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ADAPTATION OF A LOGISTICS COMPANY'S BUSINESS MODEL IN THE ERA OF DIGITALIZATION

Oksana Pozniak, Yurchenko Kateryna. "Adaptation of a logistics company`s business model in the era of digitalization". *The article is devoted to the study of the adaptive capabilities of logistics companies in the conditions of global digitalization. The developed conceptual model of logistics company adaptation defines the tasks, principles, components, and stages of adaptive management, allowing the logistics company to obtain a synergistic effect from the implementation of the model as a complete system, provides an opportunity to improve the quality of management, forming a proactive adaptation management mechanism. Taking into account modern trends, in the conceptual model adaptation and sustainable development are highlighted as its main components, since sustainable development is based on compliance with the principles of environmental sustainability and social responsibility, adaptation is defined as a tool for the effective implementation of these principles in a logistics company in a changing environment. It was determined that to make corrective changes to the existing business model, it is necessary to assess the existing level of adaptability of the logistics company. To implement this approach, a system for evaluating the effectiveness of adaptive management of business processes of a logistics company has been developed, which consists of 7 subsystems, having a variable character, oriented to any stage of the company's digitalization. Applying a comprehensive approach to the system of evaluating the effectiveness of adaptive management based on the calculation of integral criteria for each subsystem is justified, which are summarized in a total integral indicator that summarizes the influence of all factors and determines the degree of adaptability of the logistics company's business model.*

Keywords*:* business model, logistics company, adaptation, adaptive management, digitalization, integral indicator

Оксана Позняк, Катерина Юрченко. «Адаптація бізнес-моделі логістичної компанії в епоху цифровізації». *Стаття присвячена дослідженню адаптаційних можливостей логістичних компаній в умовах глобальної діджиталізації. Розроблена концептуальна модель адаптації логістичної компанії визначає завдання, принципи, компоненти та етапи адаптивного управління,*

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що дозволяє логістичній компанії отримати синергетичний ефект від впровадження моделі як цілісної системи, дає можливість підвищити якість управління, формування проактивного механізму управління адаптацією. Враховуючи сучасні тенденції, у концептуальній моделі адаптація та сталий розвиток виділені як її основні складові, оскільки сталий розвиток ґрунтується на дотриманні принципів екологічної стійкості та соціальної відповідальності, адаптація визначається як інструмент ефективної реалізації цих принципи в логістичній компанії в мінливому середовищі. Визначено, що для внесення корегуючих змін в існуючу бізнес-модель необхідно оцінити наявний рівень адаптивності логістичної компанії. Для реалізації даного підходу розроблено систему оцінки ефективності адаптивного управління бізнес-процесами логістичної компанії, що складається з 7 підсистем, які мають варіативний характер, орієнтованих на будь-який етап діджиталізація компанії. Обґрунтовано застосування комплексного підходу до системи оцінки ефективності адаптивного управління на основі розрахунку інтегральних критеріїв для кожної підсистеми та загального інтегрального показника, який узагальнює вплив усіх факторів і визначає ступінь адаптивності бізнес-моделі логістичної компанії.

Ключові слова: бізнес-модель, логістична компанія, адаптація, адаптивний менеджмент, діджиталізація, інтегральний показник

Introduction. Modern business realities are characterized by the increasing digitization of business relations in the global economic environment, forming new forms of interaction between partners in supply chains. These changes are caused by the varying degree of implementation of innovative trends, which are defined in the Logistics Trend Radar [4], developed by the leading logistics company DHL, and have an impact not only on the development of the logistics industry but also on the entire global economic environment, causing a rethinking of business principles and orientation towards more flexible approaches to decision-making, requiring constant monitoring and maximum adaptation to changes in the external environment. Accordingly, conducting business under modern conditions requires the management of a logistics company to develop skills for the rapid adaptation of the existing business model to ensure and maintain the efficiency of operations and the formation of the company's development potential. Thus, logistics companies, to gain competitive advantages in the logistics services market, must adapt the existing business model to the challenges of both the external and internal environment, introducing modern digital tools and forming a digital business model.

