

Enterprise Integration Models: Advantages and Challenges of Implementation in the Context of the COVID-19 Pandemic

Zorina Ya. Shatska*

*Kyiv National University of Technologies and Design
01011, 2 Nemyrovycha-Danchenka Str., Kyiv, Ukraine*

Abstract. The relevance of the study of the choice of enterprise integration model is related to the need to solve various problems faced by Ukrainian enterprises in the context of the COVID-19 pandemic, including: reduction in profitability, reduction in investment, increase in the level of costs for ensuring the protection and safety of employees, the transition to environmental and savings production, and others. The purpose of the study is to analyse the existing Ukrainian and foreign business models based on synergy and integration, which allows creating a business structure. The theoretical and methodological basis of the study is general scientific and specific methods used to solve the problem of operation, integration, and development of enterprises in the context of the COVID-19 pandemic. The paper summarises the problems faced by Ukrainian enterprises amid the COVID-19 pandemic. It is proposed as one of the ways out of the crisis of Ukrainian enterprises after the COVID-19 pandemic, the transition to business models based on synergy and integration with the formation of a business structure. For this purpose, Ukrainian and foreign models of creating business structures based on synergy and integration are summarised. The following models developed by Ukrainian researchers are identified: the model of a horizontally integrated business structure; the model of a vertically integrated business structure; the model of a globally integrated business structure; the model of a conglomerate-integrated business structure. The following models developed by foreign researchers are also summarised: a model for quantifying the impact of enterprise integration on the results of its activities; an information model; a model for designing and implementing an integrated enterprise system; a “three-lens” model; a business case model; a model for inter- and intra-organisational cooperation

Keywords: business structures, business models, system approach, coronavirus disease, supply chains

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*Corresponding author

Introduction

The COVID-19 pandemic has led to the suspension of business around the world due to the introduction of a lockdown. The largest losses were suffered by industries that depend on political factors, trade disputes between countries and other geopolitical changes, namely: metallurgy, mechanical engineering, light industry. Since the beginning of the pandemic, the volume of industrial output in Ukraine has decreased by 8%, and more than 20% of enterprises have closed [1]. According to data of Centre for Applied Research [2], only in Kyiv, more than 35% of enterprises stopped working, 16% of staff was reduced.

The main problems faced by Ukrainian enterprises in the context of the COVID-19 pandemic were:

1. Reduced profitability and reduced investment. In order to survive the lockdown, Ukrainian enterprises are forced to suspend programmes for the modernisation of fixed assets, and investments are reduced by 10-16%. "Analysing the activity of producers in the conditions of previous crises, this indicator may fall to 32-35%" [1]. The situation is aggravated by a significant decline in market demand, falling prices for products, which leads to a reduction in the net profit of enterprises.

2. Increase in the level of costs for ensuring the protection and safety of employees. Starting from the end of 2020, enterprises were forced to increase the level of costs for ensuring the protection of personnel's health (purchase of personal protective equipment and temperature screening systems, carry out disinfection of premises, organise work taking into account social distance and other anti-epidemic measures). In order to reduce the spread of the pandemic, public transport was used to transport personnel to their place of work. All this led to an increase in the cost of labour protection measures, which increased by 18-27% in 2020 [1].

3. Implementation of the principles of environmental and savings production. The pandemic has increased the need for more rational use of resources, due to a significant increase in their price (especially energy carriers) and supply disruptions. The introduction of savings production measures would allow the company to reduce the cost of production, integrate into global production and sales chains, compensating for financial losses due to lockdown.

4. Supply chain protection. The failure of supply chains has not greatly affected the functioning of Ukrainian enterprises, as they are just joining global supply chains, gradually starting to export products with high added value. Ukrainian enterprises of the agro-industrial complex and the pharmaceutical industry are more active in this direction.

