-2020 by 4.2 percentage points or from 6.2 to 2.0% of the total expenditures on environmental protection. During this period, there was a tendency to reduce the share of capital investment in the development of transport and warehousing by 47.6 percentage points or from 58.8 to 11.2% of

the total expenditures on environmental protection in this area. The share of current expenditures on environmental protection in the field of transport and warehousing, respectively, increased by 47.6 percentage points or from 41.2 to 88.8% of the total expenditures on environmental protection in this type of economic activity (Table 4).

Table 4 - Dynamics of total expenditures on environmental protection in the field of transport and warehousing

Year	Total volume, mln UAH	including in the field of transport and warehousing		Including			
				capital investments		current expenses	
		mln UAH	share, %	mln UAH	share, %	mln UAH	share, %
2012	20514,0	1262,6	6,2	742,1	58,8	520,5	41,2
2013	20377,9	691,6	3,4	197,6	28,6	494,0	71,4
2014	21925,6	330,0	1,5	78,0	23,6	252,0	76,4
2015	24591,1	303,8	1,2	59,0	19,4	244,8	80,6
2016	32488,7	824,9	2,5	96,7	11,7	728,2	88,3
2017	31492,0	575,4	1,8	65,3	11,3	510,1	88,7
2018	34392,3	742,3	2,2	168,2	22,7	574,1	77,3
2019	43735,9	819,0	1,9	64,0	7,8	755,0	92,2
2020	41332,2	807,4	2,0	90,1	11,2	717,3	88,8

Source: compiled according to data [63, c. 191, 194, 198].

The share of current expenditures on environmental protection in the field of transport and warehousing decreased in 2012-2019 by 1.2 percentage points or from 3.7 to 2.7% of total current environmental expenditures. The share of expenditures on air and climate protection in the field of transport and warehousing decreased by 1.6 percentage points or from 2.4 to 0.8% of the

total costs for all types of economic activity. At the same time, the share of expenditures on air and climate protection in the field of transport and warehousing decreased by 3.1% in the total current expenditures on environmental protection in this area or from 6.1 to 3% (Table 5).

Table 5 - Dynamics of current expenditures on environmental protection in the field of transport and warehousing

Year	Total volume, mln UAH	including in the field of transport and warehousing		of which the expenditures on the air and climate protecting, mln UAH	including in the field of transport and warehousing	
		mln UAH	share, %		mln UAH	share, %
2012	13924,7	520,5	3,7	1330,8	31,9	2,4
2013	14339,1	494,0	3,4	1411,1	29,0	2,1
2014	13965,7	252,0	1,8	1234,6	22,6	1,8
2015	16915,5	244,8	1,4	1512,6	60,3	4,0
2016	19095,2	728,2	3,8	1755,4	32,4	1,8
2017	20466,4	510,1	2,5	2086,9	31,8	1,5
2018	24318,0	574,1	2,4	2897,7	26,7	0,9
2019	27480,2	755,0	2,7	2963,9	22,4	0,8

Source: compiled according to data [63, c. 172, 192, 198].

According to the State Statistics Service of Ukraine, the share of capital investment in air protection and climate change increased in 2010-2020 by 1 percentage point or from 41.3 to 42.3% of the total capital investment in environmental protection. The share of

capital investments in waste management increased by 4.7 percentage points or from 17.2 to 21.9% (Table 6).

Table 6 - Dynamics of capital investments in environmental protection

Year	Total volume, mln UAH	Including on			
		protection of atmospheric air and climate change issues		Waste management	
		mln UAH	share, %	mln UAH	share, %
2010	2761,5	1139,9	41,3	475,6	17,2
2011	6451,0	2535,6	39,3	1183,9	18,4
2012	6589,3	2462,7	37,4	730,5	11,1
2013	6038,8	2411,9	39,9	713,9	11,8
2014	7959,9	1915,1	24,1	784,0	9,8
2015	7675,6	1422,9	18,5	737,5	9,6
2016	13390,5	2502,8	18,7	2208,7	16,5
2017	11025,5	2608,0	23,7	2471,0	22,4
2018	10074,3	3505,9	34,8	1182,0	11,7
2019	16255,7	4276,7	26,3	5754,3	35,4
2020	13239,6	5595,3	42,3	2899,8	21,9

Source: compiled on the basis of information materials of the State Statistics Service of Ukraine.

In 2012-2019, the share of capital investments in environmental protection in the field of transport and warehousing decreased by 10.9 percentage points or from

11.3 to 0.4% of the total capital investment in environmental protection for all types of economic activity (Table 7).

Table 7 - Dynamics of capital investments in environmental protection in the field of transport and warehousing

Year	Total volume, mln UAH	including in the sphere of transport and warehousing, mln UAH	Share in total capital investment, %
2012	6589,3	742,1	11,3
2013	6038,8	197,6	3,3
2014	7959,9	78,0	1,0
2015	7675,6	59,0	0,8
2016	13390,5	96,7	0,7
2017	11025,6	65,3	0,6
2018	10074,3	168,2	1,7
2019	16255,7	64,0	0,4

Source: compiled according to data [63, c. 189, 191].

During the study period, the share of investments in equipment and installations related to environmentally friendly technologies in the field of transport and warehousing decreased by 18.2 percentage points or from 21.7 to 3.5% of the total investment. The share of investments in integrated technologies for air and climate protection in the field of transport and warehousing decreased by 22.8 percentage points or from 44.2 to 21.4% of the total

investment. At the same time, the share of investments in complex technologies for the protection of atmospheric air and climate in the field of transport and warehousing increased by 29.5 percentage points or from 60.9 to 90.4% of the total investment in equipment that is associated with environmentally friendly technologies in this area (Table 8).

Table 8 - Dynamics of investments in equipment and installations, which are associated with integrated environmentally friendly technologies

Year	Total volume, mln UAH	including in the field of transport and warehousing		Of these, investments for the protection of atmospheric air and climate, mln UAH	including in the field of transport and warehousing	
		mln UAH	share, %		mln UAH	share, %
2012	3714,8	806,6	21,7	1112,2	491,5	44,2
2013	3233,9	191,7	5,9	1094,2	142,7	13,0
2014	4638,2	70,8	1,5	428,5	11,0	2,6
2015	4952,2	49,2	1,0	436,0	10,0	2,3
2016	7783,7	82,0	1,1	528,9	25,4	4,8
2017	4183,4	47,5	1,1	300,1	12,0	4,0
2018	3519,4	125,7	3,6	514,1	114,0	22,2
2019	3519,4	121,9	3,5	514,1	110,2	21,4

Source: compiled according to data [64, c. 134].

During the period 2010-2020, the volume of emissions of pollutants into the atmosphere from mobile sources of pollution decreased by 30.1%, and their share in the

total emissions of pollutants increased by 6.2 percentage points or from 38.1 to 44.3% (Table 9).

Table 9 - Emissions volumes of pollutants into the atmosphere from mobile sources of pollution

Year	Total volume, mln UAH	including mobile sources of pollution, thousand tons	Share in total emissions of pollutants, %
2010	6678,0	2546,4	38,1
2011	6877,3	2502,7	36,4
2012	6821,1	2485,8	36,4
2013	6719,8	2424,7	36,1
2014	5346,2	1996,2	37,3
2015	4521,3	1663,9	36,8
2016	4686,6	1608,5	34,3
2017	4230,6	1645,7	38,9
2018	4121,2	1612,9	39,1
2019	4108,3	1648,8	40,1
2020	4017,3	1778,7	44,3

Source: compiled according to data [63, c. 26, 28].

The amount of pollutant emissions into the atmosphere from mobile sources of pollution per capita increased in 2016-2020 by 13% or from 37.7 to 42.6 kg. This was due to an increase in emissions of carbon monoxide by 12.8% (from 28.8 to 32.5 kg), nitrogen dioxide - by 18.4% (from 3.8 to 4.5 kg).

As the analysis shows, the total volume of air emissions from road transport decreased in 2010-2019 by 28.3% or from 2313.8 to 1659.5 thousand tons. The volume of carbon dioxide emissions into the air from road transport increased by 13.4% or from 1782.7 to 2021.1 thousand tons [63, p. 26, 28].

There is a negative trend in the development of waste recycling in Ukraine. Thus, according to the State Statistics Service of Ukraine, the amount of generated waste increased in 2019 compared to 2010 by 4.5%. At the same time, the total amount of waste accumulated during operation in specially designated places and facilities increased by 16.5%. Meanwhile, the volume of recycled waste decreased by 25.5%, and the volume of disposed waste in specially designated places and facilities - by 23.3%. The share of recycled waste in the total amount of generated waste decreased in 2010-2019 by 9.8 percentage points or from 34.3 to 24.5% (Table 10).

Table 10 - Dynamics of indicators that characterize development waste recycling systems in Ukraine

Year	Waste generated volume, mln t	Recycled waste volume, mln t	Volume of waste disposed of in specially designated places and objects, mln t	The total amount of waste accumulated during operation in specially designated areas and facilities, mln t
2010	422,5	144,9	311,6	13219,9
2011	443,8	153,4	251,4	14372,1
2012	446,7	143,1	263,6	14856,6
2013	445,3	146,7	264,7	15111,6
2014	355,0	109,3	203,7	12205,4
2015	312,3	92,5	152,3	12505,9
2016	295,9	84,6	157,4	12393,9
2017	366,1	100,1	169,8	12442,2
2018	352,3	103,7	169,5	12972,4
2019	441,5	108,0	238,9	15398,6

Source: compiled according to the section "Environment" on the official website of the State Statistics Service of Ukraine.

Conclusions. Thus, the statistical analysis shows the need to implement the principles and tools of the circular economy as a concept of sustainable development of the national logistics system in Ukraine.

From a macroeconomic point of view, a circular economic investment strategy may lead to a 10% reduction in the cost of raw materials and a 7% increase in GDP in the European Union in 2030 compared to the usual business model [65]. However, such a leap in development undoubtedly requires strategies that focus on the specific potential of the economy, as well as the appropriate infrastructure and administrative capacity. An important long-term opportunity for a circular economy is to reduce direct and indirect environmental costs. Direct costs are associated with waste management. However, indirect costs for the use of natural resources are also relevant. Globally, an international group of resource experts under the United Nations Environment Program estimates that these costs are up to USD2.4 trillion. [66].

In addition, it should be emphasized that the development of a circular economy contributes to the social effect through job creation. According to a study by the European Commission [67], depending on how waste is treated, a different number of jobs can be created: for 10 thousand tons of used products can create one job for incineration, six jobs - for disposal, 36 jobs - for waste recycling and up to 296 jobs for their recovery and reuse.

It is worth taking into account the best European experience, for example, in Finland, where practical solutions of the closed-loop economy are effectively implemented. The essence of the transition is to rethink value chains and develop new business models. Currently, there are several solutions developed by experts from the Finnish innovation fund Sitra, which help accelerate the transition to a circular economy [68]. These include:

- product-service systems and sharing models;

- ways of values to the sphere of food;
- sustainable delivery models (efficient delivery models and logistics operations play a crucial role in the implementation of circular economy solutions. RePack company offers reusable packaging solutions that minimize air transportation costs. Koepala offers sophisticated lunch boxes that are flat for storage and transportation and can be assembled in packaging products of various forms, all of which have turned the potential of the circular economy into real market results);

- roadmaps for carbon-neutral industries (important for Finland's future industrial development; for example, a € 300 million investment in a battery cluster creation and the first multifunctional textile recycling center in Northern Europe to handle 10% of textile waste; resource efficiency and recycling Betolar creates value by converting construction industry waste into concrete-like building materials with a carbon footprint of up to 90% less than conventional concrete);

- education on the development of the circular economy.

In conditions of fierce competition, domestic companies are implementing the mechanism of the circular economy in their economic activities through various strategies and tools, including:

- 1) Design of the future - is the production of products where traditional materials can be replaced by renewable or recycled.

This optimizes the use of resources and reduces the amount of waste in the production process. For example, Adidas has made sneakers with 100% recycled materials. One type of material is used in production and it is not used. General Electric uses 3D printing to prepare parts to save material.

- 2) Special use and virtualization are already common for many business models. Uber, BlaBlaCar, Airbnb are examples of this approach. From the Ukrainian examples of the Oh My Look! Brand, which is being transformed from dress rental services into a virtual subscription wardrobe offer.

3) Strategy "goods as a service" - replacement of the traditional model of selling goods for the sale of services. A classic example is Rolls Royce, which has built a market that customers have enjoyed for more than 60 years. The company offers customers in the aviation industry instead of buying aircraft engines to use 'Power-by-the-Hour' service that predicts paying for engine use a fixed rate for 1 year of operation. To service the service approach, the engine life cycle is increased by 25%. Another example is the successful subscription of a Volvo car. The customer can choose the model through the website and form a subscription with fixed monthly payments. This model is an alternative to leasing or buying a car.

4) Autonomous use in production (already used in the use of products or as components that become part of new products). Yes, Canon is once again accepting end-of-life products and using components in new devices without using the functional characteristics of the materials. This approach is part of Dell, which uses secondary materials for the production of spare parts. The Michelin Group is returning to the production process of 17 million tons of used car tires.

5) Reuse in consumption - when by optimizing service companies can increase the life cycle of products. For example, the eBay marketplace offers damaged, but fully functional devices on a special site at reduced prices.

The reuse strategy also offers to sell and buy used products. In Sweden, there is a special supermarket Retuna, the range of which consists of "second-hand" things.

6) Industrial symbiosis and recycling of production waste - can significantly increase business efficiency. The first example of symbiosis in the concept of circular economy is considered to be the project in Kalundborg (Denmark). There, the participating companies united the principle of interaction, when the waste of production of one business becomes a resource for another. At the same time, economic costs and greenhouse gas emissions are reduced. The consortium includes Denmark's largest oil refinery, owned by energy giant Equinor, the pharmaceutical company Novo Nordisk, the city's municipal water and heating company, a waste management operator and others.

Ukraine also has examples of efficient use of resources in the production process. For example, Myronivsky Khlebobproduct is building biogas complexes for poultry waste processing and energy production. Obolon Concern sells beer by-products to agricultural companies, which become animal feed. Special tanks for heat recovery from freeze equipment are installed in the Silpo supermarket chain to meet the need for a hot water supply.

In further scientific researches, it is planned to analyze and generalize the international experience of "green" transformation of logistics systems in the conditions of the circular economy, substantiate and develop conceptual provisions for the formation and operation of "green" supply chains in the context of the circular economy

References

1. Kharazishvili, Y., Kwilinski, A., Grishnova, O., Dzwigol, H. (2020). Social Safety of Society for Developing Countries to Meet Sustainable Development Standards: Indicators, Level, Strategic Benchmarks (with Calculations Based on the Case Study of Ukraine). *Sustainability*, 12(21), 8953. <https://doi.org/10.3390/su12218953>.
2. Abazov, R. (2021). Education for sustainable development and ICT: The case of MDP program at al-Farabi KazNU. *Herald of Journalism*, 58(4), 34-43. <https://doi.org/10.26577/HJ.2020.v58.i4.04>.

3. Boichuk, N., Kauf, S. (2019). Sustainable logistics: a framework for green city logistics – examples of Polish cities. *Conference Proceedings of the 9th Carpathian Logistics Congress □ CLC 2019*, December 2□4, 2019, Zakopane, Poland, 339-346.
4. Pearce, D., Markandya, A., Barbier, E. (1989). *Blueprint for a Green economy*. London: Earthscan Publications Ltd.
5. UNEP (2011). *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication – A Synthesis for Policy Makers*. https://sustainabledevelopment.un.org/content/documents/126GER_synthesis_en.pdf.
6. Haney, A., Krestyaninova, O., Love, Ch. (2019). *The Circular Economy Boundaries and Bridges*. Oxford: Said Business School, University of Oxford. <https://www.sbs.ox.ac.uk/sites/default/files/2019-09/the-circular-economy.pdf>.
7. Reike, D., Vermeulen, W.J.V., Witjes, S. (2018). The circular economy: New or Refurbished as CE 3.0? – Exploring Controversies in the Conceptualization of the Circular Economy through a Focus on History and Resource Value Retention Options'. *Resources, Conservation and Recycling*, 135, 246-264. <https://doi.org/10.1016/j.resconrec.2017.08.027>.
8. Boulding, K. E (1966). *Economic Analysis; Volume I Microeconomics* (Hardcover). 4th ed. New York: Harper & Row.
9. Boulding, K. (1966a). The Economics of the Coming Spaceship Earth. In: Jarrett, H. (Ed.). *Environmental Quality in a Growing Economy, Resources for the Future*. Johns Hopkins University Press, Baltimore, 3-14.
10. Su, B., Heshmati, A., Geng, Y., Yu, X. (2013). A review of the circular economy in China: Moving from rhetoric to implementation. *J. Clean. Prod.*, 42, 215-227.
11. Kirchherr, J., et al. (2018). Barriers to the circular economy: evidence from the European Union (EU). *Ecological Economics*, 150, 264-272. <https://doi.org/10.1016/j.ecolecon.2018.04.028>.
12. Kirchherr, J., Hekkert, M. Bour, R., Huibrechtse-Truijens, A., Kostense-Smit, E., Muller, J. (2017). *Breaking the Barriers to the Circular Economy*. Deloitte.
13. Pheifer, A. G. (2017). *Barriers and Enablers to Circular Business Models*. Brielle.
14. Ritzén, S., Sandström, G. Ö. (2017). Barriers to the Circular Economy – integration of perspectives and domains. *Procedia CIRP*, 64, 7-12.
15. Batova, N., Shershunovich, E., Tochickaja, I. (2019). Circular Economy in Belarus: barriers to transition. *BEROC Green Economy Policy Paper Series*, PP no. 9. <http://www.beroc.by/upload/iblock/41c/41c28e417ff84b7b98895d34ab20c782.pdf> (in Russian).
16. Gureva, M .A. (2019). Teoreticheskie osnovy tsirkulyarnoy ekonomiki [The theoretical basis of circular economy]. *Culture and the environment – the basics of sustainable development of Russia. Green bridge through the generations*, 54-59. (in Russian).
17. Esipova, O. V., Blazhnov, N. M., Satsyuk, I. A. (2018). Tsirkulyarnaya ekonomika [Circular economy]. *Modern science: current issues, achievements and innovations*, 107-110. (in Russian).
18. Mishenin, E., Koblyanskaya, I. (2017). Perspektivy i mekhanizmy razvitiya «Tsirkulyarnoy» ekonomiki v globalnoy srede [Prospects and mechanisms of development of Circular economy in a global environment]. *Marketing i menedzhment innovatsiy*, 2, 329-343. (in Russian).
19. Sergienko, O., Rohn, H. (2004). Basics of the Eco-efficiency Theory. https://wupperinst.org/uploads/tx_wupperinst/Basics_EcoEfficiency_ru.pdf. (in Russian).