Analysis of recent research and publications. The article expands the research begun by the authors on the problems of identifying and classifying business models of a logistics company, forming an optimal business model [6-7], as well as assessing the effectiveness of logistics assets formed within the framework of the existing business model of a logistics company [5], delving into the issues adapting the business model of a logistics company in the context of digitalization [8].

The expansion of the problem was due to the growing interest of scientists in identifying the impact of innovative digital trends on the formation and adaptation of a company's business model. This is confirmed by the article [3], which summarizes the results of expert surveys conducted by international organizations as a method of empirical research with the aim of identifying current problems, features and trends in providing customer-oriented logistics services to consumers in the digital space.

According to another survey [2] that summarizes the the evolutionary trends in the business models of companies in the road freight transport sector, identifies the

importance of business integration on digital platforms to optimize resources and provide better services by creating unified interfaces for contracting, customer service, shows the importance of technology adoption and assimilation of changing customer needs and values in the development and planning of business models.

Bortnik [1] highlights the key aspects of the digital transformation of a business model in the context of creating value standards for all stakeholders. Adaptation of the model to digital and social changes is proposed to be considered as a transformation of a new form of doing business in connection with the growing use of digital assets, which is most suitable and satisfies the conditions of functioning in the digital economy. builds relationships with digital consumers and partners.

The conceptual and applied foundations of adaptive strategic management in the conditions of digital transformation of business are reflected in [10], where the principles and approaches of adaptive strategic management in the conditions of digitalization of business are defined, current methods of diagnosis of prerequisites for strategy implementation, selection and implementation of its optimal option are systematized, and the toolkit of adaptive management is defined.

The issue of business model adaptation in the context of the digitalization of the economy of Ukraine was considered in [9] on the basis of a system-activity approach, which determines the consideration of this issue in the context of the entire country, and not a separate entity.

The variety of aspects of this issue determines the relevance of further research, especially taking into account the possibility of adaptation of logistics companies of Ukraine in the conditions of martial law.

Objectives statement. The purpose of the article is to develop a conceptual approach to the adaptation of the business model in the conditions of digitalization to optimize the strategic and operational activities of the logistics company.

Basic material and results. The adaptation process is very important for any company, as it affects the company's business model, and ineffective adaptation management can lead to serious losses. The organization of control is one of the most important parts of ensuring the fulfillment of assigned tasks and making corrective decisions when indicators deviate from the planned ones.

To achieve this goal, it is necessary to update the strategic management methodology and develop modern methods and mechanisms, investment, and financial instruments. Developing strategic goals requires the adoption of strategic plans in the medium and long term, a plan for adapting to change, the use of digital resources, and the adoption and promotion of innovation.

To fully adapt a company, it is necessary to determine the main goals, understand what actions to take, what needs to be changed to fit the new business model, what this can lead to, etc. Therefore, the company must have a clear model with all the stages that the adaptation process takes on. Based on the conducted analysis of approaches to the adaptation models, a conceptual model of adaptation of a logistics company in the context of digitalization is proposed. The conceptual model is shown in Fig. 1.

This model helps a logistics company to determine not only how to adapt its management to the conditions of digitalization, but also helps to reveal important aspects of this process. Thus, this conceptual model describes the components of adaptive management, namely adaptive management in the conditions of digitalization and the conditions of modern development. Furthermore, managers have more opportunities to study this issue through the model and choose the type of management that is more suitable for a logistics company.