5. Digital transformation of the business. The pandemic has accelerated the digital transformation of businesses. The introduction of electronic resource planning systems, automation of production processes, the transition of personnel to remote work and other measures helped to maintain the efficiency of business processes of Ukrainian enterprises during quarantine. According to a study conducted in 2020 by the Association of Employers of Ukraine on the topic "Business and COVID-19: survive cannot die" [3], it was

found that the most serious problems of functioning of enterprises in quarantine conditions are that: business partners of the enterprise have been negatively affected by quarantine restrictions and do not carry out normal economic activities (74% of respondents), suppliers are not able to ensure timely deliveries (49%) and insufficient working capital to pay staff and operations (34%). Therefore, 53% of business managers do not have a plan to ensure continuous work in the context of a pandemic. "An assessment of the safety margin of enterprises under quarantine conditions shows that a third of the surveyed enterprises would be able to survive from 2 to 3 months. Almost a fifth believes that their business would only be viable for 1-8 weeks, while another fifth expects their business to survive for 3-6 months. Only 6% of respondents were not affected by the coronavirus" [3]. This indicates that the crisis of business activity caused by COVID-19 has slowed down business growth.

The complication of business conditions has led to the need to restructure traditional business processes, change economic priorities and solve a number of new problems faced by enterprises. At the same time, the COVID-19 pandemic has provided a unique opportunity to overcome the traditional attitude of enterprises to products, personnel and technologies as separate components and combine their capabilities into a new development model based on synergy and integration with the formation of integrated business structures – business structures.

The purpose of the study is an analysis and systematisation of business models based on synergy and integration with the creation of a business structure. According to the established goal, the objectives of the study are: generalisation of Ukrainian and foreign business models based on synergy and integration; identification of advantages and disadvantages of implementing these models on business structures in the context of the COVID-19 pandemic.

Literature Review

Given the multifaceted problems of enterprise integration and various aspects of the creation of business structures in a pandemic COVID-19, this issue is considered by Ukrainian scientists, including U.Z. Vatamanyuk-Zelinska [4], V.M. Horbatov [5], N.V. Zakharchenko [6], I.I. Kryshchyna [7], N.D. Maslij [8], I.M. Miahkykh [9], O.M. Nifatova [10], A.A. Pylypenko [11], I.V. Strutynska [12], N.S. Skopenko [13] and many others. In their studies, the problems of integration of enterprises at the micro level are considered from different aspects, namely: taking into account in the process of integration of enterprises of the business environment and the development of special mechanisms of integration of enterprises [4]. Development of a model of competitive interactions between integrated structures in the strategic economic zone, based on the theory of interspecies competition and assessment of the competitiveness of integrated structures [5]. Issues of the integration development of high-tech industrial enterprises in the context of the implementation of the model of high-tech economic growth [6].

Construction of strategic accounting of integrated business from the standpoint of systems theory and the use of a set of risk management tools [7]. Identification and calculation of the compatibility potential of enterprises of the integrated structure by choosing a business partner, based on the analysis of socio-cultural, scientific and technological, organisational, financial and economic, territorial and legal aspects of the potential business partner [8]. Management of economic development of integrated enterprises (for example, airlines), which includes reflected by the relevant classes of models of the relationship between performance indicators for each of the selected potentials, determines the stages of economic development and is a system of interrelated tasks of enterprise identification in the integrated business structure, that provides their ability to establish factors of influence and organise a gradual process of formalisation of the behaviour of the enterprise as an economic system, according to the selected optimal of the developed scenarios [9]. Assessment of the potential of the intellectual synergy of the integrated business structure on the basis of branding [10]. Study of institutional regulation of processes and relationships between integrated enterprises focused on the regulation of norms and rules of conduct of locally optimised organisational systems with the allocation of strategic accounting functions [11]. Development of a polystructural approach to the definition of the Index of digital transformation of business structures and the algorithm of road maps of digital transformation of business structures [12]. Analysis of integration processes taking into account the key goals of integration activities, the stage of the integration life cycle and a set of methods of the four-level system of analytical procedures to the retrospective, operational, and forecast assessment of financial, economic, investment and integration activities of enterprises in the process of tactical integration [13].