-
20. Yuan, Z., Bi, J., Moriguchi, Y. (2006). The circular economy: A new development strategy in China. *J. Ind. Ecol.*, 10, 4-8.
21. Melnik, L., Khens, L. (2007). Sotsialno-ekonomicheskii potentsial ustoychivogo razvitiya [Socio-economic potential of sustainable development]. ITD "Universitetskaya kniga". (in Russian).
22. Wen, C. F., Zhao, Y. L., Liang, R. Z. (2007). 'Recycle of low chemical potential substance'. *Resources, Conservation and Recycling*, 2, 475-486. <https://doi.org/10.1016/j.resconrec.2006.10.011>
23. Geng, Y., Doberstein, B. (2008). Developing the circular economy in China: Challenges and opportunities for achieving 'leapfrog' development. *Int. J. Sustain. Dev. World Ecol.*, 15, 231-239. <https://doi.org/10.3843/SusDev.15.3>.
24. Zhang, H., Hara, K., Yabar, H., Yamaguchi, Y., Uwasu, M., Morioka, T. (2009). Comparative analysis of socio-economic and environmental performances for Chinese EIPs: Case studies in Baotou, Suzhou, and Shanghai. *Sustainability Science*, 4, 263-279. <https://doi.org/10.1007/s11625-009-0078-0>.
25. Zhu, Q., Geng, Y., Sarkis, J., Lai, K. (2011). Evaluating green supply chain management among Chinese manufacturers from the ecological modernization perspective. *Transp. Res. PART E-LOGISTICS Transp.*, 47, 808-821. <https://doi.org/10.1016/j.tre.2010.09.01>.
26. Sazonova, T. (2013). Volny internatsionalizatsii i perspektivy globalizatsii [Waves of internationalisation and prospects of globalization]. *Scientific works of the Free Economic Society of Russia*, 176, 495-502. (in Russian).
27. Jiao, W., Boons, F. (2014). Toward a research agenda for policy intervention and facilitation to enhance industrial symbiosis based on a comprehensive literature review. *Journal of Cleaner Production*, 67(15), 14-25. <https://doi.org/10.1016/j.jclepro.2013.12.050>.
28. Wei, F., Liu, S., Yin, L., Li, W., Yu, Z. (2014). Research on Performance Evaluation System for Green Supply Chain Management Based on the Context of Recycled Economy-Taking Guangxi's Manufacturing Industry as Example. *J. Grey Syst.*, 26, 177-187.
29. Haas, W., Krausmann, F., Wiedenhofer, D., Heinz, M. (2015). How Circular is the Global Economy?: An Assessment of Material Flows, Waste Production, and Recycling in the European Union and the World in 2005. *Journal of Industrial Ecology*, 5. <https://doi.org/10.1111/jiec.12244>.
30. Tukker, A. (2015). Product services for a resource-efficient and circular economy – a review. *J. Clean. Prod.*, 15, 76-91. <https://doi.org/10.1016/j.jclepro.2013.11.049>.
31. Ghisellini, P., Cialani, C., Ulgiati, S. (2016). A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. *J. Clean. Prod.*, 114, 11-32.
32. Sauve, S., Bernard, S., Sloan, P. (2016). Environmental sciences, sustainable development and circular economy: alternative concepts for trans-disciplinary research. *Environ.*, 17, 48-56. <https://doi.org/10.1016/j.env-dev.2015.09.002>.
33. Lieder, M., Rashid, A. (2016). Towards circular economy implementation: A comprehensive review in context of manufacturing industry. *Journal of Cleaner Production*, 1, 36-51. <https://doi.org/10.1016/j.jclepro.2015.12.042>.
34. Serbulova, N., Sivolapenko, E., Panosyan, S. (2016). Aktualnost perekhoda ot lineynoy k tsirkulyarnoy modeli ekonomiki' [The relevance of the transition from a linear to a circular economic model]. *Economist of the year 2016*, 60-65. (in Russian).

35. Pilyugina, M. (2016). Tsirkulyarnaya model ekonomiki kak novyy podkhod k probleme ustoychivogo razvitiya' [The circular economy model as a new approach to sustainable development]. *Stroitelstvo – formirovanie sredy zhiznedeyatel'nosti*, 148-149. (in Russian).
36. Geissdoerfer, M., et al. (2017). The Circular Economy e A new sustainability paradigm? *J. Clean. Prod.*, 143, 757-768. <https://doi.org/10.1016/j.jclepro.2016.12.048>.
37. Murray, A., Skene, K., Haynes, K. (2017). The circular economy: an interdisciplinary exploration of the concept and application in a global context. *J. Bus. Ethics.*, 140(3), 369-380.
38. Aleksandrova, V. (2017). Aktualnost perekhoda k modeli tsirkulyarnoy ekonomiki v Rossii [The actuality of transition to the model of circular economy in russia]. *International Journal of Humanities and Natural Sciences*, 11, 106-110. (in Russian).
39. Pakhomova, N., Rikhter, K., Vetrova, M. (2017). Perekhod k tsirkulyarnoy ekonomike i zamknutym tsepyam postavok kak faktor ustoychivogo razvitiya' [Transition to circular economy and closed-loop supply chains as driver of sustainable development]. *Vestnik Sankt-peterburgskogo universiteta ekonomika*, 5. 244-268. <https://doi.org/10.21638/11701/spbu05.2017.203> (in Russian).
40. Mashukova, B. (2016). Osnovnye printsiipy tsiklichnoy ekonomiki (ekonomika zamknutogo tsikla) [Basic principles of circular economy (circular economy)]. *European science*, 7(17), 14-16. (in Russian).
41. Nechaeva, E. (2018). Rol sotsialnoy laboratorii i Quadruple Helix modeli v perekhode Samary na tsirkulyarnuyu ekonomiku [The role of social laboratory and Quadruple Helix models in the transition of Samara on the circular economy]. *Vestnik sovremennyh issledovaniy*, 8.2(23), 60-62. (in Russian).
42. Antropov, V., Bochko, V., Kniss, M. (2018). Razvitie «zelenoy» ekonomiki Rossii [The development of “green” economy in Russia]. *Vestnik Uralskogo gosudarstvennogo universiteta putey soobscheniya*, 3(39), 68-83. (in Russian).
43. Korhonen, J., et al. (2018). Circular economy as an essentially contested concept. *Journal of Cleaner Production*, 175, 544-552. <https://doi.org/10.1016/j.jclepro.2017.12.111>.
44. Gureva, M. A. (2019). Teoreticheskie osnovy kontsepta tsirkulyarnoy ekonomiki [The theoretical basis of the concept of circular economy]. *Journal of International Economic Affairs*, 9(3), 2311-2336. <https://doi.org/10.18334/eo.9.3.40990> (in Russian).
45. Dzwigol, H., Trushkina, N., & Kwilinski, A. (2021). The Organizational and Economic Mechanism of Implementing the Concept of Green Logistics. *Virtual Economics*, 4(2), 74-108. [https://doi.org/10.34021/ve.2021.04.02\(3\)](https://doi.org/10.34021/ve.2021.04.02(3)).
46. Zaloznova, Yu., Kwilinski, A., Trushkina, N. (2018). Reverse logistics in a system of the circular economy: theoretical aspect. *Economic Herald of the Donbas*, 4(54), 29-37.
47. Trushkina, N. (2018). Green logistics as a tool to improve the quality of life in conditions of globalization. *Contemporary Problems of Improve Living Standards in a Globalized World: Volume of Scientific Papers* (pp. 147-152). Opole, Publishing House WSZiA.
48. Trushkina, N. (2019). Development of the information economy under the conditions of global economic transformations: features, factors and prospects. *Virtual Economics*, 2(4), 7-25. [https://doi.org/10.34021/ve.2019.02.04\(1\)](https://doi.org/10.34021/ve.2019.02.04(1)).
49. Trushkina N.V. (2019). Green logistics as a concept of sustainable development of the transport and logistics system in Ukraine. *Determinants of sustainable economic development: monograph* (pp. 232-241) / Edited by V. Khrapkina, V. Ustimenko. Kyiv: Interservice (in Ukrainian).
50. Trushkina, N. V. (2019). Green logistics as a component of corporate social responsibility of business. *III International Scientific Conference The Modern Trends in the Development of*

Business-Social Responsibility: Conference Proceedings, June 28th, 2019, Nova School of Business and Economics, Lisbon, Portugal (pp. 112-115). Riga: Baltija Publishing (in Russian).

51. Kashchena, N., Solokha, D., Trushkina, N., Potemkin, L., Mirkurbanova, R. (2019). Use of multi-agent simulation modeling for predicting the sales of wholesale trade companies. *Journal of Management Information and Decision Sciences*, 22(4), 483-488.

52. Koev, S.R., Tryfonova, O., Inzhyievska, L., Trushkina, N., Radieva, M. (2019). Management of Domestic Marketing of Service Enterprises. *IBIMA Business Review*, Article 681709. <https://doi.org/10.5171/2019.681709>.

53. Koev, S.R., Tryfonova, O., Inzhyievska, L., Trushkina, N., Radieva, M. (2019). Contact personnel assessment as a prerequisite for introduction of internal marketing system. *Proceedings of the 33rd International Business Information Management Association Conference*, IBIMA: Education Excellence and Innovation Management through Vision 2020, pp. 6497-6510.

54. Sandiuk, H., Lushpiienko, Yu., Trushkina, N., Tkachenko, I., Kurganskaya, E. (2019). Special Procedures for Electronic Public Procurement. *Journal of Legal, Ethical and Regulatory Issues*, 22, Special Issue 2. Business laws and legal rights: research and practice. <https://www.abacademies.org/articles/special-procedures-for-electronic-public-procurement-1544-0044-22-SI-2-351.pdf>.

55. Kwilinski, A., Trushkina, N. (2019). Logistics cluster as an institution of regional development in the context of economic modernization. *Science and practice*, June 28, University of Macedonia, Midas S.A., Thessaloniki, Greece, pp. 55-59.

56. Ivanov, S. V., Liashenko, V. I., Trushkina, N. V. (2019). Innovatsiyni rozvytok transportno-lohistychnoi systemy v Ukraini: problemy ta shliakhy yikh vyryshennia [Innovative development of the transport and logistics system in Ukraine: problems and solutions]. In: Liashenko V. I., Prokopenko O. V., Omelyanenko V. A. (Ed.). *Instytutsionalna model innovatsiinoi ekonomiky [Institutional model of innovative economy]* (pp. 114-130). Kyiv: Institute of Industrial Economics of the NAS of Ukraine. (in Ukrainian).

57. Ivanov, S., Dzwigol, H., Trushkina, N. (2019). Proposals for the Formation of a Transport and Logistics Cluster as an Institution of Regional Development (on the Example of Donetsk Economic Region). *Economic Herald of the Donbas*, 4(58), 51-60. [https://doi.org/10.12958/1817-3772-2019-4\(58\)-51-60](https://doi.org/10.12958/1817-3772-2019-4(58)-51-60).

58. Ivanov, S. V., Liashenko, V. I., Trushkina, N. V. (2020). Pravovi aspekty stvorennia transportno-lohistychnykh klasteriv v rehionakh Ukrainy [Legal aspects of creating transport and logistics clusters in the regions of Ukraine]. *Gesellschaftsrechtliche Transformationen von wirtschaftlichen Systemen in den Zeiten der Neo-Industrialisierung* (s. 661-668). Nürnberg: Verlag SWG imex GmbH (in Ukrainian).

59. Trushkina, N., Dzwigol, H., Kwilinski, A. (2021). Cluster model of organizing logistics in the region (on the example of the economic district "Podillya"). *Journal of European Economy*, 20(1), 127-145. <https://doi.org/10.35774/jee2021.01.127>.

60. Trushkina, N. (2020). International experience in implementing the mechanism of "green" financing for sustainable development of transport and logistics systems. *Competitiveness and sustainable development: Book of abstracts of the 2nd Economic International Conference*, Chisinau, Republic of Moldova, November 20th, 2020 (pp. 10). Chişinău: Tehnica-UTM.

61. Hryhorak, M. Yu., Trushkina, N. V. (2020). Development of the logistics system of the economic region "Polissya" in the context of the green economy: ecological problems and perspectives". *Intellectualization of logistics and Supply Chain Management*, 4, 27-40. <https://doi.org/10.46783/smart-scm/2020-4-3>.

-
62. Dźwigoł, H., Kwilinski, A., & Trushkina, N. (2021). Green Logistics as a Sustainable Development Concept of Logistics Systems in a Circular Economy. In Khalid S. Soliman (Ed.), *Proceedings of the 37th International Business Information Management Association (IBIMA)*, 1-2 April 2021 (pp. 10862-10874). Cordoba, Spain: IBIMA Publishing.
63. State Statistics Service of Ukraine (2020). Environment of Ukraine 2019: statistical yearbook. Kyiv.
64. State Statistics Service of Ukraine (2020). Activity of business entities 2019: statistical yearbook. Kyiv.
65. Ellen MacArthur Foundation (2017). Achieving, Growth Within. A 320-Billion Circular Economy Investment Opportunity available to Europe up to 2025. Brüssel.
66. Müller, A., Wilts, H. (2019). Bestandsaufnahme für die erfolgreiche Planung und Umsetzung einer Kreislaufwirtschaft in Belarus. Eine Analyse von Stärken und Schwächen sowie von Chancen und Risiken im Gebiet Brest. Angefertigt vom Wuppertal Institut im Auftrag der Deutschen Gesellschaft für Internationale Zusammenarbeit (GIZ). Berlin.
67. European Commission (2018). Impacts of Circular Economy Policies on the Labour Market. Final Report and Annexes. Luxembourg.
68. Kojvisto, T. (2020). The Finnish Five: Circular Economy (interview with Kari Herlevi). September 25. <https://www.goodnewsfinland.com/ru/feature/finskaya-pyaterka-tsirkulyarnaya-ekonomika/>.

UDC 005.932:331.54

DOI: [https://doi.org/10.46783/smart-scm/2021-7\(8\)-2](https://doi.org/10.46783/smart-scm/2021-7(8)-2)

JEL Classification: C42, J23, J63, M12, O15.

Received: 12 June 2021

Volovyk O.I. Senior Lecturer of Logistics Department, National Aviation University (Ukraine)

ORCID – 0000-0001-7718-8732

Researcher ID –

Scopus author id: –

Tsapenko O.A. Student of Logistics Department of National Aviation University (Ukraine)

ORCID –

Researcher ID –

Scopus author id: –

ANALYSIS OF PROFESSIONAL REQUIREMENTS FOR A MODERN LOGISTICIAN

Olena Volovyk, Oleksandr Tsapenko *"Analysis of professional requirements for a modern logistician".* The article is devoted to the research of modern labour market requirements for experts in logistics. The reasons of logistics importance for the proper functioning of national and international economies were outlined. The list of requirements set by business representatives to successful candidates is summarized. The analysis of the job market was performed using topic-related websites that cover job markets in Ukraine, the United Kingdom of Great Britain, Austria, Slovakia and the Russian Federation. Empirical studies, data analysis and synthesis, expert assessments, and generalization methods were used to perform the scientific inquiry. The number of specific competencies mentions in the job ads analyses and the relative difference between studies' indicators were counted. It was revealed that there is a great demand in almost all areas of the economy for logistics specialists. The tendency to find the personnel, who are willing to learn and improve on a continual basis, and can demonstrate a larger range of soft skills in addition to being an effective communicator, has been traced. Assumptions were made about possible changes in the requirements of employers to candidates, in connection with the presence of drivers of Industry 4.0 environment forming. Recommendations for further research of labour market requirements were provided.

Keywords: logisticians, competences, hard skills, soft skills, labour market of logistics, logistic, statistics.

Олена Воловик, Олександр Цапенко. *"Аналіз професійних вимог до сучасного логіста".* Стаття присвячена дослідженню сучасних вимог ринку праці до фахівців з логістики. Окреслено значення логістики для належного функціонування національної та міжнародної економік. Узагальнено перелік вимог, які висувають представники бізнесу до кандидатів. Аналіз ринку праці було проведено за допомогою тематичних веб-сайтів, які охоплюють ринки праці в Україні, Великій Британії, Австрії, Словаччині та Російській Федерації. Для проведення дослідження були використані емпіричні дослідження, аналіз та синтез даних, експертні оцінки та методи узагальнення. Підраховано кількість згадок конкретних компетенцій, про які йдеться в аналізованих оголошеннях про роботу, та відносну різницю між показниками досліджень. Було виявлено, що практично у всіх сферах економіки існує великий попит на фахівців з логістики. Виявлено тенденцію до пошуку

персоналу, який готовий постійно вчитися та вдосконалюватися, та, окрім навичок ефективного спілкування, може продемонструвати більший діапазон "м'яких навичок". Були зроблені припущення щодо можливих змін у вимогах роботодавців до кандидатів у зв'язку з наявністю драйверів формування середовища Індустрії 4.0. Надано рекомендації щодо подальшого дослідження вимог ринку праці.