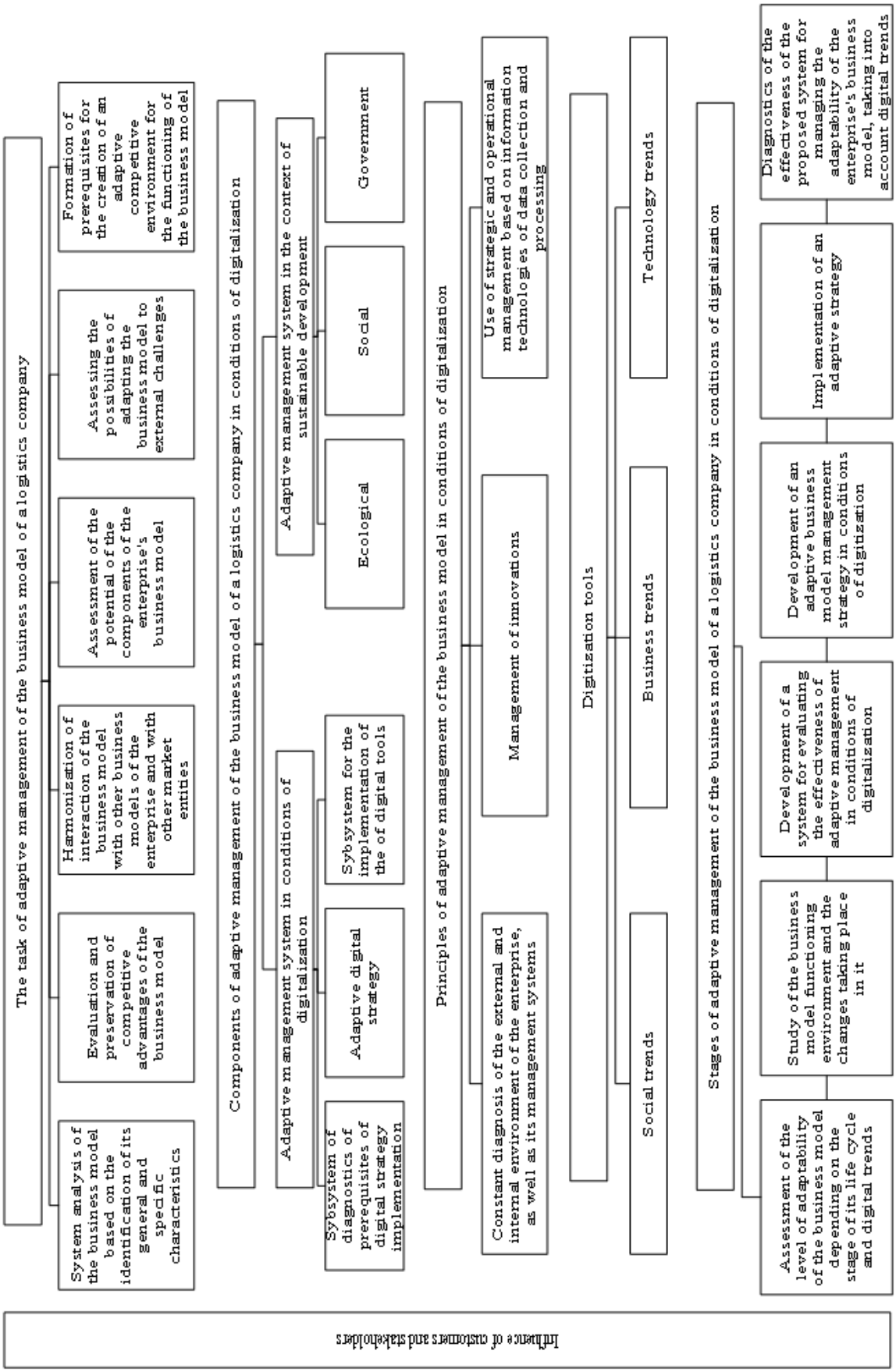

Figure 1 – Conceptual model of adaptation of a logistics company in the context of digitalization
Source: compiled by the authors

The conceptual model represents a system consisting of certain component blocks, each of which determines the specific features of this model, which forms the mechanism for the adaptation of a logistics company in modern conditions of digitalization and sustainable development.