Ukrainian scientists focus on considering the processes of creation, functioning, and development of enterprises as integrated business structures. The study is aimed at solving certain problems that would contribute to the integration interaction and development of enterprises, namely: building strategic accounting in the strategic management system of integrated business structures; features of functioning, development and interaction of locally organised integrated associations of industrial enterprises; the digital transformation of Ukrainian business structures; competition between integrated business structures in a new highly concentrated economy; the formation of professional associations, professional compliance, institutional capacity and corporate social responsibility as the basis of collective economic and food security of integrated structures; the establishment of mechanisms for integration interaction of enterprises taking into account the business environment and many others. The object of most studies is the enterprises of the agricultural sector and food industry of Ukraine, since they are the most economically active.

In the works of foreign scientists, the problems of enterprise integration at the micro level are studied in the

context of integration management, as a long-term process in which not only integrated enterprises can participate, but also auxiliary consulting companies [14]. All integration entities operate according to the "Pathfinder" or "Circle of Fortune" model, which determines a clear sequence of actions of enterprises that want to merge. The symbiotic integration model is considered in the study [15]. The author suggests a slow evolutionary unification of enterprises by preserving the culture of subsidiaries and developing the relationships necessary to achieve the goals set for the new structure. However, today the issues of choosing a model for the creation of integrated business structures – business structures – remain new and, accordingly, not sufficiently studied.

Materials and Methods

The methodological basis of the research is scientific works and publications of leading Ukrainian and foreign scientists and specialists on the problems of functioning, integration and development of enterprises and business structures in the context of the COVID-19 pandemic. The study uses a monographic method – during the analysis of published papers by foreign and Ukrainian scientists on the features of enterprise integration in the context of the COVID-19 pandemic; qualitative analysis and synthesis – to determine the main directions of enterprise integration and the creation of business structures caused by different degrees of environmental influence in the context of the COVID-19 pandemic. Based on methodological principles (unity, theory and practice, historical approach to the study of the problem, objectivity, comprehensiveness, systematic methodological requirements for conducting scientific research) and a systematic approach, the analysis of the problems of operation of Ukrainian enterprises in the context of the COVID-19 pandemic is carried out. When studying the problems of enterprises' activities amid the COVID-19 pandemic, methods of scientific observation, reverse analysis, and generalisation were used.

The study is based on a systematic method of cognition of processes and phenomena in their interrelation and development, used in the generalisation of enterprise integration models, as well as data obtained by the author in the course of specially organised research and surveys of specialists of Ukrainian enterprises. Models of integration of Ukrainian business structures have been developed using the modelling method. During the analysis of Ukrainian and foreign models of enterprise integration, the advantages and disadvantages of each model were identified using SWOT, PEST, and SNW analysis methods. The most productive way is to consider the model of enterprise integration from the standpoint of a systematic approach, which helps to study the integrity of the business structure as an object that functions at different levels of the integration system in the structure of the national economy, in which each element has a specific functional purpose.

Using the SWOT analysis method, the advantages and disadvantages of each integration model were identified;

the vision of prospects for the development of business structures in the context of the COVID-19 pandemic was formed based on the results of PEST and SNW analyses; the choice of the optimal integration model was based on the methods of system analysis, synthesis and generalisation.

Results and Discussion

According to the optimistic scenario, it is planned to activate multilateral cooperation and integration processes as one of the directions of global economic recovery after the end of the COVID-19 pandemic. This is confirmed by the historical experience of humanity's reaction to global shocks, which resulted in the creation of various integration associations (UN, NATO and others) and integrated enterprises in the form of transnational corporations (TNCs). Negotiations are already actively underway to eliminate trade duties between the two countries, search for ways to in-depth sectoral cooperation localisation in target markets, technological and industrial integration [16].

Under the influence of the COVID-19 pandemic, a new economic model of development is being formed, called the "post-COVID19 economy", the main directions of development of which are:

1. "Nationalisation" of the economy, integration and concentration of critical production chains within economies, limiting or reducing the share of global trade operations [16].
2. "Virtualisation" of business and economy, such as transfer a significant amount of business activity to the virtual world. Today, 39% of business leaders surveyed suggest that the COVID-19 pandemic has significantly accelerated

the digital transformation of their business. This allowed transferring some employees to remote work and reduce the number of office space [17; 18].