Ключові слова: логісти, компетентності, «жорсткі навички», «м'які навички», ринок праці з логістики, логістика, статистика.

Елена Воловик, Александр Цапенко. "Анализ профессиональных требований к современному логисту". Стаття посвящена исследованию современных требований рынка труда к специалистам по логистике. Определена значимость логистики для надлежащего функционирования национальной и международной экономик. Обобщен перечень требований, которые выдвигают представители бизнеса к кандидатам. Анализ рынка труда был проведен с помощью тематических сайтов, которые охватывают рынки труда в Украине, Великобритании, Австрии, Словакии и Российской Федерации. Для проведения исследования были использованы эмпирические исследования, анализ и синтез данных, экспертные оценки и методы обобщения. Подсчитано количество упоминаний конкретных компетенций, о которых говорится в анализированных объявлениях о работе, и относительную разницу между показателями исследований. Было обнаружено, что практически во всех сферах экономики существует большой спрос на специалистов по логистике. Выявлена тенденция к поиску персонала, который готов постоянно учиться и совершенствоваться, и, кроме навыков эффективного общения, может продемонстрировать больший диапазон "мягких навыков". Были сделаны предположения относительно возможных изменений в требованиях работодателей к кандидатам в связи с наличием драйверов формирования среды Индустрии 4.0. Даны рекомендации по дальнейшему исследованию требований рынка труда.

Ключевые слова: логисты, компетенции, «жесткие навыки», «мягкие навыки», рынок труда логистики, логистика, статистика.

Introduction. Nowadays, a career in logistics is one of the most popular areas of option for university admission and employment in Ukraine and is considered to be among the ten most popular professions in the near future, according to the Rail.insider review (2021) [1]. It can be said that a logistician operates as an organizer of any process in different areas of the company's activity. Since logistics has gone beyond the frames of being a technical speciality towards a managerial position, these specialists have become widespread in different spheres of economic activities like production, retail, transportation, etc. Moreover, this profession is regarded as one of the fundamental areas of activity of an organization which involves such operational activities as product distribution and transportation.

The current research justifies the high demand for logisticians with a steady tendency for growth, and outlines the requirements for competencies of the labour

market. This study can help junior job seekers assess the level of demand from employers, as well as provide higher education institutions with ideas on how to meet the requirements of the ever-changing business and economic environment in order to achieve a competitive advantage.

Analysis of the latest research. The issues of the labour market in logistics and the requirements of employers for logistic professionals have been explored by such scientists as D. Bowersox, D. Closs, M. Bixby Cooper, A. Harrison, R. van Hoek, M. Grygorak, E. Krykavsky, O. Pokhylchenko, and others [2-5, 10]. The majority of prior research has emphasized the main task of the logistician as to optimize the material flows management, because their high level of expertise directly leads to the costs reduction, which, in turn, increases the profitability of the business. The list of competences for a logistician which meets the requirements of the contemporary labour market can be formed based on the

analysis of the potential responsibilities which will involve careful preparation and maintenance of inventory records, demand structure, contractors selection, human resource management, and so on [6]. According to D. Bugayko, A. Vasylenko and D. Grabovsky (2018), logistics professionals are among the most needed and prestigious employees, because almost all business processes contain a logistics component [7].

Currently, the share in the labour market for logisticians is still growing based on the data provided by Yu. Bratyshko, O. Posylkina, and G. Kubasova (2018). In particular, the share of vacancies for the positions of "Logistician" and "Logistics Manager" on job search sites accommodates up to 1.5% of the total number of job ads. This trend is due to the national dynamics of the Ukrainian economy as a whole and the labour market of Ukraine in particular which leads to positive dynamics of wages, increased number of registered vacancies, predominance of the hired staff number over the retired, and so on [8].

M. Shevchun (2020) states that companies experience a shortage of proficient logistic managers. They are forced to "steal" employees from each other through attracting successful candidates by growing monetary compensations. Businesses try to hire an employee who possess soft skills in addition to technological ones as well which include though not limited to knowledge of specialized software, types of loaders and equipment, etc. [9]. Another steady trend which has become peculiar to Industry 4.0 for the past decade is a strong growing demand for IT competences among candidates. O. Pokhylchenko (2019) suggested that "without digital technology supply chains have no future. That is why the requirement for top managers is to focus on building teams in order to identify the best ways to harness the powerful potential of digital technologies in their supply chains" [10].

Formulation of the purpose of the study. The purpose of this article is to explore the job ads for professions related to logistics,

organise the data in a meaningful manner and analyse the obtained results in order to identify the modern labour market requirements for experts in logistics and related areas. This paper also aims to formulate assumptions about the required future skills for a logistics manager in the Industry 4.0 environment as a key driver of forming a new generation of professionals. To ensure the realization of these goals, the following research methods were used in scientific inquiry: empirical studies, data analysis and synthesis, expert assessments, and generalization.

The main research. Prior to the start of research on labour market offers, it is necessary to describe the reasons why logistics is important for the proper functioning of national and international economies, and factors of popularity among potential specialists in this sphere.

According to the Council of Supply Chain Management Professionals (2005), logistics is "planning, managing, and implementing an effective, powerful flow and storage of goods and related information from point of origin to point of consumption, which aims to satisfy customer requirements" [11]. These actions form the idea of integrating many activities toward supporting a certain objective, which comes from a particular task needed to be solved by a decision maker.

In the field of logistics or transport, the nature of the work of professionals is specific. Managers in this branch of economy must acquire such competencies as basics of business organization and information management, order processing, warehousing, process management, etc. Referring to I. Smirnov and T. Kosareva (2008), logisticians are expected to promote business development in general, create and administrate transport companies or departments, organize activities, prepare and arrange documentation necessary for the development of business relations, initiate and implement innovations, giving priority to international transport and logistics activities, in order to improve the business

performance. That is why, the contribution of well-trained professionals to the growth and prosperity of the economy has a very large impact [12]. The modern trend in logistics specifies a variety and diversity of its type, such as: transports, distribution, purchase, finance, personnel, reverse, service, strategic and other branches of logistics. Though, the research showed that general requirements for a professional are approximately the same with disregard of the implementation area. The list of them, formulated by the employers, is the following:

- Higher education (preferably a master's degree);
- Knowledge of foreign languages;
- IT and specific software skills;
- Communication skills;
- Analytical thinking and system thinking;
- Leadership and creativity;
- Diligence, reliability, punctuality;
- Presentation skill including effective self-presentation.

The outline of the specifics and basic professional requirements in a sphere of logistics management eloquently identifies the features of logistics application in different fields of professional and scientific activity. To investigate further the list of qualifications needed, the analysis of available job advertisement sources, systematization, and summarization of the information collected, as well as graphic modelling used to build the diagrams and competence radar, were completed.

The first stage of the research was carried out in the mid-November 2020. This period was characterized by an introduction of stricter measures in quarantine restrictions due to the unfolding of a new wave of the pandemic and the absence of vaccination processes. Meanwhile, there was an increased level of applicants (for example, university graduates), as well as the creation of new job places with the prospect for the next economic year and to fill in the new one, connected with projects to support the

recovery of state economy during the after-pandemic crisis. From the total mass of vacancies, a selection of 30 random ads for each trial was perfumed: 13 – from Ukrainian sources (such as rabota.ua, work.ua, and grc.ua), 5 – from British (reed.co.uk) and by 4 from Austrian, Slovak, and Russian (karriere.at, profesia.sk, hh.ru). The same websites were used during both stages of research. There were attempts to analyse the situation with job market in Poland and Germany, as those countries have sufficient representation of Ukrainians on their job markets. But the access to German recruiting websites is banned outside the country. Polish sources did not provide proposals on wages or a full list of requirements. Interested readers can get acquainted with the full array of data sample via contacting the authors.

During the task implementation, the following search queries and their equivalents in languages used on the site were applied: logistician; logistics manager (manager of logistics); specialist in logistics; transportation manager/coordinator. During the analysis of the collected information, the following criteria were used to summarize it:

- Job title (position);
- Source and country;
- Industry and company;
- Proposed amount of salary;
- General competences for a candidate.

In most cases, the title of the ad reflects the name of the position – logistician or logistics manager. Almost all economic spheres show a great demand for specialists in this area, more often in transportation and delivery, production, retail. The amount of month salary is above the average level in countries, but with exceptions.

Generally, every analysed job advertisement lists about five-seven requirements. Higher education (preferably specialized), work experience in the field from one to three years and computer skills are mandatory by two-thirds of employers. Knowledge of foreign languages is required in every third job advertisement. Age and gender requirements are specified only in

some items from one Ukrainian source: generalizing, male from 25 to 40. Pertaining personal skills, about half of vacancies are accompanied by the requirement for proficient communication ones. Thirty-three percent of job ads indicated that there is a

need for strong time management, self-organization and other types of skills from the side of the applicant. The absolute and relative frequencies of the indicated criteria are summarized in Table 1:

Table 1. The number of specific competencies mentions in the first job ads analysis

№	Competence	Frequency of mentioning	Relative frequency
1	Higher education	17	0.57
2	Age and/or gender requirements	3	0.10
3	IT skills and knowledge of special software	21	0.70
4	Work experience	21	0.70
5	Foreign languages knowledge	11	0.37
6	Driver license	3	0.10
7	Knowledge of legislations and documents	7	0.23
8	Communication skills	16	0.53
9	Time management and responsibility	12	0.40
10	Self-organization and attentiveness	10	0.33
11	Other personal skills (except 8-10)	14	0.47

Source: compiled by the authors

An analysis of the frequency of particular requirement was also carried out in the context of the vacancy sources and is shown on the following bar chart (Fig. 1).

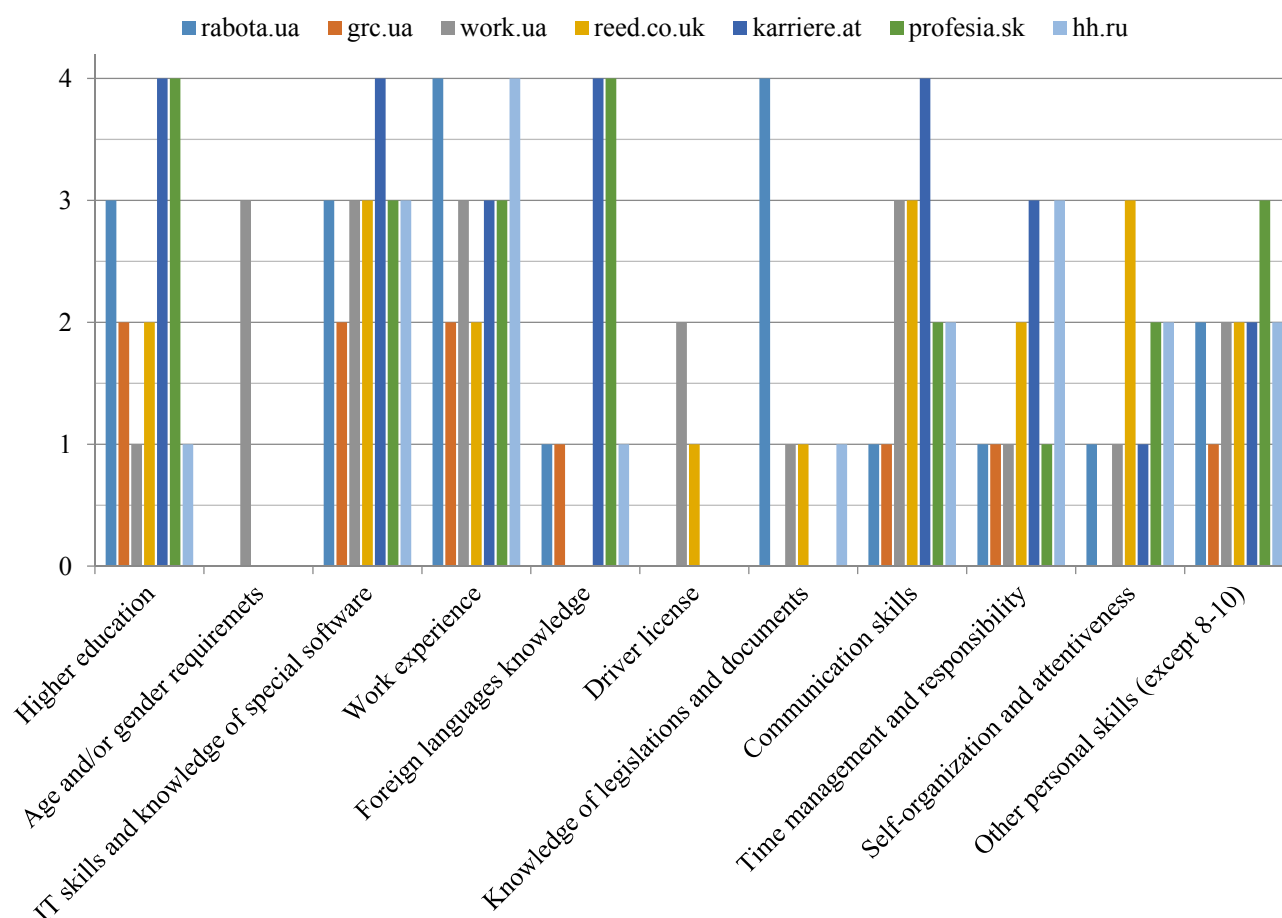


Figure 1 – The quantitative comparison of requirements for logistics manager competencies based on collected job-type ads within the sources, November 2020

Source: compiled by the authors

The data were re-collected and the second re-examination was performed in August 2021. This month was characterized by attempts to revive pre-quarantine methods of doing business, due to a decrease in the incidence of COVID-19, active vaccination procedures all around the world, and, as a result, the abolition of the imposed strict quarantine restrictions. Actually, an increase in vacancies resulted from the revival of areas affected by the lockdowns. Worth mentioning that the summer period for job search is the most demanded by university students and graduates. The second study fully used the technique and methodology of the first one that makes the results consistent and comparable.

Pertaining to the result of the second wave of observations, the average number of requirements per vacancy decreased to four-six items that can be attributed to the outflow of personnel, in particular, abroad or to other areas of economic activity. Mostly, the transportation and production spheres are seeking professionals of that kind. The demand for candidates with higher education possessing strong self-organization (from 33% to 57%) and communication skills has risen. Comparing to the data from November 2020, the number and range of other criteria have increased, in particular, for hard skills and soft skills, which are different from those presented in the previous list for analysis. There is a tendency of demanding the personnel who are willing to learn and

continually improve, and can demonstrate a larger range of soft skills in addition to being an effective communicator (i.e. being quick learners, stress-resistant, possess strong decision-making skills, etc.).

The table summarizing the number of occurrences for each requirement together with the corresponding relative values compares the results of both stages of the research (Table 2):

Table 2. The number of specific competencies mentions in the second job ads analysis and relative difference between studies' indicators

№	Competence	November 2020		August 2021		Relative difference
		Frequency of mentioning	Relative frequency	Frequency of mentioning	Relative frequency	
1	Higher education	17	0.57	19	0.63	0.06
2	Age and/or gender requirements	3	0.10	2	0.07	-0.03
3	IT skills and knowledge of special software	21	0.70	23	0.77	0.07
4	Work experience	21	0.70	22	0.73	0.03
5	Foreign languages knowledge	11	0.37	13	0.43	0.06
6	Driver license	3	0.10	2	0.07	-0.03
7	Knowledge of legislations and documents	7	0.23	7	0.23	0
8	Communication skills	16	0.53	20	0.67	0.14
9	Time management and responsibility	12	0.40	12	0.40	0
10	Self-organization and attentiveness	10	0.33	17	0.57	0.24
11	Other personal skills (except 8-10)	14	0.47	24	0.80	0.33

Source: Compiled by the authors

Similar approaches were applied in the second stage of the study, which was carried

out in August 2021, and the corresponding results are presented in Fig. 2.