The model describes the main tasks of adaptive management in conditions of digitalization, which directly helps managers to determine what goals should be set for themselves in the company, how to distribute responsibilities between departments for more effective management, and what basic conditions must be met. This also applies to digitization tools. Modern trends change faster than companies have time to adapt to something new, so you need to constantly monitor such trends and offer customers approaches with a certain novelty. Constantly adapting to changes, the logistics company increases its responsiveness, and change management potential, which affects both the general level of company management and all levels of the hierarchy, which affects the so-called "outputs" and "outcomes" - improving the quality of logistics services, in accordance with potential and existing customer requirements; increase in the number of loyal customers; proactive response to external and internal environment risks; adaptation of the management system, corporate responsibility to modern trends, such as sustainable development, etc.

Considering the above, sustainable development is defined as the main component of adaptive management of the business model of a logistics company, accordingly, it is necessary to identify stakeholders and customers as subjects that determine the occurrence of changes and receive benefits from their implementation in conditions of digitalization.

The implementation of digital tools in the areas identified in the Logistics Trend Radar, which was developed by the logistics services market leader - the logistics company DHL, forms the innovative adaptation potential of the logistics company and becomes an impetus for other global operators of the logistics services market to develop their own Trend Radars (in particular, the logistics company DSV), which makes it possible to identify digitalization as one of the company's main strategies and adapt the business model to the implementation of these changes.

The model clearly describes the stages of adaptive management, which helps a logistics company form a comprehensive vision of the business model adaptation process and makes it possible to improve the quality of management by forming a proactive adaptation management mechanism. This model is quite flexible, and an important aspect of the adaptation process is the step-by-step understanding of each microprocessor in a given system. Without a clear description, any company may experience disruptions, so it cannot be fully said that the company is effectively adapting to digitalization. In addition, given changes in customer behavior and requirements, without "step-by-step" instructions, a company may simply lose customers because it will not be able to adapt to changes in customer behavior, service requirements, etc.

During the implementation of this model, it is necessary to determine the current state of the logistics company and its ability to implement changes and adapt the existing business model. To implement these goals, the following stages are presented in the model:

1. *Assessments of the level of adaptability of the business model depending on the stage of its life cycle and digital trends.* This is a very important stage of the model, as it determines the feasibility of using digital tools depending on the stage of the life cycle. At the early stages of a logistics company's life cycle, it is possible to implement various digital tools, forming an innovative model, but this requires significant investment, which may not always be economically feasible. As the logistics company develops, the business model may change, and the introduction of

digital tools allows it to obtain and maintain competitive advantages in the market.

2. *Study of the business model functioning environment and the changes taking place in it.* As already mentioned, factors and subjects of the external environment have a decisive influence on the expediency of adapting the existing business model, therefore, the study of these factors allows determining the degree of their influence in order to form a mechanism for responding to them.

3. *Development of a system for evaluating the effectiveness of adaptive management in conditions of digitalization.* This stage is determined by a high degree of variability of those indicators that a logistics company can use to assess the existing state of adaptability and determine its growth potential.

4. *Development of an adaptive business model management strategy in conditions of digitalization.* Depending on the conducted assessment of the effectiveness of adaptive management of the logistics company, it is necessary to adjust the existing strategy and define digital trends that should be implemented in the logistics company.

5. *Implementation of an adaptive strategy.* This stage is determined by the implementation project of the strategy established in the previous stage.

6. *Diagnostics of the effectiveness of the proposed system for managing the adaptability* of the enterprise`s business model, taking into account digital trends, determines the effectiveness of the proposed changes, the feasibility of corrective actions, characterizes the transition of the logistics company to a new level - the level of formation of a digital business model. Digitalization is changing the world around us, companies, industries, business models and business processes. It is important to adapt flexibly and quickly to new challenges by changing and restructuring some production processes. Digital transformation not only leads to changes in the product environment, but also initiates changes in business models, which changes the life cycle of the company.