3. Changes in the work of staff. With the transition to remote work, there was an increase in the share in the service sector where personal contact is not required, the introduction of strict sanitary and epidemiological standards and measures where it is impossible to abandon personal contacts, an increase in the robotisation of production processes, and so on. However, despite the transition of employees to remote work, 68% of managers believe that communication with employees has improved during the crisis [17; 18].

3. Restrictions and the mass transition of enterprises to non-cash operations.

4. Increasing the role of the state, nationalisation or purchase of problematic or critical enterprises, enterprise integration, and so on. Despite "falling economic indicators in Ukraine, 72% of managers expect their organisations' profits to grow in the next 3 years" [3]. This directly depends on how quickly it is possible to make the necessary changes to the existing business model after the pandemic.

One of the directions of recovery of Ukrainian enterprises from the crisis after the COVID-19 pandemic is the transition to business models based on synergy and integration with the creation of a business structure. A business structure is a voluntary integration entity that can include several enterprises and, if necessary, freelancers as separate business entities [19]. Models of creation of business structures (BS) based on synergy and integration, developed by Ukrainian researchers are as follows (Fig. 1):

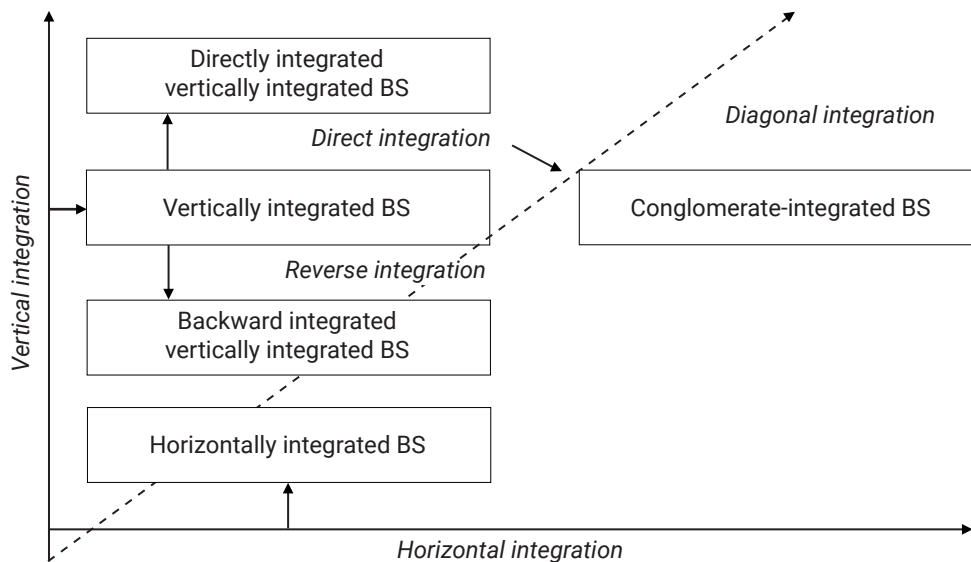


Figure 1. Models of creation of business structures

Source: developed by the author

Horizontally integrated business structures are formed as a result of the influence of the horizontal integration process. This method combines enterprises within the same industry that operate at the same stage of the production process. Horizontal integration, as noted by G.V. Ortin, provides for the "integration of enterprises at the same stages of production, operating and competing in

one market segment, in one industry and specialising in the production of the same or similar products or the provision of the same or similar services" [20]. The advantages and disadvantages of creation horizontally integrated business structures in the context of the COVID-19 pandemic are shown in Table 1.

Table 1. Advantages and disadvantages of creating horizontally integrated business structures in the context of the COVID-19 pandemic

Model of BS	Advantages of BS	Disadvantages of BS
Horizontally integrated	<ul style="list-style-type: none"> • Building the capacity of an integrated enterprise; • Increasing market share; <ul style="list-style-type: none"> • market leadership; • Reducing market competition by combining competing businesses; • Savings on production scale 	<ul style="list-style-type: none"> • Monopolisation of the industry; • Creating barriers to new businesses entering the market; <ul style="list-style-type: none"> • Price wars; • Reducing the product range

Source: developed by the authors based on [19]

As a result of the development of horizontal integration processes within the industry, integrated associations (horizontally integrated business structures) are formed, which “are most often understood as a set of enterprises (both from one industry and from different industries) that operate as a single system and have a common management goal. Along with this, enterprises that are part of the integrated structure are integral financial and property complexes that can independently perform production and commercial operations, effectively carry out economic and financial activities and be competitive in the market” [21].