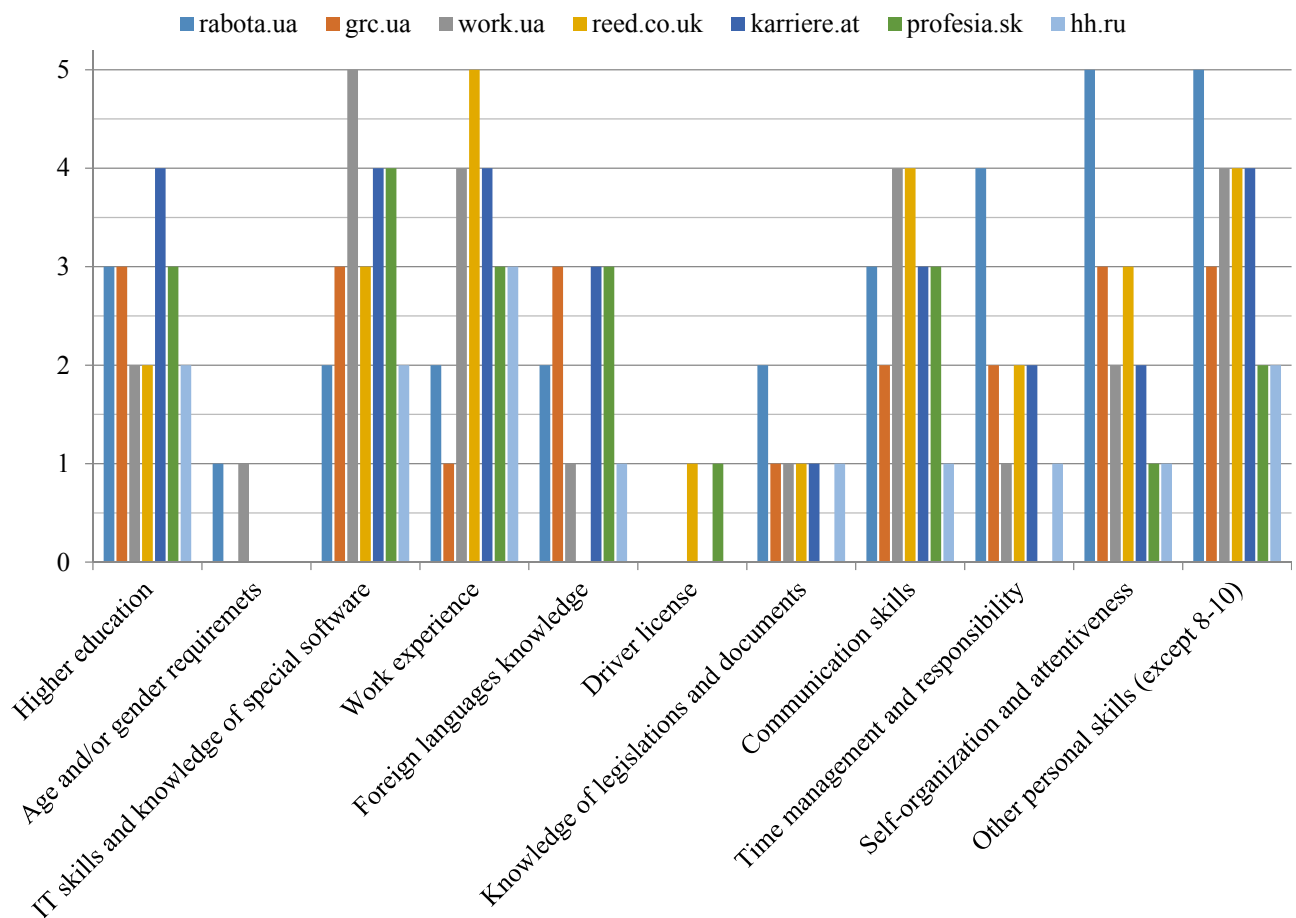


Figure 2 – The quantitative comparison of requirements for logistics manager competencies based on collected job-type ads within the sources, August 2021

Source: Compiled by the authors

The obtained results can be summarised using the competence radar, based on the same criteria listed before. They will be evaluated on a 5-point scale, marking competencies as they are mentioned in ads from the sample (Fig. 3). The authors' own assessment of the criteria application in the professionals' selection process is also added to this graph along with an explanation of each.

The authors agree with the importance of higher education and developed soft skills for the logistician of the 21st century. The knowledge gained at the university is a solid foundation for any expert. Languages and computer skills are considered to be must-haves, but could be learned at any age.

Proficiency in documentation flow processes is desirable, but it may be recovered with a quick search on the Internet to remain updated on ever-changing regulatory policies. Work experience indicates a level of expertise, but this requirement might neglect a lot of talented students and graduates who lack experience due to their age. In most cases, job ads that indicate work experience as a required competence offer more favourable working conditions, payment compensations and work incentives. A driver licence could be in need in case of intensive travelling. Public transport and taxis are the partial or full replacement of driving. Age or gender requirements are considered as infringing on the rights of potential applicants.

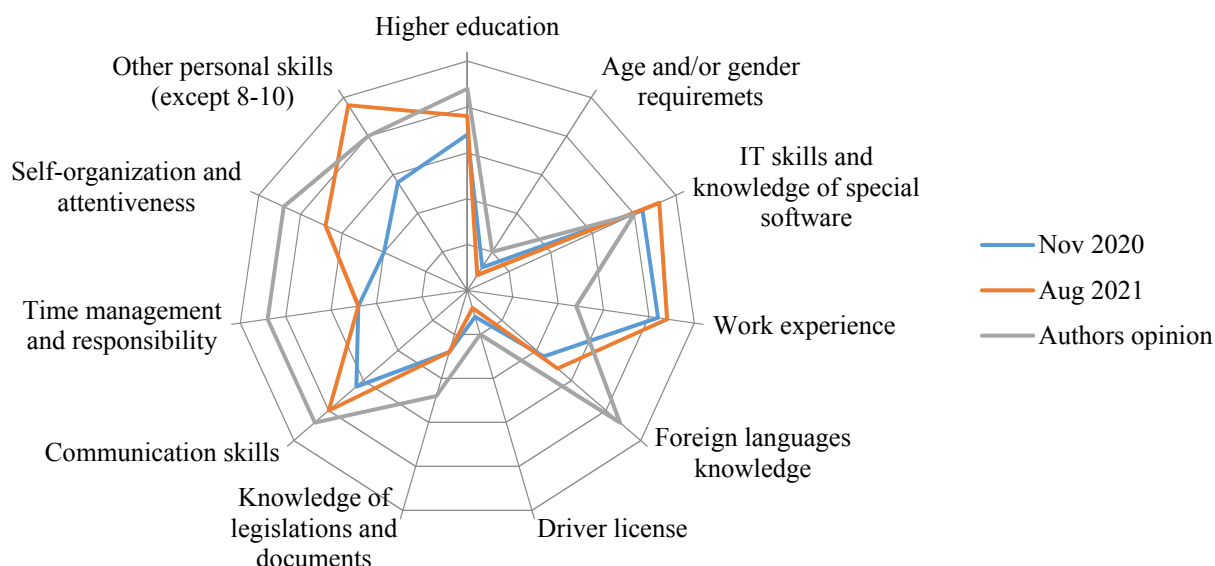


Figure 3 – The competence radar, based on the materials of research done, and authors' own view

Source: compiled by the authors

Based on the research data, it can be assumed that contemporary employers prefer candidates with work experience rather than higher education in the field of supply chain management or transport technologies: the stronger work experience, the higher the starting salary.

While comparing job offers coming from domestic and foreign vacancy-related sites, it was discovered that Ukrainian employers need professionals with completed higher education and have work experience in logistics. Foreign companies prefer graduates with dual or multiple educational degrees, solid training in management, proficiency in IT, knowledge of economics and languages. Among soft skills, employers seek candidates with strong self-management, self-learning and self-improvement ones. An increase of

the foreign labour markets trends impact on the Ukrainian one may be expected.

Conclusions. The logistics market continues to grow rapidly and develops a high potential for employment. The most important tasks for logistics managers at all levels are to optimize logistics costs and risk management. Logistics belongs to the number of highly paid and prestigious fields of employment. The research conducted in November 2020 and August 2021 showed that the labour market needs professionals who have completed higher education supported by strong business experience and are aware of the specifics in the field, accompanied by well-developed communication and personal skills. The list of competencies for a successful candidate for the position of a logistician needs continual revision as it represents a highly sensitive field

of the economy that depends on changes in the business, economic, social and technological environment.

References

1. Kopylov, M. (2021). Where logistics is taught in Ukraine. Rail.Insider. URL: <https://www.railinsider.com.ua/de-v-ukrayini-navchayut-logistyczi/>
2. Bowersox D., Closs D. and Bixby Cooper M. (2019). Supply Chain Logistics Management. 4th Edition. McGraw-Hill Higher Education, 678 p.
3. Harrison A., van Hoek R. (2019). Logistics Management and Strategy Competing Through the Supply Chain. 6th Edition. Prentice Hall, 317 p.
4. Grygorak, M. (2017). Intellectualization of the logistics services market: concept, methodology, competence: Monograph. Kyiv: Sic Group Ukraine, 513 p.
5. Krykavsky E., Pokhylchenko O., Fertch M. (2019). Logistics and supply chain management. Lviv: Lviv Polytechnic Publishing House, 848 p.
6. Van Duin, R. (2012). Logistics Concept Development in Multi-Actor Environments (Doctor Thesis). <http://dx.doi.org/10.13140/2.1.1426.9122>
7. Bugayko D., Vasylenko A., Grabovsky D. (2018). Logistics labour market analysis and requirements submitted by employers to logistics. Proceedings of the XVI International Scientific and Practical Conference "Problems of training professional personnel in logistics in a global competitive environment", Kyiv. 26-27.10.2018, p. 40-43.
8. Bratyshko, Yu., Posylkina O., Kubasova G. (2018). Research of labor market needs in logistics managers. Management, economics and quality assurance in pharmacy, № 4 (2018), p. 50-58. <https://doi.org/10.24959/uekj.18.33>
9. Shevchun M. B. Problems and prospects of training specialists in the field of logistics in modern conditions. Problems of training professionals in logistics in a global competitive environment: Proceedings of the XVIII International scientific-practical conference. - 2020. – p. 415-418
10. Pokhylchenko O. (2019). Logistics and supply chain management trends in transformation change projection of Industry 4.0. Intellect XXI, №3, p. 149–154. http://www.intellect21.nuft.org.ua/journal/2019/2019_3/26.pdf
11. Ballou R. (2006). The evolution and future of logistics and supply chain management. Produção. v. 16, n. 3, p. 375-386, Set./Dez. 2006. <http://dx.doi.org/10.1590/S0103-65132006000300002>
12. Smirnov I., Kosareva T. (2008). Transport logistics. Tsentr uchbovoi literatury, 220 p.

UDC 005.932:331.54

DOI: [https://doi.org/10.46783/smart-scm/2021-7\(8\)-3](https://doi.org/10.46783/smart-scm/2021-7(8)-3)

JEL Classification: C42, J23, J63, M12, O15.

Received: 12 June 2021

Marchuk V.Ye. Doctor of Engineering, Associate Professor, Professor of Logistics Department National Aviation University (Ukraine)

ORCID – 0000-0003-0140-5416

Researcher ID – S-6514-2018

Scopus author id: – 56246790900

Savchenko L.V. PhD of Technical Sciences, Associate Professor, Associate Professor of Logistics Department of National Aviation University (Ukraine)

ORCID – 0000-0003-3581-6942

Researcher ID – Q-5323-2018

Scopus author id: – 57208225385

Harmash O.M. PhD (Economics), Associate Professor, Associate Professor of Logistics Department National Aviation University (Ukraine)

ORCID – 0000-0003-4324-4411

Researcher ID – I-4542-2018

Scopus author id: – 57218381499

MANAGEMENT OF REVERSE LOGISTICS IN THE SUPPLY CHAIN

Volodymyr Marchuk, Lidia Savchenko, Oleg Harmash. *"Management of reverse logistics in the supply chain". The article considers the issue of return flow management in supply chains. Recently, this problem has become particularly acute due to growing economic losses and social, economic and security threats, a sharp increase in the return of unused, substandard, end-of-life products, hazardous and hazardous waste, materials for recycling and regeneration. This link of business processes was not even distinguished in the structure of the supply chain before.*

Based on the analysis of the theory and practice of recycling, resource conservation, recycling and disposal, the authors concluded that it is necessary to form a closed supply chain with the participation of reversible flows and based on the concept of product life cycle.

The example of Ukraine illustrates the current situation with the formation and accumulation and processing of waste production and life due to the actual lack of reverse logistics services. The paper develops a comprehensive scheme-structure of existing problems of reverse logistics and offers specific recommendations for solving problems of reverse logistics management in Ukraine. Each aspect of improving the management system considered from the standpoint of economic, social, environmental, technical and technological efficiency. Particular attention paid to the relevant educational work with the population on ways to implement

the principles of reversible logistics, improving the culture of consumption together with the introduction of legal and social responsibility.

Keywords: supply chain management, reverse logistics, reverse flow, development aspects.

Володимир Марчук, Лідія Савченко, Олег Гармаш. "Управління реверсивною логістикою в системі ланцюгів постачань". В статті розглянуто питання управління зворотними потоками в ланцюгах постачань. В останній час ця проблема стала особливо гострою у зв'язку із зростанням економічних втрат та соціальних, економічних і безпекових загроз, різкого збільшення повернень невикористаної, некондиційної, відпрацьованої свій ресурс продукції, шкідливих та небезпечних відходів, матеріалів для вторинної переробки та регенерації. Ця ланка бізнес-процесів раніше навіть не виділялась в структурі ланцюга постачань.

На основі проведеного аналізу теорії і практики рециклінгу, ресурсозбереження, вторинної переробки та утилізації автори прийшли до висновку про необхідність формування замкнутого контуру ланцюга постачань за участю реверсивних потоків та на основі концепції життєвого циклу продукту.

На прикладі України проілюстровано сучасний стан з утворенням і накопиченням та переробкою відходів виробництва і життєдіяльності через фактичну відсутність служб реверсивної логістики. В роботі розроблено комплексну схему-структуру існуючих проблем реверсивної логістики і запропоновано конкретні рекомендації щодо напрямків вирішення проблем управління реверсивною логістикою в Україні. Кожен аспект удосконалення системи управління розглядається з позиції економічної, соціальної, екологічної, техніко-технологічної ефективності. Особливу увагу приділено відповідній просвітницькій роботі з населенням щодо шляхів реалізації принципів реверсивної логістики, підвищення культури споживання разом з впровадженням юридичної та соціальної відповідальності.

Ключові слова: управління ланцюгами поставок, реверсивна логістика, реверсивний потік, аспекти розвитку.

Владимир Марчук, Лидия Савченко, Олег Гармаш. "Управление реверсивной логистикой в системе цепей поставок". В статье рассмотрены вопросы управления обратными потоками в цепях поставок. В последнее время эта проблема стала особенно острой в связи с ростом экономических потерь и социальных, экономических и угроз безопасности, резкого увеличения возвратов неиспользованной, некондиционной, отработав свой ресурс продукции, вредных и опасных отходов, материалов для вторичной переработки и регенерации. Это звено бизнес-процессов раньше даже не выделялась в структуре цепи поставок.

На основе проведенного анализа теории и практики рециклинга, ресурсосбережения, вторичной переработки и утилизации авторы пришли к выводу о необходимости формирования замкнутого контура цепи поставок с участием реверсивных потоков и на основе концепции жизненного цикла продукта.

На примере Украины проиллюстрировано современное состояние с образованием и накоплением и переработкой отходов производства и жизнедеятельности из-за фактического отсутствия служб реверсивной логистики. В работе разработана комплексная схема-структура существующих проблем реверсивной логистики и предложены конкретные рекомендации по направлениям решения проблем управления реверсивной логистикой в Украине. Каждый аспект совершенствования системы управления рассматривается с позиции экономической, социальной, экологической, технико-технологической эффективности. Особое внимание уделено соответствующей просветительской работе с населением о путях реализации принципов реверсивной логистики, повышение культуры потребления вместе с внедрением юридической и социальной ответственности.

Ключевые слова: управление цепями поставок, реверсивная логистика, реверсивный поток, аспекты развития.

Introduction. At the present stage of economic development of Ukraine reverse logistics is considered as an important factor in the development of logistics companies and enterprises, industries and the state as a whole. The organization of reverse logistics processes in Ukraine today is poorly understood. This is due to the fact that most supply chains are focused only on the movement of material flows in the forward direction and do not take into account the possibility of their return in the opposite side. The processing of returned goods flows, as well as their recycling or disposal, involve a large number of problems and costs, which require knowledge and experience in the field of reverse logistics management, as well as an understanding of the relevant infrastructure.

Analysis of the latest research. The logistics approach to reverse material flow management means integration into the supply chain management system, in order to reduce costs and increase the economic efficiency and sustainability of logistics companies and enterprises.

It should be noted that the literature uses different terms: logistics of reverse flows, inverse logistics, recycling logistics, and so on. These concepts are almost similar in content and do not contradict each other, but only reflect the different views of the authors on the same problem - management of raw materials, products, work-in-progress material, packaging, finished products from consumer to manufacturer to return them to consumer properties or disposal [1].

Practical issues of application of BSCM (Back Supply Chain Management) technology are considered in [2]. It is shown that on the basis of reverse logistics must be: solved the problem of cost optimization in the field of recycling and waste disposal; implemented the resource saving and energy saving systems in production; created the after-sales support systems for goods (service and maintenance, modernization and repair); created and developed the inverted and closed supply chains, etc.

Problems of reverse logistics are widely disclosed and analyzed in the works of domestic and foreign scientists - B. Anikin, V. Dybska, Yu. Yegorov, O. Zueva, A. Kanke, I. Kosheva, N. Moiseeva, V. Sergeev, A. Sterligova, S. Uvarov, M. Hrygorak and others. The issues of development and implementation of programs for the development of ecological and economic systems of waste management on the basis of reverse logistics were considered by foreign scientists De Brito M.P., Geroliminis N., Merkis-Guranowska A. and Rosik-Dulewska C., I. Harris, M. Naim, C. Mumford, Murphy Paul R.

Research of organizational mechanisms of improvement of waste management systems was carried out by scientists I. Vakulenko, N. Korobchenko, V. Krylyuk, Yu. Shulaev, T. Shevchenko. In the works of T. Dovga, I. Sadovnichia and M. Samoilik the feasibility of introducing solid waste recycling on the basis of logistics is assessed. A significant part of the work [3] is devoted to reverse flows, in particular, the economic efficiency of recycling.

Reverse flow management, through the introduction of modern IT systems, can be an effective tool to reduce financial costs. Currently, organizations seek to reduce costs and increase return on investment through the introduction of ERP-systems, the effectiveness of which can be achieved in short time, taking into account their profitability and cost savings. Setting up an RMA system (Return Merchandise Authorization) related to the ERP system via the Internet and training its customers allows the company to implement a convenient and simple process of returning goods. This system contributes to the operational tracking of returns [4, 5].