The effectiveness of business process management in the context of digitalization can be assessed by the following criteria:

– private and consolidated integral performance indicators of business process management in the context of the digitalization of the economy;

– indicators of indicative assessment of the effectiveness of the business process management system. It is based on the use of a set of partial indicators and makes it possible to assess the relationship between the effectiveness of the management system of a business entity and its production, financial, and non-financial indicators, the effectiveness of the management system of a business entity at different stages of management decision-making, and to conduct a comparative assessment of effectiveness before and after the implementation of measures as part of adaptation to the requirements of digitalization;

– determination of the content of the digital environment of the business process presented as a result of the intelligent integration of elements and tools of digital transformation, digital communication, and data transmission channels, private digital platforms of basic information technologies, software, and databases of various enterprise systems, the analysis of which will allow a qualitative assessment of the current digital maturity of the business entity, develop proposals for reforming the structure of the digital environment.

The effectiveness of adaptive management of business processes in conditions of digitalization can be traced in detail by the following subsystems of indicators:

Subsystem 1. Effectiveness of a logistics company: the stage of achievement of the established goals for a logistics company in a context of digitalization.

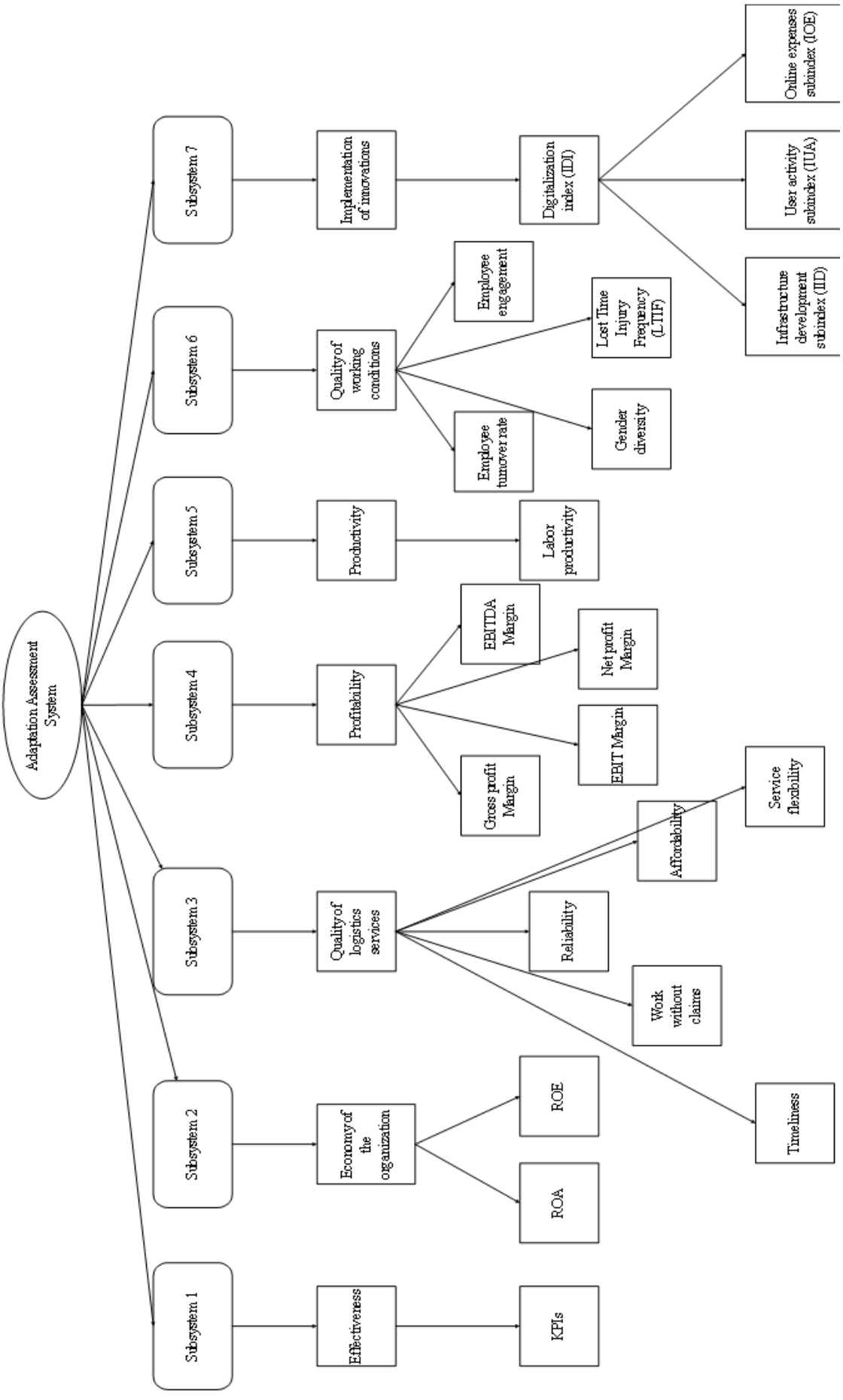

Figure 2 – System for evaluating the effectiveness of adaptive management of a logistics company`s business model

Source: compiled by the authors

Subsystem 2. Economy of a logistics company: characterizes the strategy and tactics of the formation and use of economic resources of the logistics company depending on the chosen business model and taking into account digital trends.

Subsystem 3. Quality of logistics services: characterizes the the level of quality of logistics services, based on the assessment carried out by the logistics company itself, as well as the assessment of customers.