The creation of a vertically integrated business structure occurs due to the vertical integration of enterprises and can be carried out in two directions: forward and reverse. For direct vertical integration (*forward integration*) there is business development in the supply chain and the production process is controlled. Directly integrated business

structures are formed as a result of the integration of enterprises upwards, that is, by establishing integration ties with the consumer enterprise of products (services). For example, a car manufacturer teams up with a distributor of automotive spare parts, or buys a car dealership to sell its own cars. This provides the business structure with more revenue and brings it closer to the consumer. During reverse vertical integration (*backward integration*) there is a combination with an enterprise that operates in the supply chain and produces raw materials and/or products for the production of products of the buyer's enterprise. Backward-integrated business structures are formed as a result of the integration of enterprises downwards, that is, by establishing integration ties with the enterprise-supplier of products (services). The advantages and disadvantages of creating vertically integrated business structures in the context of the COVID-19 pandemic are presented in Table 2.

Table 2. Advantages and disadvantages of creating horizontally integrated business structures in the context of the COVID-19 pandemic

Model of BS	Advantages of BS	Disadvantages of BS
Vertically integrated	<ul style="list-style-type: none"> • Association with suppliers of raw materials (materials, components); • Obtaining uninterrupted supplies of raw materials (materials, components); • Entering new commodity markets; <ul style="list-style-type: none"> • Refusal of intermediaries and contractors' services; • Increasing market share; • Monopolisation of the industry 	<ul style="list-style-type: none"> • Refusal of services from suppliers who are not part of the business structure; <ul style="list-style-type: none"> • Loss of flexibility of the business structure; • Weak reaction to changes in market conditions; • Focus on the chosen field of activity; • Creating barriers for other enterprises to access raw materials

Source: developed by the authors based on [19]

The creation of a business structure through vertical integration can also be carried out through internal expansion of activities, mergers or acquisitions. The business structure is vertically integrated only when it controls two or more stages in the supply chain. Conglomerate-integrated business structures are formed as a result of conglomerate integration, as a process that involves combining enterprises

that are included in an unrelated business. The conglomerate integration model allows building integration links with an enterprise that is not adjacent, but is included in a technological chain that includes potentially adjacent enterprises. Advantages and disadvantages of creating horizontally integrated business structures in the context of the COVID-19 pandemic are presented in Table 3.

Table 3. Advantages and disadvantages of creating horizontally integrated business structures in the context of the COVID-19 pandemic

Model of BS	Advantages of BS	Disadvantages of BS
Conglomerate-integrated	<ul style="list-style-type: none"> • Less dependent on the influence of the external environment; • More competitive due to the integration of all chains from supply to sales 	<ul style="list-style-type: none"> • Loss of flexibility of the business structure; • Weak reaction to changes in market conditions; • Complexity of BS management processes

Source: developed by the authors based on [19]

The creation of a globally integrated business structure is the result of the manifestation of integration processes at the enterprise level on a global scale [20]. Such business structures are called transnational corporations (TNCs).

The advantages and disadvantages of creating vertically integrated business structures in the context of the COVID-19 pandemic are shown in Table 4.

Table 4. Advantages and disadvantages of creating horizontally integrated business structures in the context of the COVID-19 pandemic

Model of BS	Advantages of BS	Disadvantages of BS
Globally integrated	<ul style="list-style-type: none"> • Monopolisation of global industries; • Transfer of production to “third” world countries with cheap raw materials and low cost of human resources; • Minimisation of customs tariffs and taxation; • Access to new technologies is not restricted; • Creating new jobs in different countries 	<ul style="list-style-type: none"> • Influence on the government of the countries where TNC branches are located; • Withdrawal of assets of branches located in other countries to the parent company or to offshore zones; • Creating barriers for other businesses to enter global sales markets; • Transfer of environmentally hazardous industries to the “third” world countries

Source: developed by the authors based on [19]