In practice, Investment Recovery Management systems can help manufacturers and retailers with effective reverse logistics to determine what can be done with returned goods. There are many ways to solve this problem - repair and resale, donations to charity, destruction etc. [6, 7].

Thus, supply chain management in the system of reverse logistics is a relatively new field of research, but in foreign research has already achieved some progress. However, there is a problem of implementation of the foreign approaches to the Ukrainian conditions, designing of reverse flows logistic systems in unstable economic situation.

The goal of the work. The aim of the paper is to analyze the current state and role of reverse logistics in supply chain management, identify problems and

prospects for the development of reverse logistics in Ukraine.

Presentation of the main material of the study. The use of reverse logistics in Ukraine is becoming increasingly important with increasing sales, consumer awareness and safety of goods. According to [8], the most common reasons for the return of goods by consumers are hidden manufacturing defects, irreversibility of the product size, color, style to consumer requests, incompleteness (Fig. 1).

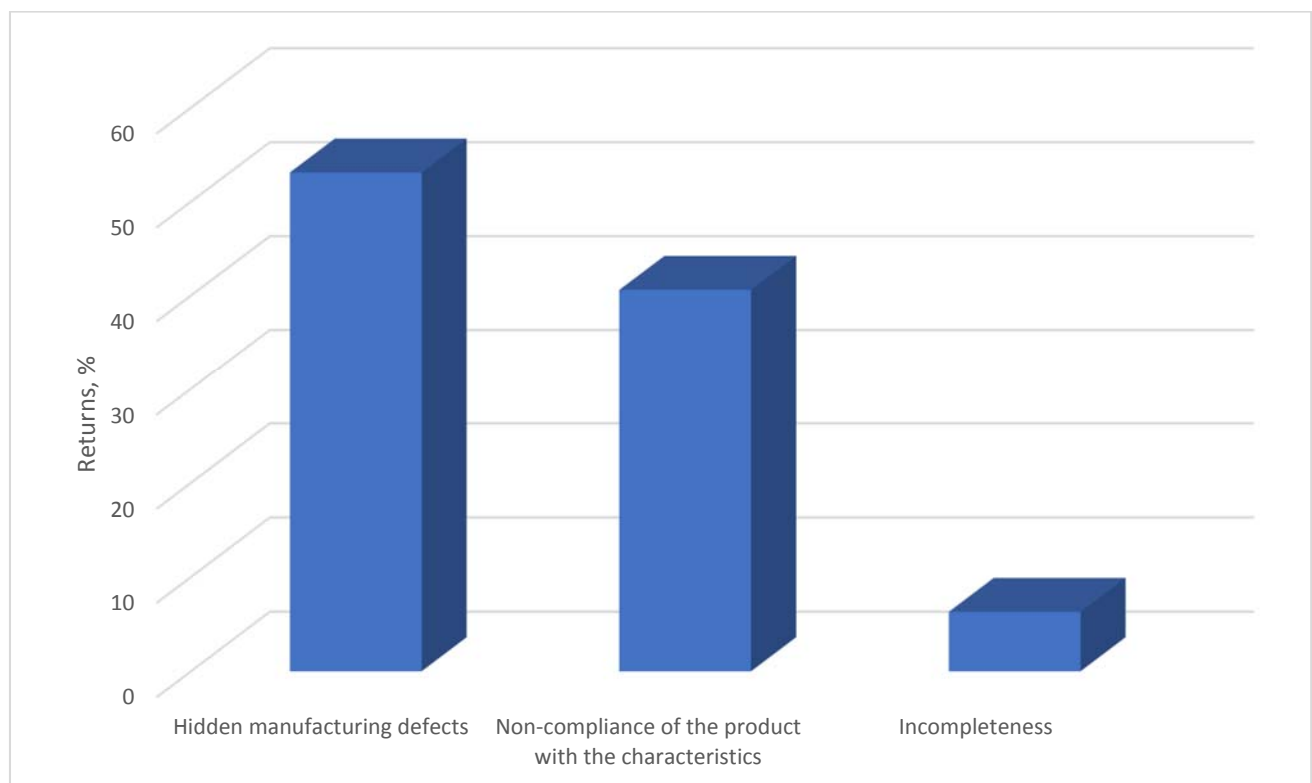


Figure 1 - Reasons for returning goods by consumers

Source: compiled by the authors

The application of the logistics principles allows a comprehensive approach to the implementation of key processes and tasks of reverse flow management, provides increased customer satisfaction, additional profits and support the product life cycle. To do this, it is necessary to consider the issue of reverse logistics as an integral part of a complex mechanism in a supply chain management system.

In Ukraine, there are significant problems in the development of reverse logistics (Fig.

2). The first problem is the underestimation of the importance of reverse logistics both in the state and in the policy of companies and enterprises. In order to assess the significance of the application of the principles of reverse logistics, we present some statistics on waste management in Ukraine. Ukraine is one of the countries with the highest absolute volumes of waste generation and accumulation. 700-720 million tons are generated annually. The total mass of waste accumulated on the territory of Ukraine in surface storage exceeds

25 billion tons, which is about 40 thousand tons per 1 km². Taking into account the current technological level of waste processing in Ukraine, among the total amount of waste generated annually, the valuable is 410-430 million tons. Only 1-2% of all industrial waste belongs to the category of highly toxic, but their impact on the environment is growing [9].

Underestimation of the importance of reverse logistics has led to the fact that there are no services that would deal with reverse logistics in companies and logistics chains. This can be explained by the fact that reverse logistics is considered not to add any value, bring some losses and lead to unnecessary financial pressure on participants in the logistics chain. In addition, return operations

require more careful inventory control, information management, cost accounting and disposal.

The next problem in the development of reverse logistics in Ukraine is the lack of opportunities to integrate reverse logistics into existing logistics chains. Luckily, the situation is changing. Reverse logistics is recognized by many companies as an integral part of the supply chains management and distribution of goods, which deserves the same attention as "direct" logistics. Indeed, both types of logistics are important for successful business, as they have the same goal - to find ways to do better, faster and cheaper, providing a high level of customer service (trade and wholesale intermediaries).

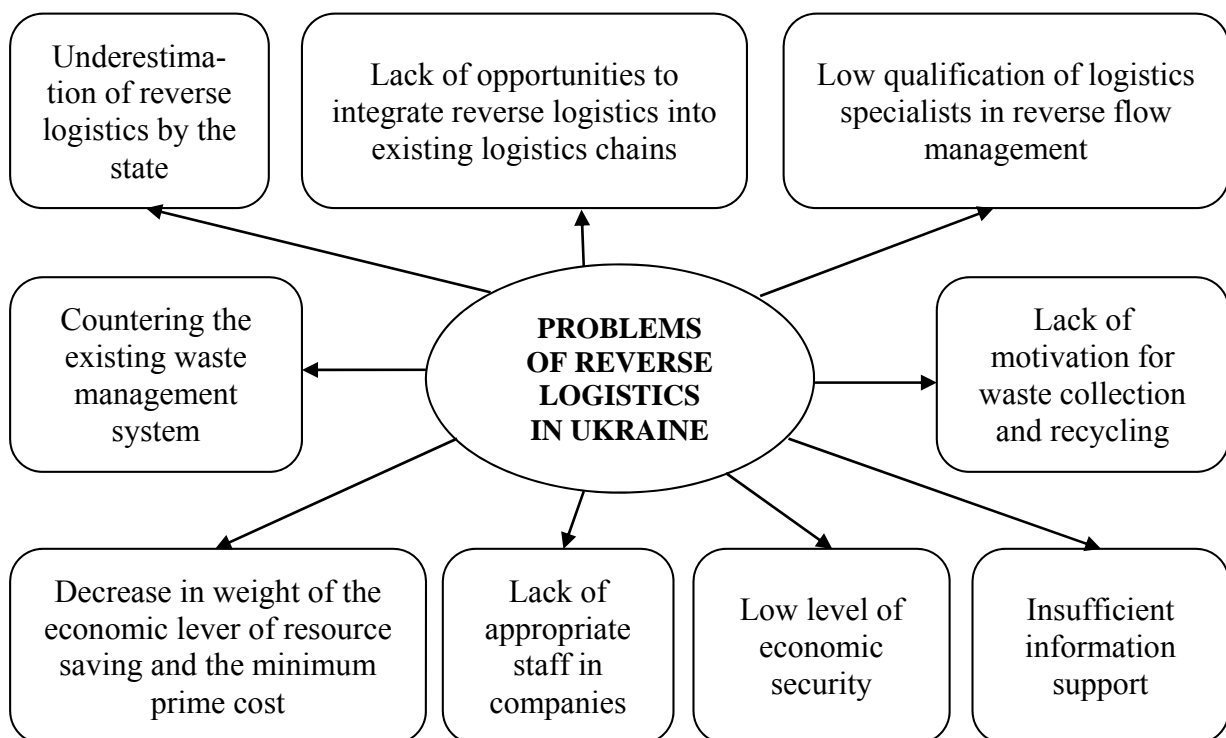


Figure 2 - Problems of reverse logistics development in Ukraine

Source: compiled by the authors

Low qualification of logistics specialists of different levels in the issues of reverse flow management and implementation of the principles of reverse logistics in the activities of companies is the next problem in Ukraine. Despite the significant progress in the

training of logistics specialists in the universities of the country, today there is a staff shortage for senior and especially middle-level specialists. This problem, in our opinion, is systemic in nature and is related to: the reluctance of the state and logistics

companies to invest in studying of relevant professionals; administrative barriers and a high level of corruption in the economy and many others.

Another serious problem in the development of reverse logistics is lack of information support, which is primarily related to the first problem - the underestimation of the reverse logistics importance, which is not a priority for companies and enterprises. Despite the fact that some companies have automated information systems related to reverse logistics, the resources of such systems are not enough to support reverse flows, due to the complexity of a large number of exceptional cases.

For the operational interaction of different companies in the logistics chain in the implementation of the principles of reversible logistics, it is necessary to create a modern flexible information system. To facilitate the work of companies and ensure the efficient organization of reverse logistics in supply chains, EDI (electronic data interchange) standards have been specially developed - a series of standards and conventions for the transmission of structured digital information between organizations, based on regulation of message formats. Typical sets of operations have been developed to effectively manage the flow of information related to reverse logistics. But management's neglect of reverse logistics has not led to an increase in the use of EDI standards in companies, despite lower costs for standards to increase their availability.

Ukrainian communities, especially rural ones, have limited opportunities to collect and safely dispose of garbage, which is due to low motivation of the population and unpreparedness of society as a whole. Collecting and further disposing of waste in rural areas is a difficult task, as transporting garbage from remote areas to recycling points is very expensive. As a result, toxic and dangerous landfills from years of illicit emissions continue to grow. Unofficial and

illegal landfills pose a significant threat to human health and the environment, degrade drinking water quality, pollute the atmosphere and have a devastating effect on sanitary and hygienic soil conditions.

Solving the problems of reversible logistics in Ukraine requires a comprehensive solution of economic, environmental, technological, social and regulatory aspects of development (Fig. 3).

The economic aspect is directly related to the cost of promoting reverse flows in the supply chain, which includes:

- the cost of processing reverse flows, which begins with the decision to return the goods for further restoration (processing) or return the money to the buyer at his request or replacement with a similar product;
- logistics costs associated with the movement of return flows from places of consumption to the place of processing (transport, loading and unloading and warehousing);
- processing costs (restoration of product quality indicators or its sale at reduced prices);
- costs of disposal of goods.

The main ways to reduce such costs are:

- introduction of innovative technologies of rational (effective) reverse logistics flows management;
- training of personnel involved in the reception of reverse flows, and improving their technical equipment;
- standardization of customer service processes when returning goods in order to meet their requirements;
- automation of logistics processes (transportation, warehousing, loading and unloading) during the organization and planning of reverse logistics;
- introduction of best practices in reverse processes management;
- outsourcing of reverse logistics processes.

The implementation of these areas will increase the efficiency of the use of available resources of companies and enterprises, reduce costs in the implementation of reverse logistics processes.

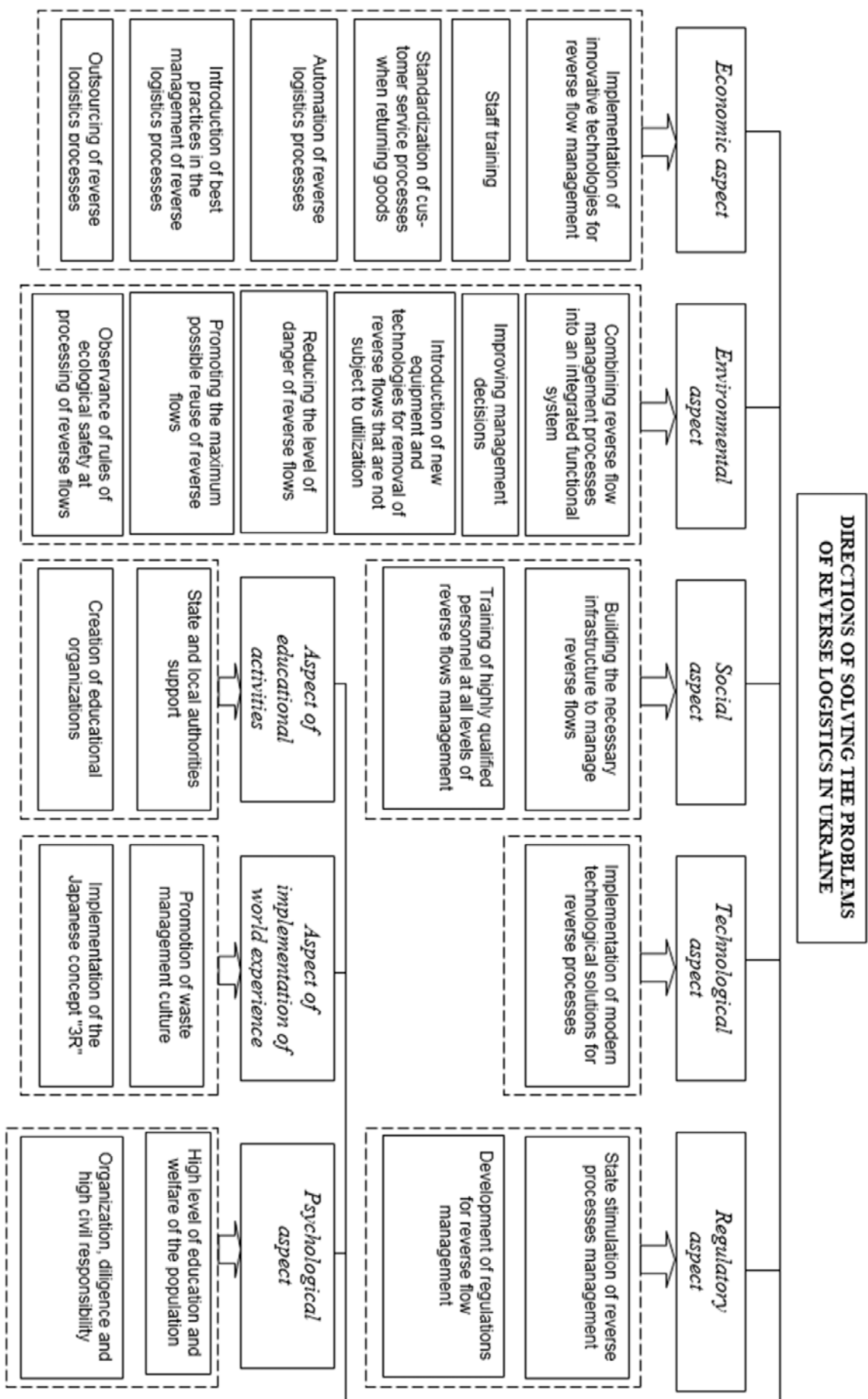


Figure 3 - Directions for improving reverse logistics in Ukraine

Source: Compiled by the authors

In addition to the economic aspect, logistics management of reverse flows in supply chains should implement the environmental aspect, aimed at reducing the negative impact on the environment [10].

The environmental aspect of the concept of reverse logistics and logistics in general should include the minimization of harmful emissions: emissions and wastewater, noise and vibration. This transformation of definitions has given rise to the concept of "environmental logistics", i.e. the design and management of logistics processes (transportation, warehousing, industrial relocation, disposal) in order to limit the negative impact on the environment. In the context of globalization of the world economy, the dynamic development of distribution networks, the transport sector is becoming the largest source of environmental pollution [11].

What is now called "green logistics" or "environmental logistics" is a combination of several areas of research that have begun at different times over the past 40 years. This concept includes the following five components: emission reductions from transport, urban logistics, reverse logistics, corporate environmental strategy focused on logistics and "green" supply chain management [1].

According to a study by PE International (UK), today the leaders and top managers of large companies recognize a number of significant economic benefits in the implementation of environmentally friendly logistics systems [12]. The results of the survey conducted by EyeforTransport (2007), Aberdeen Group (2008), Insight (2008), as the main factors in the implementation of environmental logistics systems, identified such as improving corporate image, competitiveness of the company, cost savings and compliance with government regulations [13].

The same direction of economic and environmental goals in the field of waste disposal is most fully observed, which is often

supplemented by product recycling. Therefore, the tasks of logistics in the field of reverse flow disposal should be considered the design and implementation of logistics chains from the place of their origin to the place of their disposal (storage, reuse, etc.). It is obvious that in these chains will perform the functions of accumulation, segregation (sorting), transportation, storage, transformation, reuse.

The main ways to reduce the negative impact of reverse logistics processes on the environment should be considered:

- integration of reverse flow management processes into a single, integrated functional system that promotes economical, safe implementation of reverse logistics tasks;
- improvement of management decisions that make it possible to increase the efficiency of nature management while preserving and improving the environment at the local, regional and global levels;
- introduction of new equipment and technologies, ecologically safe methods and means for removal of reverse flows which are not subject to utilization;
- promoting the maximum possible reuse of reverse flows;
- compliance with the rules of environmental safety in the processing of reverse flows;
- reducing the level of danger of reverse flows.