Subsystem 4. Profitability of company`s activity: characterizes the financial stability of the company`s structure.

Subsystem 5. Productivity: characterizes the efficiency of workforce (labor productivity).

Subsystem 6. Quality of working conditions. This subsystem of indicators supports the definition of sustainable development as the main component of the adaptation model of the business model of a logistics company and evaluates the impact of the implementation of digital tools on both the workforce and the change in the quality of working conditions.

Subsystem 7. Implementation of innovations. Determines the level of innovation in the company and allows to assess the impact of digital and information and communication technologies on the technical and technological stability of the logistics company.

The proposed system of indicators makes it possible to assess the degree of adaptation of the logistics company as a whole and its individual components, to assess the impact of the implementation of digital tools on the main economic resources of the company, financial performance indicators, as well as on the established strategy. The indicators included in each subsystem may vary, depending on the meaningful component that the management of the logistics company determines for its evaluation, the KPI system implemented in the company, etc.

Fig. 2 presents the system for evaluating the effectiveness of the adaptive management of a logistics company`s business model developed by the authors, which consists of 7 subsystems, and the indicators corresponding to each subsystem, which evaluate the current level of adaptation, how effectively the logistics company carries out adaptation, which aspects require more attention and changes, and which indicators have already normalized and become positive for companies.

The details of the proposed system of indicators, which are grouped by subsystems, are summarized in Table 1.

Table 1. Main indicators of subsystems for evaluating the effectiveness of adaptive management of a logistics company`s business model in the context of digitalization

№	Subsystem	Main indicator	Formula
1	2	3	4
1	Subsystem 1: Effectiveness	KPIs	Depends on the company`s main goals. Usually shows the deviation between the forecasting indicator and the result of the company for the year. Can be used the following indicators: - *Net profit margin;* - *Market share;* - *Satisfactory index;* - *CapEx.*