The social aspect of reverse logistics is that the introduction of its principles in production will create new jobs, train new highly qualified personnel. In addition to recycling or disposal, reverse flows can be used for social purposes - charity (for example, computers, electrical and similar equipment and components), which significantly expands the life cycle of such goods.

Thus, it is necessary to consider the main directions of development of the social aspect of reverse logistics:

- creation of the necessary infrastructure for reverse flow management;

- training of highly qualified personnel at all levels of management of reverse material flows;

- rational use of reverse flows, including for charity.

The technological aspect of reverse logistics is associated with the development of modern technological solutions for the management of reverse flows, which will allow to decrease pollution of territories, get economic benefits and relieve social tensions. Це стане практичною реалізацією засад реверсивної логістики у межах замкненого логістичного ланцюга певного рівня.

This will be a practical implementation of the principles of reverse logistics within a closed logistics chain of a certain level.

The strategy of reverse logistics development in Ukraine is impossible without taking into account the legal aspect aimed at state stimulation of reverse flow management processes, which can not only optimize the use of natural resources, improve the environmental situation, but also improve the country's image internationally.

The treatment of reverse material flows in Ukraine is regulated by a number of regulations, including more than ten laws, hundreds of regulations at the level of the Cabinet of Ministers and regulatory documents of other agencies. The main legal act is the Law of Ukraine "On Waste". It provides a basic level of legal regulation of waste management and defines the legal, organizational and economic framework for activities related to the prevention or reduction of waste generation, collection, transportation, storage, treatment, disposal, and prevention of the negative impact of waste on the environment and human health on the territory of Ukraine. The law is constantly being improved, in particular, the last changes were made in 2010 (Law of Ukraine 1825-UI of January 21, 2010).

An important aspect of solving the problems of reverse logistics in Ukraine is the introduction of best practices of developed countries. Thus, in Japan, the problem of waste disposal is probably especially relevant

because there is no place for their disposal. To solve this problem with state support, the concept of "3R" proposed in April 2005 is widely promoted and implemented. It comes from three English words: reduce, reuse, recycle, which means reducing the amount of waste generated, reusing them and recycling as raw materials. These requirements at the present stage must meet the entire life cycle of products and services - including the stages of design, extraction of raw materials, transportation, production, use, dismantling of equipment, reuse of the product and its destruction.

The success of the 3R initiative largely depends on the right combination of public policies and programs adopted at the local level, which will solve the most difficult problems. It is no exaggeration to say that the proper disposal of waste has become a way of life for the Japanese. Also a huge role is played by geographical specifics (small area and lack of resources) and features of historical and cultural development of Japan, which explain the inherent dislike of its inhabitants to waste and, most importantly, a caring attitude to nature.

New trends in waste disposal in Japan in 2020 - the intention to completely eliminate the incineration and disposal of waste, moving solely to recycling.

The aspect of educational activities with the population in Ukraine is at an early stage, compared to developed countries. In addition to state support, real decisions of local authorities (communities) are necessary to change the mentality of the population in relation to waste management. An example of public education activities is the adoption by the municipality of Kamikatsu of a declaration of zero waste. To do this, they created a non-profit organization "Academy of Zero Waste". The mayor proposed to strengthen the law, which makes producers responsible for collecting their obsolete products, namely, to introduce a ban on the production and sale of goods that cannot be recycled. He also lectures in other cities in Japan, promoting the concept of zero waste.

The population of Ukraine should make a significant contribution to the fight against environmental pollution, and this is due to the psychological aspect. Only a high level of education and well-being of Ukrainians, organization, diligence and high civic responsibility - the key to success in solving the problems of reverse logistics.

Management of reverse flows should be considered as an integrated activity in the implementation of management functions. Active tactical and strategic planning should be carried out to optimize reverse flows, in particular organization, motivation, control and regulation of the process of flow of returns, industrial waste, waste products, containers, packaging, etc. from places of origin to application or storage.

Enterprises and companies need to constantly carry out a thorough analysis of the actual state of reverse flow management throughout their cycle, which will allow them to gain a number of competitive advantages, namely:

- reverse logistics can be valuable in increasing the product life cycle, the complexity of the supply chain, in the practice of use and consumer preferences, aimed at improving the quality of products and increasing productivity by reengineering business processes;
- service of returned products increases the degree of customer satisfaction;
- reduction of emissions of harmful substances into the environment;
- increase profits through re-sales of returned products;
- improve the reputation among customers through the development of the social aspect of reverse logistics;

- reduce operating costs and the probability of returns due to repair and improvement of products, understanding the real reasons for return;

- reduce transportation costs, after-sales service and repairs, administrative costs;

- optimize warehousing activities, improving the quality of goods and at the same time turning the returned goods into stock, going for processing and resale, etc.

Conclusions. Thus, the importance of reverse logistics in the supply chains management, in the activities of enterprises and companies and in Ukraine in general is becoming increasingly important. This is primarily due to the fact that reverse logistics is associated with obtaining competitive advantages, but to illustrate the benefits of it is quite difficult in the absence of a single view of the nature and tools of reverse logistics. Reverse logistics today is the strategically important part of business processes. Efficient maintenance of reverse flows can give companies a competitive advantage, but cannot be the basis of competition.

On the other hand, it is connected with the state support of reverse logistics processes, change in policy of companies and enterprises towards realization of principles of reverse logistics and introduction of their social and legal responsibility, increasing of culture of consumption, actualization of problems of environmental protection, etc. In addition, in today's environment, most supply chain management systems are not adapted to organization of reverse flows management, and, therefore, the problem of logistics management of reverse flows remains relevant.

References

1. Marchuk, V.Ye. Reversyivna lohistyka ta retsyklinh naukomistkoi produktsii : naukovo-metodychne vydannia / V.Ye. Marchuk, M.Yu. Hryhorak. – K.: Lohos, 2013. - 132 s.
2. Hryhorak, M.Yu. Teoretychni zasady reversyvnoi lohistyky / M.Yu. Hryhorak, Yu.M. Chychkan-Khlipovka // http://ena.lp.edu.ua/bitstream/ntb/34196/1/7_36-42.pdf

3. Hrytsenko S.I., Savchenko L.V. Ekolohistyka. Navch. posibnyk. Kyiv: NAU, 2021. 230s.
4. Lee N., Sumner W. The Six Hidden Costs of Reverse Logistics // Reverse Logistics Magazine. 2006. Fall,
5. Rupnow P. Increase Profits using the Reverse Logistics Cost Equation // Reverse Logistics Magazine. 2006. Spring/Summer.
6. Walsh J. Reverse Logistics and the Total Product Life Cycle // Reverse Logistics Magazine. 2007. Nov./Dec.,
7. Hryhorak M.Yu., Savchenko L.V. Kontseptualni osnovy rozvytku reversyvnoi lohistyky v tsyrkuliarnii ekonomitsi. Pryazovskyi ekonomichnyi visnyk. 2018b, №5 (10). http://pev.kpu.zp.ua/journals/2018/5_10_uk/15.pdf
8. Zueva O. N. Reversyvnaia lohistyka v upravlenii zapasami // Yzvestiya BHU. 2009. №1. URL: <https://cyberleninka.ru/article/n/reversivnaya-logistika-v-upravlenii-zapasami> (data obrashchenia: 14.07.2021).
9. Green logistics. Improving the environmental sustainability of logistics / Alan McKinnon, Sharon Cullinane, Michael Browne and Anthony Whiteing, the Chartered Institute of Logistics and Transport, London, 2010, 372 p.
10. Hryhorak M.Yu., Varenko Yu.V. Pryntsypy «zelenoi lohistyky» v deiatelnosti lohystycheskykh provaidirov. Matematycheskoe modelyrovanye, optymizatsiya y ynfomatyyonnyie tekhnolohy: 4 mezhdun. nauchn.konf., 25-28.03.14, mat-konf. - Kyshynev, 2014. - T.2. - S. 139-146.
11. Savchenko L.V. Enerhoefektyvnist ta ekolohizatsiia lohistychnoi diialnosti. Enerhoefektyvnist ta enerhozberezhennia: ekonomichnyi, tekhniko-tekhnolohichnyi ta ekolohichnyi aspekty : kolektyvna monohrafiia / Kol. avtoriv; za zah. red. P. M. Makarenka, O. V. Kalinichenka, V. I. Aranchii. Poltava : Astraia, 2019. S. 510-515
12. Kartava, O.F. Vprovadzhennia metodiv ekolohichnoi lohistyky v rehionalnykh prohramakh povodzhennia z vidkhodamy / O.F. Kartava, A.H. Kartavyi, V.O. Khrutba // Mizhvuzivskyi zbirnyk "NAUKOVI NOTATKY". — Lutsk. — 2014. — Vyp. №45. — S. 240–244.
13. Problemy vidkhodiv v Ukraini http://pidruchniki.com/18060203/ekologiya/problemi_vidkhodiv_ukrayini.
14. Marchuk V.Ye., Harmash O.M., Ovdienko O.V (2020) "World Trends in Warehouse Logistics". Intellectualization of logistics and Supply Chain Management. [Online], vol.2, pp.32-50, available at: <https://smart-scm.org/en/journal-2-2020/marchuk-volodymyr-harmash-oleh-ovdienko-oksana-world-trends-in-warehouse-logistics/> (Accessed 28 July 2020). DOI: <https://doi.org/10.46783/smart-scm/2020-2-3>

UDC 005:334.7:339.944: 658.7

DOI: [https://doi.org/10.46783/smart-scm/2021-7\(8\)-4](https://doi.org/10.46783/smart-scm/2021-7(8)-4)

JEL Classification: F15, F23, F63, M16, O19.

Received: 18 July 2021

Kulik V.A. PhD (Economics), Professor, Professor of Logistics Department National Aviation University, Honored Worker of National Education of Ukraine, Honorary employee of aviation transport of Ukraine (Ukraine)

ORCID – 0000-0002-3975-9036

Researcher ID – S-7356-2018

Scopus author id: –

Semeriahina M. M. Senior Lecturer of Logistics Department, National Aviation University (Ukraine)

ORCID – 0000-0001-7490-6874

Researcher ID – S-7158-2018

Scopus author id: –

RISTVEJ Jozef PhD (Economics), Professor, Vice-Rector University of Zilina (Slovakia),

ORCID – 0000-0002-2290-1470

Researcher ID – B-7917-2011

Scopus author id: – 39962519800

Zakharchuk A.P. Assistant of Logistic Department at National Aviation University (Ukraine)

ORCID –

Researcher ID –

Scopus author id: –

POLYCENTRIC MANAGEMENT OF THE GLOBAL SUPPLY CHAIN INTEGRATION

Volodymyr Kulyk, Myroslava Semeriahina, Ristvej Jozef, Alla Zakharchuk. *"Polycentric management of the global supply chain integration". The impact of modern conditions of functioning of the world economic system on the processes of its globalization and global supply chains was examined in article. One of the main factors in intensifying the deepening of production and technological ties is recognized as logistics integration. It creates a new scheme for global supply chain management. It is based on the unity of the principles of hierarchy and heterarchy in the choice of forms and scope of integration.*

Logistics integration is seen as a process of organizing the interaction of cooperating entities in the chain, aimed at achieving the ultimate system goal. In-depth and situational adjustment of production and

technological relations and joint use of resources and capital of enterprises in the logistics chain is realized either through their mergers and acquisitions or in other forms of virtual integration.

The consequence of such integration is the formation of comprehensive logistics services with high added value.

The author's vision of building a heterarchical system of global supply chain management using the institutions of focus centers is presented. Basic recommendations for strategic and tactical planning of the chain's activities as a single integrated entity have been developed.

Such a system provides self-organization of management and flexible dispersion of centers of general system management decisions according to the functions and competencies of specialized supply chain centers.

Heterarchical self-organization of management operates on the terms of relations' equality, full openness and transparency between interacting entities, a single information environment and communication channels.

Keywords: logistics management, integration, hierarchy, heterarchy, focal specialized coordination centers.

Володимир Кулик, Мирослава Семерягіна, Ріствей Джозеф, Алла Захарчук.
"Поліцентричне управління інтеграцією глобального ланцюга постачань". В статті досліджено вплив сучасних умов функціонування світової економічної системи на процеси її глобалізації та логістизації. Одним із головних факторів інтенсифікації поглиблення виробничо-технологічних зв'язків визнано логістичну інтеграцію, що породжує нову схему управління глобальними ланцюгами постачань. Вона базується на єдності принципів ієрархії та гетерархії при виборі форм і обсягів інтеграції.

Логістична інтеграція розглядається як процес організації взаємодії співпрацюючих господарюючих суб'єктів ланцюга, спрямований на досягнення кінцевої системної цілі. Поглиблене і ситуаційне коригування виробничо-технологічних зв'язків та спільне користування ресурсами і капіталом підприємств логістичного ланцюга реалізується або через їх злиття і поглинання або в інших формах віртуального об'єднання.

Наслідком такої інтеграції є формування комплексних логістичних послуг з високою доданою вартістю.

В статті пропонується авторське бачення розбудови гетерархічної системи управління глобальними ланцюгами постачань з використанням інституцій фокусних центрів, для яких розроблено базові рекомендації щодо стратегічного і тактичного планування діяльності суб'єктів ланцюга як єдиного цілісного утворення.

Така система забезпечує самоорганізацію управління і гнучке розосередження центрів прийняття загально-системних управлінських рішень за функціями та компетенціями спеціалізованих центрів ланцюга постачань.

Гетерархічна самоорганізація управління функціонує на умовах рівноправності взаємовідносин, повної відкритості і прозорості між взаємодіючими суб'єктами, єдиного інформаційного середовища та каналів зв'язку.

Ключові слова: логістичний менеджмент, інтеграція, ієрархія, гетерархія, фокусні спеціалізовані центри координації.

Владимир Кулик, Мирослава Семерягина, Риствей Джозеф, Алла Захарчук.
"Полицентрическое управление интеграцией глобальной цепи поставок". В статье исследовано влияние современных условий функционирования мировой экономической системы на процессы ее глобализации и логистизации. Одним из главных факторов интенсификации углубления производственно-технологических связей признано логистическую интеграцию, что порождает новую схему управления глобальными цепями поставок. Она базируется на единстве принципов иерархии и гетерархии при выборе форм и объемов интеграции.

Логистическая интеграция рассматривается как процесс организации взаимодействия сотрудничающих хозяйствующих субъектов цепи, направленный на достижение конечной

системной цели. Углубленное и ситуационное корректировки производственно-технологических связей и совместное пользование ресурсами и капиталом предприятий логистической цепи реализуется или через их слияния и поглощения или в других формах виртуального объединения.

Следствием такой интеграции является формирование комплексных логистических услуг с высокой добавленной стоимостью.

В статье предлагается авторское видение построения гетерархической системы управления глобальными цепями поставок с использованием институтов фокусных центров, для которых разработаны базовые рекомендации по стратегическому и тактическому планированию деятельности субъектов цепи как единого целостного образования.

Такая система обеспечивает самоорганизацию управления и гибкое рассредоточение центров принятия общесистемных управленческих решений по функциям и компетенциям специализированных центров цепи поставок.

Гетерархична самоорганизация управления функционирует на условиях равноправия взаимоотношений, полной открытости и прозрачности между взаимодействующими субъектами, единой информационно-среды и каналов связи.

Ключевые слова: логистический менеджмент, интеграция, иерархия, гетерархия, фокусные специализированные центры координации.

Introduction. Since the beginning of the XXI century, the world economy has undergone radical changes. They are related, on the one hand, to the reduction of trade barriers and the liberalization of trade regimes, and, on the other hand, to the dynamic development of export-oriented sectors of the economy of the Asia-Pacific region. The intensive process of relocating production from Western Europe and the United States to Asian countries and the formation of the reverse flow of finished products in the context of growing consumption in developed countries have become the most important stimulus for the global market for integrated supply chain management services. Logistics integration can be seen as a process of interaction between participants in the supply chain, aimed at achieving common goals by expanding and deepening production and technological links in the process of sharing resources. It can also be considered as a system-optimal adjustment of the combined capital of cooperating enterprises and the creation of favorable partnerships for the implementation of their joint economic activities. In principle, there are two forms of chain integration: the creation of alliances and other types of production associations of the virtual plan, or the merger and acquisition

of enterprises-entities of logistics activities in the form of transport and logistics holdings.

Analysis of recent research and publications. The problem of logistics integration is constantly considered in the literature and electronic resources and reports of the world's leading logistics companies. However, the issues of building an original system for managing the effectiveness of integration remain controversial, especially in global supply chains. A separate problem of logistics integration is the positioning of the world's leading logistics companies as integrated providers of comprehensive logistics services with high added value. An example is Kuehne + Nagel, which began establishing global logistics integration in Eastern Europe, and later entered into a strategic alliance with the logistics environment of East Asia and latterly the United States logistics environment. This was facilitated by the high professionalism of the company's specialists, the availability of a developed specialized infrastructure of logistics business processes, which provided a global impact on the quality of comprehensive logistics services. Given the expansion of activity areas and the transformation of logistics providers, we can conclude that today logistics companies are ready to provide their customers with integrated integrated logistics solutions. They

provide manufacturers with information that can ensure the efficiency of the global logistics chain through integration into its production business processes. A logistics company becomes not just a service provider, but part of the manufacturer's business. They provide a full range of logistics services. The boundaries of a logistics provider's product

are becoming wider, and competencies are becoming more complex.