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Continue Table 1

1	2	3	4
2	Subsystem 2: Economy of a logistics company	ROA	*ROA = Net income / Average total assets*
		ROE	*ROE = Net income / Average total equity*
3	Subsystem 3: Quality of logistics services	Timeliness	$T = \frac{1}{n}\sum_{i=1}^{n}\frac{t_{\exp\_i}}{t_{fact\_i}}$, where $t_{\exp\_i}$– orders fulfillment time, expected by customer; t_{fact_i} – the actual time of orders fulfillment; *n* – the total number of customers.
		Work without claims	$Y = \frac{\sum Q_{ex} - \sum Q_{cl}}{\sum Q_{ex}}$, where Q_{cl} – the total number of orders, which was made with claims from customers; Q_{ex} – the total number of executed orders.
		Reliability	$R = \frac{\sum Q_{rel}}{\sum Q_{ex}}$, where Q_{rel} – the total number of orders, which was made with all contractual terms.
		Affordability	$\mathrm{A} = \frac{1}{n}\sum_{i=1}^{n}\frac{C_{\exp\_i}}{C_{fact\_i}}$, where $C_{\exp\_i}$ – price (cost) of orders, expected by customer; C_{fact_i} – the actual price (cost) of orders for customer; *n* – the total number of customers.
		Service flexibility	$F = \frac{\sum Q_{ex}}{\sum Q_{req}}$, where Q_{req} – the total number of customers requests (contacts).
4	Subsystem 4: Profitability	Gross profit Margin	*Gross profit Margin = Gross Profit / Revenue*
		EBITDA Margin	*EBITDA Margin = (Net income + Interest + Tax+ + D&A Expenses) / Revenue = EBITDA / Revenue*
		EBIT Margin	*EBIT Margin = (Net income + Interest + Tax) / Revenue = = EBIT / Revenue*
		Net profit Margin	*Net profit Margin = Net income / Revenue*
5	Subsystem 5: Productivity	Labor productivity	*Labor productivity = Revenue / Number of staff*

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End of table 1

1	2	3	4
6	Subsystem 6: Quality of working conditions	Employee turnover rate	*Employee turnover rate = Employee who left / 0,5*(Employee at the beginning + Employee at the end) *100*
		Gender diversity	Represents the percentage of female in the company.
		Lost Time Injury Frequency (LTIF)	*LTIF = ([Number of lost time injuries in the reporting period] x 1,000,000) / (Total hours worked in the reporting period)*
		Employee engagement	*Employee engagement rate = Number of employees whose score of engagement is higher than 7 / Total number of employees *100*
7	Subsystem 7: Implementation of innovations	Digitalization index	$DI = \frac{\sum_{i=1}^{n} Weight_n * Metric_n}{Total\ Weight}$, where $Weight_n$ – weighting coefficients for each metric; $Metric_n$ – metrics characterizing the company's digital readiness; $Total\ Weight$ – the sum of all weighting coefficients.

Using groups of indicators corresponding to each subsystem, it is possible to conduct a detailed analysis of the entire company's activities, since all the main indicators have been identified, reflecting not only the effectiveness of the company's adaptation to digitalization but also the efficiency of the logistics company. Applying the proposed assessment system, it is possible to assess the company's performance and the level of its involvement in ensuring a safe working environment, determine the company's digitalization indicators, and also analyze how effectively the company operates using KPIs. Certainly, not all indicators have clearly defined formulas, since the company can analyze some indicators using its own examples. For example, different companies may have their own KPI systems, which, in turn, helps analyze their activities. Also, for example, a company may have a certain level of gender diversity, the norm of which the company chooses for itself, which determines a certain level of variability in the proposed system.

To determine the contribution to the formation of the assessment system, it is necessary to summarize each indicator of the subsystem by creating integral criteria. Based on the integral indicators of each subsystem, the overall integral indicator of the company can be determined. The formulas for these indicators are as follows:

$$IC_n = \sqrt[m]{\prod_{i=1}^{m} C_i}, \quad (1)$$

where
IC – integral criteria of subsystem;
n – number of subsystem;
m – the number of the criterions analyzed;
Ci –value of criterions analyzed.

$$IC_{total} = \sum_{i=1}^{n} IC_n \,, \quad (2)$$

where
IC_{total} – total integral criteria;
n – number of subsystem;
IC_n – value of integral criteria of subsystem.