As we can see, the importance of integration processes is growing, and their scope is expanding as a result of the constant changes in the world economy. The main prerequisites for the development of integration processes in logistics is considered in Table 1.

Table 1 -Prerequisites for change and development of integration processes in global supply chains

No.	Organizational and economic changes in logistics activities	Solutions and suggestions
1	Globalization of the economy and expansion of trade	Privatization of previously public sectors of communication and transport industries
2	Globalization of freight transportation, increasing the length of transport routes, complicating delivery schemes	Focus on meeting the need for integrated supply chain management in just-in-time (JIT) mode according to Capacity Requirement Planning (CRP)
3	Increasing the need for new communication and integrated solutions	
4	Personalization and development of the service economy, the need to respond quickly to customer needs, the growth of competition	The emergence of new participants in the transport and logistics market, the formation of new packages of services, the emergence of new types of competition
5	The need to reduce technological and production cycles, the emergence of the effect and change the structure of cargo flows	Concentration on core business and outsourcing of non-core business
6	Elongation and complication of supply chains, environmental aspects, the desire for "waste-free" management	The emergence of interaction structures of large and small companies, a multi-stage system of subcontracting

The development of the European market for integrated chain management services today focuses on mergers and acquisitions as forms of coordination, integration and interaction of interdependent resources.

The European market shows a high level of activity on mergers and acquisitions, characterizing the periodicity of the stages of reforming the leading logistics companies into global logistics operators.

Depending on the chosen forms of integration of logistics business processes and entities that perform them, the methods and technologies of interaction management, communication links of integrated facilities have change.

After all, not all logistics companies, as well as companies - consumers of logistics services, can accept the trend of integration through acquisitions. This is confirmed by studies of the American and European markets regarding the ways and scope of development of logistics outsourcing (see Table 2). It should be noted that the objects of such outsourcing are not ancillary, but the main logistics processes.

According to data of Table 2, most consumers need one-component services, integrated logistics solutions are more in demand in the European market than in the US market.

A similar trend is observed in the market of logistics services in Ukraine. A study conducted by the Ukrainian Logistics Alliance

showed that customers primarily order transport and / or freight forwarding services, 33% cited customs brokerage, 31% noted warehousing, 8% listed supply chain

management. Some say they prefer to use the services of vehicle owners. 41% of respondents expressed a desire to order express delivery of goods.

Table 2 - Share of outsourced logistics services

No.	Logistics function	USA	Europe
1	Warehousing	72	70
2	International transportation	66	89
3	Customs brokerage	60	34
4	Customs clearance	57	48
5	Cross-docking	55	19
6	Domestic transportation	54	82
7	Freight bill auditing and payment	53	19
8	Freight forwarding	47	40
9	Distributed order management	35	22
10	Reverse logistics (return)	27	32
11	Product labeling, packaging, assembly, kitting	25	29
12	Reverse logistics (defective, repair)	22	30
13	Consulting	21	12
14	Information technology (IT) services	19	24
15	Contract production	16	16
16	Supply management	16	33
17	Inventory management	14	27
18	Tariff negotiations	14	12
19	Carrier selection	13	21
20	Integrated logistics solutions	10	19
21	Water transport management	9	18
22	Order management and fulfillment	8	7
23	Inventory holding	6	9

The paradox of the market is that, on the one hand, customers talk about the lack of specialization and the offer they need, and on the other hand, they have no specific requests for new services.

Basic material and results. The system of integration processes management in supply chains provides development of mutual relations which basis is:

- scheme of serial-parallel connections of business processes and separate operations of the generalized supply process;
- a set of executors of divisions and other economic entities of separate stages of process with definition of resource streams and actions between executors;
- determination of conditions and requirements for needs, territorial limitations, information and other parameters of supply chain operation;

- development of the scheme and conditions of constant contacts between the participants of the supply chain;

- preliminary consultation, preparation and negotiation of contracts between the parties to the chain with the end-to-end division of responsibilities and rights of chain participants;

- organization of intensive processes of training and mutual consultation of chain participants by:

- a) establishing direct contact between the participants;
- b) documenting the main processes assigned to each entity;
- c) in-dept end-to-end understanding of the essence of the goals and mission of the supply chain by all its actors;

d) obligatory acquaintance and general participation in realization of joint projects and joint use of resources;

e) use of effective benchmarking and exchange of the latest technologies and developments between the participants of the chain.

In addition, partnerships in the logistics chain should be based on the principles:

- mutual benefits;
- mutual trust;
- equality;
- transparency and controllability of the activities of each entity for all participants in the logistics chain;
- unity of philosophies of partnership cooperation and moral and psychological values;
- corporate culture of functioning and interaction of economic entities of the logistics chain;
- system orientation of all entities of the logistics chain to create the maximum value of a comprehensive logistics service for the end customer.

These principles and conditions of logistics integration can be achieved only by self-organization of the management system of a new type, combining two opposite forms of management: hierarchy and heterarchy in the global supply chain.

Heterarchical management scheme forms the collective "mind" of logistics activities, and the hierarchy provides the "strength and dynamics" of the implementation of management decisions.

Hierarchy is inherent in any form of administrative (bureaucratic, rationalist) management. F. Taylor, A. Fayol, M. Weber, P. Drucker and other classics of management theory have developed the basic principles of it. A. Fayol's 14 principles are well-known, according to which any enterprises, organizations, institutions function.

The hierarchical system of management actually provides for a monopoly authoritarian dictatorship at each hierarchical level of the power vertical, based on a clear, officially defined division of powers,

subordination and responsibility. This scheme is specific to each individual entity in the supply chain.

Much more complex is the external management to all of each individual entities of logistics activities, required for the internal integration of the global supply chain, as a unified complex of its interacting enterprises and organizations. In this case, management for integrated holistic structure of supply chains requires the use of a heterarchical approach to the development, adoption and implementation of logistics decisions.

Heterarchies are complex adaptive systems, because many organizing principles are intertwined in them. New organizational forms are heterarchical not only because they have smoothing hierarchy, but also because they are arenas of collision and coexistence of value systems. The existing interdependence of autonomous participating entities of the chain leads to an increase in the number of criteria for evaluating a comprehensive logistics service. Distributed management not only implies that the enterprises and divisions of the chain will be accountable to each other, but also that each of them will be evaluated from different positions, but focused on the final system result. The chain system and the means of communication must create a sufficiently homogeneous environment to ensure interaction between economic entities without suppressing anyone's identity. Such cooperation smooths hierarchies without eliminating diversity and without conflicts of interest. Heterarchies create the ultimate value of a service by allowing more than one way to evaluate logistical criteria. Heterarchies are associations and organizations with multiple worldviews and belief systems, as a result of which products, processes and properties have several "labels" or interpretations. The supply chain is a dynamic system. It operates in a situation of constant variational and situational changes. Accordingly, the style of "anarchic" leadership is applied to it, which is characterized by the dispersion of decision-making centers (heterarchy). This liberates

the internal organizational environment for the initiative and creativity of staff. In turn, this allows to find alternatives that help get out of the crisis or improve results.

Supply chain heterarchy is a self-organizing management system. In this system, each business entity is its manager or

management center. He develops and coordinates with other participants in the logistics activities of their own and general system solutions of a specialized nature within its competences and in the systemic interests of the entire supply chain.

The main characteristics of the heterarchy are:

- 1 – the style of multicenter leadership of specialized supply chain actors,
- 2 – dispersal of decision-making centers by competencies and specialization,
- 3 – the system of self-organization of management (each manager is the command manager of all logistic system),
- 4 – individual responsibility of each for the overall result,
- 5 – flexible management structure that adapts to situational changes,
- 6 – dispersal of specialized business processes (production centers) assigned to individual subjects of the logistics chain,
- 7 – “bottom-up” planning management scheme: through agreement and coalition to corporate strategy,
- 8 – horizontal management structure, coordination and integration, which is provided by the organizational culture with a single system of corporate values and synergy potential,
- 9 – the form of cooperation of actors is partnership, alliances, agreements between all participants of conglomerate (supply chain),
- 10 – the form of individualized mutual coordination of employees (performers and managers of different levels) by rotation, change of profile, deepening and expanding experience,
- 11 – mutual openness, cross-control within the tasks of joint activities and systemic purposefulness,
- 12 – the promptness of constant consultations, coordination and changes.

Source: [developed by the author]

The main features of heterarchical self-organization of management are:

- transition in the principles of profit formation from the receipt of profit by each business entity at the expense of the other party to the receipt of joint profit;
- formation of the principle of equality of mutual relations: transition to equal partnership instead of domination of one party;
- formation of trust: transition to full openness of the parties (transparency of each actor's activity for supply chain partners) from its absence in competitive market conditions;
- formation of comprehensive communication channels open to partners

instead of formal relations in the field of communications;

- transition to a common single information space of all actors in the supply chain instead of restrictions, safety and confidentiality in the field of information;
- transition to control of the level and quality of implementation of delegated powers from comprehensive control with claims to interacting actors in the field of control;
- formulation of contract terms from strict definitions of all components of the system of relations to open flexible formations and timely adjustment of relations;

- the focus of each entity in the supply chain should be focused primarily on the interests of the consumer and not on their own;

- development of supply chain management strategy is carried out through logistical coordination and organizational and legal forms of business process integration.

This type of management and end-to-end planning is quite complex and the most risk due to the need to resolve possible differences and conflicts. Such management is carried out by the focus company of the supply chain and the functional focus centers specialized in logistic directions, territories and spheres of activity.

The focus company should be not only the initiator, but also the integrator and coordinator of the supply chain, performing the following management functions:

- development of the project of network structure and compound of actors of the supply chain, defining quantity of actors and their professional orientation, and also the list of the enterprises providing and servicing activity of each actor of the supply chain;

- setting common goals and concepts for managing the global supply chain;

- implementation of inter-functional distribution and coordination of business processes between the interacting actors of the general network of the global chain;

- organization of consultations and coordination of the division of competencies between the participants of the supply chain with the subsequent consolidation of the decisions made in the inter-entity agreements;

- calculation of the system of balanced performance indicators of the supply chain;

- orientation of all participants regarding the development of their own strategic plans, agreed with the focus company and with the indicators of the supply chain KPI.

Functional focus centers should be aimed at coordinating, managing and planning the activities of individual entities in the supply chain in the real conditions of

implementation of the planning of the chain strategy through more detailed calendar plans of each entity for the periods: year, quarter, month.

As a result of tactical planning, schedules of homogeneous business processes are created without their detailed division into operations.

The tactical planning algorithm consists of the following stages:

- receiving forecasts and other information from the focus company for the planning period;

- conversion of the received information into calculation of demand for all types of resources for each entity;

- assessment of the adequacy of available and planned resources and identification of gaps between them;

- formation of a program to eliminate identified gaps;

- joint evaluation of the developed plan and search for opportunities to improve it, which provides a soft form of integration to maintain independence and interactive initiation of supply chain development;

- integration of the tactical plan with other levels of planning and participants in the supply chain.

In the process of developing this tactical plan it is necessary to provide:

- conducting innovative research and diversification of business processes in the interests of the supply chain as a whole;

- training, retraining and instruction of staff;

- optimization of sources of financing and composition of own suppliers and service enterprises.

The implementation of tactical plans involves:

- the comprehensive integration of business processes and entities of the supply chain;

- the unification of all efforts of the network of enterprises of the supply chain.

This is important in order to timely and high-quality formation and provision of comprehensive logistics services.

In the course of operational management and planning, the focus company and specialized coordination centers form the main management recommendations and schedules, namely:

- to develop specific working hours for the supply chain entities on week;
- to form detailed programs, i.e. schedules of all business processes;
- to form the needs and schedules of materials consumption and other resources;
- to compose a consolidated weekly-daily work schedule and a schedule-application for the provision of material, mechanized and transport resources;
- control and adjust the hourly schedule-application for loading / unloading of transport, delivery of perishable materials.

These schedules should be illustrated by appropriate cyclograms and Gantt charts and provide a clear sequence of work and the

possibility of parallel overlap of their execution time.

Conclusions. According to the results of research on the theory and practice of logistics management and assessment of the growing requirements for the management of global supply chains, we can insist on:

1. Comprehensive integration of logistics business processes and their actors is the main condition for the efficiency of global supply chains.

2. Managing global supply chains requires:

- creation of an integrated planning system,
- implementation and coordination of comprehensive management decisions agreed by all actors in the supply chain and aimed at achieving the ultimate system goals.

References

1. Management innovation: Abstract by Gary Hamel (ru). URL: <https://www.obs.ru/article/91/>.
2. Moiseyeva T. V. Analiz sovremennykh subyektno-orientirovannykh podkhodov k upravleniyu // Vestnik ChelGU, №3 (449), 2021. URL: <https://cyberleninka.ru/article/n/analiz-sovremennykh-subyektno-orientirovannykh-podkhodov-k-upravleniyu>.
3. Krasavin I. Geterarkhiya mnozhestva. URL: <https://logos-dev.ranepa.ru/home/articles/387329/>
4. Sokolova O.G. Formirovaniye sistemy pokazateley dlya otsenki effektivnosti upravleniya logisticheskoy sistemoy fokusnoy kompanii tsepi postavok. Zhurnal «Modelirovaniye i planirovaniye v tsepyakh postavok», № 1 (72), fevral 2016.
5. Sabatkoyev T.R., Sultanov R.R. Budushcheye tsepey postavok v integratsii na makro-urovne // Logistika i upravleniye tsepyami postavok, № 2 (49), aprel 2012. URL: <http://www.lscm.ru/index.php/ru/po-godam/item/795>
6. Naboka R. M. , Shuklina V. V. Vplyv intehratsiyi lohistychnykh lantsyuhiv postavok na pidvyshchennya potentsialu pidpryyemstva // Efektyvna ekonomikayu - №4, 2020. URL: http://www.economy.nayka.com.ua/pdf/4_2020/89.pdf
7. Mel'nyk D. Ya., Vorzhakova Yu. P. Intehratsiya ta spivrobitnytstvo v lantsyuhakh postavok // 2021: II Mizhnarodna naukovo-praktychna konferentsiya «Biznes, innovatsiyi, menedzhment: problemy ta perspektyvy». URL: <http://confmanagement.kpi.ua/proc/article/view/231034>
8. Boichenko M. Supply Chain Management: Ways of Streamlining (uk) // Ekonomichnyy visnyk Donbasu, № 3(61), 2020. URL: [http://www.evd-journal.org/download/2020/3\(61\)/16-Boichenko.pdf](http://www.evd-journal.org/download/2020/3(61)/16-Boichenko.pdf)

-
9. Tsyfrovi lohistychni trendy 2019 // Logistics in Ukraine. URL: <https://logistics-ukraine.com/2019/01/14/%D1%86%D0%B8%D1%84%D1%80%D0%BE%D0%B2%D1%96-%D0%BB%D0%BE%D0%B3%D1%96%D1%81%D1%82%D0%B8%D1%87%D0%BD%D1%96-%D1%82%D1%80%D0%B5%D0%BD%D0%B4%D0%B8-2019/>
 10. Kolodizyeva T. O. Vykorystannya innovatsiynykh kontseptsiy upravlinnya dlya udoskonalennya funktsionuvannya lantsyuhiv postavok // Problemy ekonomiky № 2, 2017. URL: <http://oaji.net/articles/2017/728-1502709115.pdf>
 11. Koulik V.A., Zamiar Zenon (2020) "Supply chain spiral dynamics". Intellectualization of logistics and Supply Chain Management. [Online], vol.1, pp.7-16. URL: <https://smart-scm.org/en/zhurnal-1-2020/volodimir-koulik-supply-chain-spiral-dynamics/>.
 12. Koulik V.A., Zaharchuk A.P. (2020) "Problems of management in the system of spiral dynamics of supply chains". Intellectualization of logistics and Supply Chain Management. [Online], vol.3, pp.74-82. URL: <https://smart-scm.org/en/journal-3-2020/koulik-volodymir-zaharchuk-alla-problems-of-management-in-the-system-of-spiral-dynamics-of-supply-chains/>

UDC 65.014.1

DOI: [https://doi.org/10.46783/smart-scm/2021-7\(8\)-5](https://doi.org/10.46783/smart-scm/2021-7(8)-5)

JEL Classification: C42, J63, M12.

Received: 24 July 2021

Davidenko V.V. PhD (Economics), Associate Professor, Associate Professor of Logistics Department, National Aviation University (Ukraine)

ORCID – 0000-0002-8419-4636

Researcher ID –

Scopus author id: –

Karpun O.V. PhD (Economics), Associate Professor, Associate Professor of Logistics Department, National Aviation University (Ukraine)

ORCID – 0000-0003-2058-9070

Researcher ID – S-6428-2018

Scopus author id: –

Zamiar Zenon Dr. hab. Inż, Professor, Vice-Rector the International University of Logistics and Transport in Wroclaw (Poland)

ORCID – 0000-0001-9887-0183

Researcher ID –

Scopus author id: – 56419979900

Kostiuchenko L.V. PhD in Economics, Associate Professor, Associate Professor of Department of National Aviation University (Ukraine)

ORCID – 0000-0002-7635-5153

Researcher ID – S-7795-2018

Scopus author id: –

STRATEGIC MANAGEMENT OF THE ENTERPRISE IN THE CONDITIONS IN THE INSTABILITY OF THE MARKET ENVIRONMENT

Volodymyr Davidenko, Olga Karpun, Zamiar Zenon, Lesia Kostiuchenko *"Strategic management of the enterprise in the conditions in the instability of the market environment". The article discusses the role of preventive anti-crisis management on the basis of comprehensive measures to overcome the crisis situations. The reasons and moments of crisis beginning are considered, and in case of objective impossibility to avoid entering the crisis period, the approaches to overcoming them are indicated. The basic concepts of anti-crisis management, preventive management and preventive anti-crisis management, which are effective tools for crisis management in the conditions of cyclical crisis phenomena, are defined. The main tasks of preventive anti-crisis management are revealed, and the estimation of probability of occurrence and analysis of consequences of influence of potential crisis phenomena and situations, at development of anti-crisis strategy,*

realization of action plans on crisis prevention is presented. The key areas of preventive management and the necessary tools for the implementation of anti-crisis measures at the enterprise are identified. The crisis warning functions that will be performed by the crisis prevention service are presented.

Keywords: anti-crisis management, preventive management, preventive anti-crisis management.

Володимир Давиденко, Ольга Карпунь, Заміар Зенон, Леся Костюченко. "Стратегічне управління підприємством в умовах нестабільності ринкового середовища". У статті розглянуто роль превентивного антикризового управління на основі комплексних заходів до подолання кризових ситуацій. Розглядаються причини і моменти настання кризи, а у разі об'єктивної неможливості уникнути входження в кризовий період, зазначені підходи до їх подолання. Визначені основні поняття антикризового управління, превентивного управління та превентивного антикризового управління, що є дієвими інструментами управління кризовими станами, в умовах циклічності кризових явищ. Розкрито основні завдання превентивного антикризового управління, та представлено оцінку ймовірності виникнення та аналізу наслідків впливу потенційних кризових явищ та ситуацій, при розробці антикризової стратегії, реалізації планів заходів щодо попередження криз. Виділено ключові напрямки превентивного управління та необхідні інструменти, при реалізації антикризових заходів на підприємстві. Представлено застережні функції при загрозі кризи, які будуть виконуватись службою кризового попередження.

Ключові слова: антикризове управління, превентивне управління, превентивне антикризове управління.

Владимир Давиденко, Ольга Карпунь, Замияр Зенон, Леся Костюченко. "Стратегическое управление предприятием в условиях нестабильности рыночной среды". В статье рассмотрена роль превентивного антикризисного управления на базе комплексных мер по преодолению кризисных ситуаций. Рассматриваются причины и моменты наступления кризиса, а в случае объективной невозможности избежать вхождения в кризисный период, указанные подходы к их преодолению. Определены основные понятия антикризисного управления, превентивного управления и превентивного антикризисного управления, которые являются действенными инструментами управления кризисными состояниями, в условиях цикличности кризисных явлений. Раскрыты основные задания превентивного антикризисного управления, и представлено оценку вероятности возникновения и анализа последствий влияния потенциальных кризисных явлений и ситуаций, при разработке антикризисной стратегии, реализации планов мероприятий по предупреждению кризисов. Выделены ключевые направления превентивного управления и необходимые инструменты, при реализации антикризисных мер на предприятии. Представлены меры функции при угрозе кризиса, которые будут выполняться службой кризисного предупреждения.

Ключевые слова: антикризисное управление, превентивное управление, превентивное антикризисное управление.

Introduction. The development of the world economy in the context of globalization has increased the negative impact on the domestic sector of the economy and increased the risks of entrepreneurial activity. Numerous risks in modern conditions, affecting each other, cause even greater losses, reduce the efficiency and competitiveness of business structures. The multifaceted nature of risks complicates their forecasting, adequate assessment and development of effective management methods.

The unstable activity of Ukrainian enterprises determines the urgency of the dominant role of preventive anti-crisis management of an industrial enterprise, which will allow business structures to respond purposefully and with warning to emerging risks. It should also be noted that the risks inherent in industrial entrepreneurship form a system of interrelated risks, the management of which requires consideration of their relationships, development and implementation of preventive measures to break the risk chain

and reduce the negative effects of their impact.

The theoretical basis of the study are the works of domestic and foreign experts on business risk management in a crisis, particular the scientific works of P.Drucker [1], M.Porter., V.M. Bagatsky, O.I. Baranovsky, O.P. Bednarska, N.D. Hetmantseva, V.V. Lukyanova, O.V. Kovalenko [2], O.Ye. Kuzmina, V.O. Kunin [3], N.Yu. Podolchak, A.S. Polyanska, V.M. Raspova [4], Z.Ye. Shershneva [7], and others. In which the main attention is paid to the types of management risks due to the importance of the role of preventive crisis management.

The best way to prevent a crisis is to control and monitor the processes and operations of the enterprise. Consistency and regularity of preventive actions, monitoring of the financial and economic condition of the enterprise, development of forecasts and strategic preventive measures, will reduce the crisis impact on enterprises.

Problem statement (formulation of research purposes). The main purpose of the article is to reveal the decisive role in overcoming the crisis in business, in the growing "wave-like" crisis situations, based on preventive management of industrial enterprises, which allows responding the emerging risks, avoiding the threat of unacceptable reduction of business efficiency.

Methodology. The theoretical and methodological bases of the work are the developments of domestic and foreign scientists in the field of crisis management. To achieve the main purpose of the article, the following general and special research methods were used: systematic and comparative analysis – in developing a set of measures in key areas of preventive management; abstract-theoretical – in studying the essence and determining areas for improving approaches to crisis management; hypothetical method and the method of logical generalization – in the development of basic recommendations for the use of elements of anti-crisis measures.

The main research. One of the main criteria for successful business development in modern conditions, is to ensure its sustainable development. Creating such a state is possible only with the active introduction of new technologies and products, progressive competitive strategies and a preventive approach to enterprise management. Thus, the direct impact on the enterprise activities, in conditions of rapid change, have risks that change each other.

To prevent negative processes in the functioning of the enterprise, it is advisable to identify early signs of crisis. Detection of negative phenomena in the early stages, leading to the destruction of activities, can help increase the probability of maintaining sustainable development. Preventive measures can significantly reduce the cost of resources to ensure the implementation of the tasks, because the cost of identifying and eliminating adverse factors is much lower than the elimination of the consequences of the crisis that they may cause. Preventive anti-crisis management is based on the principle of preventing the threat of crisis, with the subsequent provision of neutralization of possible negative consequences. The implementation of this principle is ensured through early diagnosis of the pre-crisis state of the enterprise and the timely use of opportunities to neutralize the crisis.

Anti-crisis management is a set of measures for preliminary assessment of the probability and possible consequences of potential crises, identification of the first signs of crises, development of anti-crisis strategy, implementation of anti-crisis plans to prevent and eliminate crisis, eliminate the consequences of crisis and prevent future crises [7].

Preventive management is based on the timely identification of crisis phenomena elements and involves the development of a set of organizational, economic and management programs aimed at preventing crisis situations.

Preventive anti-crisis management is a set of measures to monitor internal and

external opportunities, and the development and implementation of anti-crisis procedures [4].

The tasks of preventive anti-crisis management include assessment of the probability of occurrence and analysis of the consequences of the impact of potential crisis phenomena and situations, development of anti-crisis strategy, implementation of action plans for crisis prevention.

Preventive anti-crisis management is based on measures to identify, assess and manage the risks of the organization and address issues of improving the economic security of the enterprise, by increasing the ability of the organization to adapt to crisis conditions [5].

In the scientific literature, preventive anti-crisis management is considered in two areas [7]:

early anti-crisis management, which is carried out in order to overcome the danger of crisis and create the potential for profitability in the event of a decline in demand and deterioration of the organization's position in the market and the danger of losing itself;

anti-crisis management on weak signals about the threat of crisis, which is realized in the event of loss of competitiveness of products and the organization as a whole.

In preventive management, the company should be more focused on advanced management, rather than solving problems when they arise. In order to effectively combat crises, the main focus should not be on responding quickly to crisis situations, but on preventing and predicting its occurrence in advance.

Timely detection of the possibility of a crisis and timely adoption of preventive measures on crisis warning is a key task of crisis management.

Implementation of preventive management at the enterprise should take place through the use of a set of measures in key areas of activity (Fig. 1):

area of production activity:

competently and timely planning of economic activity in the short, medium and long term;

identification of new and perspective markets for products;

development of new parts and materials, reengineering;

the possibility of product diversification;

development of alternative strategies of the enterprise in the conditions of pessimistic forecast activity;

functional area of activity:

transition to preventive management technologies for the use of adaptive innovative tools;

introduction of lean production method;

implementation of methods for restructuring the enterprise;

area of management:

creating conditions to increase employment;

using the effective tools of fair motivation and stimulation of work;

creating conditions for creative activity and belonging to the functional activities of the enterprise;

introduction of a knowledge exchange system in the organization.

Analyzing these measures, it is necessary to note two key areas that should be constantly present in all areas of preventive management: the constant introduction of innovations and the activities of the crisis department.

The constant introduction of innovative approaches in anti-crisis crisis management is a key necessity for the effective functioning of a modern enterprise.

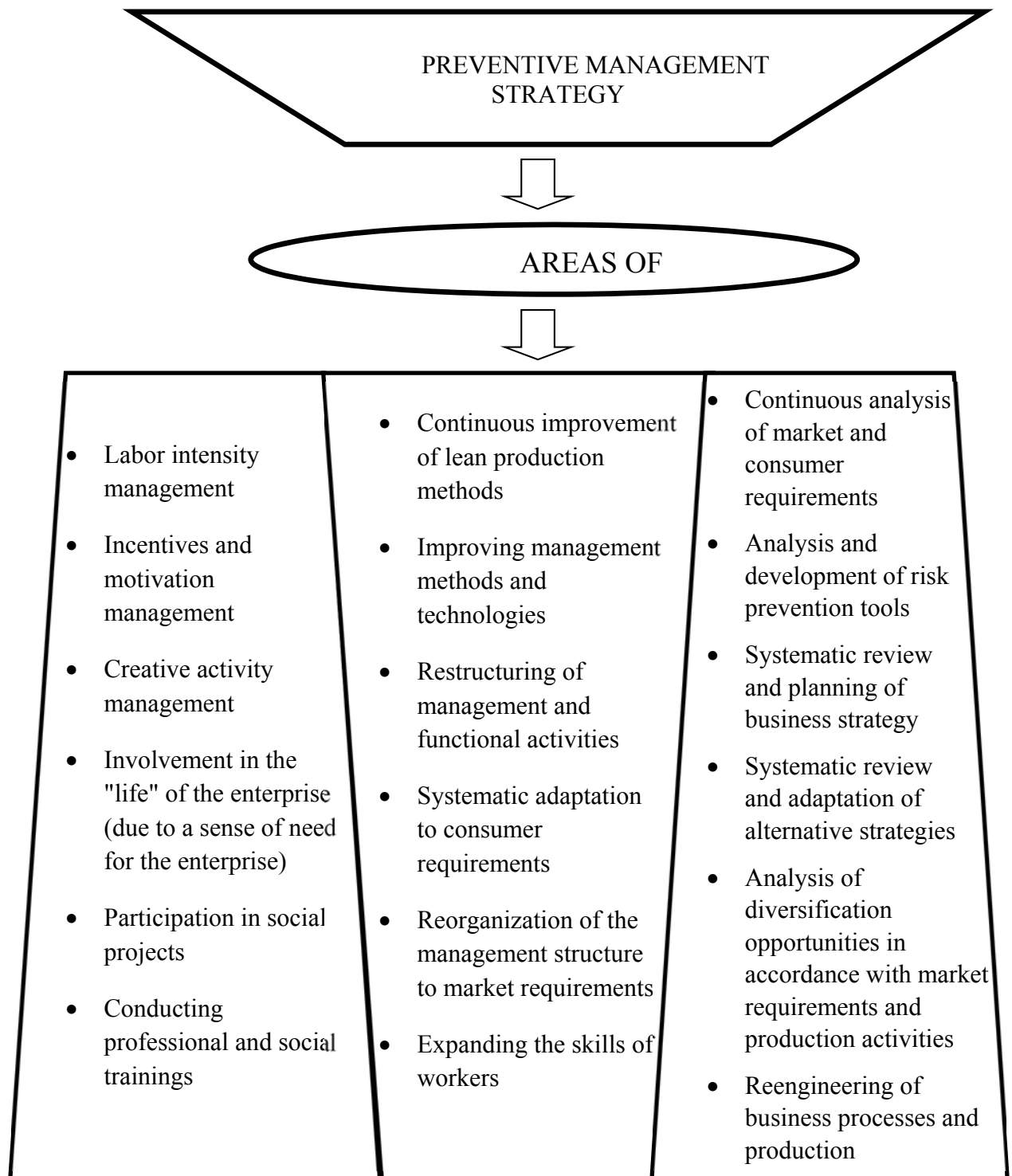


Fig. 1. A set of measures for preventive management by areas of activity

Source: [developed by the author]

The main purpose of innovative approaches in anti-crisis management is to create a preventive management system of the enterprise, in conditions of uncertainty.

Among the key forms of such innovative approaches there are:

- introduction of constant functioning of feedback with the consumer and market requirements;
- constant review and adaptation of effective business processes;
- management and support of internal knowledge and needs;

- using of tools for constant "dialogue" with the external environment.

The study of preventive anti-crisis management, based on the search for acceptable options for organizational management, makes it possible to introduce a new functional organizational unit as a crisis prevention service, and to determine their tasks and functions. The main tasks of a crisis prevention service department include:

- creation and provision of information collection systems for timely identification of causes and factors of crisis development, both in the external and internal environment;
- development of tools for analysis of factors influencing the development of insolvency of the enterprise;
- development of an anti-crisis plan in case of crisis unfolding;
- providing consulting support in developing strategies and tactics for product development and promotion;
- development of proposals for combating the crisis of the enterprise;
- timely warning of the enterprise top management about the need to make anti-crisis decisions;
- determining the desired speed of preventive measures, budgeting the necessary costs, time and resources for their implementation;
- determining the possible effect from the implementation of the proposed anti-crisis measures.

The constant threat of a crisis necessitates the allocation and strengthening of precautionary functions to be performed by the crisis prevention service, which should include crisis diagnosis and forecasting.

The essence of the diagnostic function is to establish the true state of the enterprise in terms of threats:

- determining the place of the enterprise in the development system;
- identification of crisis trends, external and internal factors of the crisis;
- generating reliable information about the threats of crisis phenomena and the

availability of a real opportunity for the company to overcome them.

The function of crisis forecasting is aimed at predicting their nature, depth, possible timing of their occurrence, development of indicators, and prevention of crisis trends.

As a result of the implementation of these functions, the crisis prevention service receives and analyzes information about the general trend, stages of cyclical dynamics of the enterprise, the depth of crisis phenomena in the enterprise, and forecast calculations of the further spread of the crisis. To ensure a timely and adequate response to the threat of a crisis, the crisis prevention service performs the function of planning anti-crisis measures, differentiated by type of crisis. Planned measures to prevent the crisis should be reflected in the strategic and operational plans of the enterprise, which is an alternative to the main plan.

Conclusions. It is impossible to completely exclude the possibility of crisis phenomena in the activities of the enterprise, as its activity is conditioned by the development of the economy. But crisis phenomena can be resisted. And the sooner the crisis is identified and diagnosed, the smaller the losses of the enterprise will be.

Preventive crisis management, understands the ability to predict the causes and timing of the crisis, and in case of objective impossibility to avoid entering the crisis period, to take the necessary measures to combat the crisis. Its advantage is that there are longer time intervals between the adoption, implementation and appearance of appropriate decisions in the managed system.

The scientific novelty of the obtained results is to determine a set of measures and key forms of innovation in preventive management, taking into account which can prevent crisis problems when they occur.

Prospects for further research in this area are an in-depth study of anticipatory anti-crisis management and determine its benefits in the activities of enterprises.

References

1. Druker P. Effektivnoye upravleniye predpriyatiyem. M.: Viliams. 2008. – 224s.
2. Kovalenko O. V. Sutnist, osoblyvosti ta deiaki problemy preventyvnoho antykryzovoho upravlinnia pidpriemstvom/O.V. Kovalenko//Visnyk Natsionalnoho tekhnichnoho universytetu „Kharkivskiy politekhnichnyi instytut“. Zbirnyk naukovykh prats. Tematychnyi vypusk: Tekhnichnyi prohres i efektyvnist vyrobnytstva. – Kharkiv: NTU „KhPI“. – 2009. - № 5. – S. 99-106.
3. Kunin V.A. Preventivnoye upravleniye predprinimatelskimi riskami promyshlennykh predpriyatiy. SPb.: Izd-vo SPbAUE. 2009.- 349 s.
4. Raspopov V.M. Preventivnoye antikrizisnoye upravleniye: uchebnoye posobiye / V.M. Raspopov. V.V. Raspopov. – M.: Magistr: INFRA-M. 2012. – 432 s.
5. Raspopov V.M. Upravleniye izmeneniyami: uchebnoye posobiye / V.M. Raspopov. – M.: Magistr: INFRA-M. 2013. – 336 s.
6. Rudenskiy R.A. Antisipativnoye upravleniye slozhnymi ekonomicheskimi sistemami: modeli. metody. instrumenty: monografiya / R.A. Rudenskiy; Donetskyy natsionalnyy un-t. NII problem ekonomicheskoy dinamiki. – Donetsk: Yugo-Vostok. 2009. – 257 s.
7. Shershnova Z.Ie. Antykryzove upravlinnia pidpriemstvom: Navch. posib. / [Z.Ie. Shershnova, V.M. Bahatskyi, N.D. Hetmantseva]; Za zah. red. Z.Ie. Shershnovoi. – K.: KNEU, 2007. – 680 s.

Scientific publication

**INTELLECTUALIZATION OF LOGISTICS AND SUPPLY CHAIN
MANAGEMENT**

The electronic scientifically and practical journal

№ 7(8) (2021)
August 2021

ISSN 2708-3195

DOI: [https://doi.org/10.46783/smart-scm/2021-7\(8\)](https://doi.org/10.46783/smart-scm/2021-7(8))



This work is licensed under a Creative Commons Attribution 4.0 International License