This comprehensive assessment system forms the base for conducting a holistic analysis of the company, determining the level of services and quality of its work, and assessing the effectiveness of using different types of economic resources, especially the workforce, efficiency, and profitability of a logistics company. After such a detailed analysis, the company can decide for itself whether to remain at the current level or improve its activities through the introduction of digital tools, or by, analyzing the work of other companies with a similar business model, understand what changes can improve the efficiency of the logistics company. The use of an integral indicator calculated both for each of the subsystems and a general integral indicator helps to summarize all subsystems together and highlights the general trend of the company's development. Thus, the analysis of subsystems, combined into a single structure, forms a basis for considering the effectiveness of adaptive management and determining at what stages changes need to be made.

Using the system for evaluating the effectiveness of adaptive management of a logistics company`s business model, it is important to form aspects of the business model of the company and provide a full analysis of all indicators to understand the situation of the company. It is important to underestimate the full analysis of a company`s effectiveness, quality of services, profitability, productivity, etc. This model allows the company to distribute responsibilities for managing all aspects affected by the system, to monitor which indicators are returning to normal, and where the company has bottlenecks. To overcome the bottlenecks of the company, it is important to understand the main aspects that influence the company`s performance. Such a system also helps with that understanding, since the company would be able to analyze all fields of its work.

In addition, this system is aimed at analyzing indicators that will reveal the company's full potential, which in turn can help it decide which digital system can be implemented. For example, if a company has a high productivity indicator, then the company has good working conditions, and therefore the quality of working conditions is also high. This helps the company develop social sustainability; in turn, working conditions can be improved by introducing robotization or artificial intelligence. After all, if the company has good conditions for employees, then it will not be difficult for them to switch to new technologies.

Moreover, for example, a company may have high-quality indicators for the services provided, which means that the company has a close and profitable relationship with clients who can rely on the logistics company. Consequently, this company can develop in the direction of working with clients and introduce the same CRM system, which will improve this relationship even more.

Thus, this system can open up the potential for a company, indicate both strengths and weaknesses and show in which industry the company should develop and invest, if any. In addition, this system will indicate where the company is not yet ready to implement digital projects, but where it is worth paying attention and improving performance so that the company has even more potential in the future.

This adaptation assessment system can help the company navigate and quickly respond to changes in any aspect of the company's work, and determine where the company should pay more attention. Also, this system can show in real time the company's readiness for any changes that relate not only to digitalization.

Conclusions. The conceptual model for adapting the business model of a logistics company and the system for assessing the effectiveness of adaptive management in the context of digitalization, developed by the authors, allows to comprehensively assess the prospects for the company's development in the digital environment, creating the potential for a rapid flexible response, adaptation, and adjustment in case of changes in the conditions of the external and internal environment. This makes it possible to improve the quality of management, to form a management mechanism for proactive adaptation, which leads to a fundamental change in the entire strategy of the logistics company, determines proactive management actions in relation to the factors of the external environment, and as a result of adaptation, changes of a qualitative nature are formed - an increase in the overall potential of the logistics company, actualizing this issue in the context of global digitalization.

Digitization of the world economy is happening at a very fast pace, the types of digital tools that can be implemented, according to the Logistics Trend Radar, are determined based on its life cycle, the company's readiness for digitalization, and the existing level of implementation of innovative technologies. The implementation of a system for evaluating the effectiveness of adaptive management of business processes of a logistics company, which is focused on any stage of the company's digitalization, allows to generalize the influence of all factors and determines the degree of adaptability of the logistics company's business model, its readiness for future digitalization. The implementation of digital technologies and the creation of radars of technological trends allow for the formation of a digital business model that takes the digital transformation of business to a qualitatively new level. This identifies new directions for further research and opportunities for creating digital supply chain ecosystems. Consider promising research in the field of creating digital ecosystems of supply chains, creating digital trend radars, and developing models of digital transformation of the business model of a logistics company.

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