According to the “Fortune Global 500” rating, which is maintained by the American Business magazine Fortune, since 1995 there have been 500 transnational corporations operating in the world. Such business structures are multi-level and are structured in different directions, that is, “corporate associations and individual enterprises can be part of inter-country business structures” [22]. Foreign scientists offer the following models of forming business structures based on synergy and integration, which are relevant in the context of the COVID-19 pandemic, which include:

1. *Model of quantitative assessment of the impact of enterprise integration on the results of its activities* [23]. The model is based on the implementation of data coverage analysis (DCA) and the microeconomic concept of marginal rates. DCA data coverage analysis is used to assess the marginal benefits of enterprise integration. This allows measuring and comparing the production efficiency of integrated enterprises, in particular by correlating the benefits obtained with the resources consumed in the process.

2. *Information model* [24]. An information model based on representations for enterprise integration into processing industries, which divides the subject area space into 16 sub-groups, organised as 4 components of the subspace: essence, behaviour, tasks and contractor, and 4 types of models: data, behaviour, activity, and contractor. The analysis carried out using such an enterprise integration model allows obtaining information about the vertical relationships between different levels of model decomposition, which is the key to enterprise integration. The model presents a specification of 4 types of components (models) that are used in the enterprise integration project, which is carried out on the example of traditional Chinese medicine.

3. *Model of design and implementation of an integrated enterprise system* [25]. This model includes various technological, human, and organisational elements. Several different reference architectures have been proposed to build the model. It is mainly a structure consisting of a step-by-step methodology, reference models and a set of

auxiliary tools that would allow creating an integrated enterprise. The model was used as a research project for reference architectures on enterprise integration of the IRIS group from the University of Haume I Castellon.

4. *“Three-lens” model* [26]. The model provides a new perspective for enterprise integration and improvement programmes. The three-lens model is based on a methodology for synthesising different approaches to BPR (*Business Process Reengineering*), which included examples of consulting organisations and developed methodologies of large companies and consists of several stages: strategy development; identification of key processes; analysis of existing processes; process redesign; implementation. Each lens describes one of the key aspects of the enterprise’s activities: “Technology”, “Product”, “Discipline” and helps to choose approaches to integration and improvement of enterprises by systematically considering all three lenses.

5. *Business case model* [27]. The model is based on a business case methodology with case studies to illustrate aspects of using business cases and blue printing in enterprise integration technologies and increasing ROI or investment to create shareholder value that is achieved in the enterprise integration process.

6. *Model of Inter-and intra-organisational cooperation* [28]. Modern global markets lead to the emergence of large integrated enterprises that unite various companies located in many countries of the world. Management and decision-making in such organisations mainly depend on the availability and usability of information used by different enterprises and should be equally perceived and understood by each enterprise. The use of corporate technologies and technologies of internal organisational integration of the model helps to get a general idea of information coming from different sources.

An enterprise that intends to integrate and form a business structure independently chooses a partner and integration model, taking into account its own strengths and weaknesses, threats and opportunities for further development in the context of the COVID-19 pandemic. The

effectiveness of using various models of forming business structures based on synergy and integration for the exit of Ukrainian enterprises from the crisis caused by the COVID-19 pandemic is confirmed by research conducted by the USAID Small Business Index [17], which revealed that a business that belongs to any business associations has significantly higher performance indicators in sales, access to resources and profitability. This indicates that if there are business associations on the territory of the community or the community cooperates with business structures, there is a positive impact on the development of the business as a whole.

Conclusions

In order to get Ukrainian enterprises out of the crisis caused by the COVID-19 pandemic, it is proposed to step up the integration process at enterprises and form business structures. A business structure is understood as a voluntary integration entity, which can include both several enterprises, and, if necessary, freelancers, as separate business entities. The creation of a business structure is possible through the transition of enterprises to business models based on synergy and integration. At the same time, the creation of business structures occurs in the process of integration of several enterprises, depending on their goals and objectives, which are defined by enterprises, and has different forms in space and time, which is amplified and accelerated by the global

processes of globalisation and the impact of the COVID-19 pandemic.

The study summarises the integration models developed by Ukrainian researchers, namely: horizontal integration model; vertical integration model; conglomerate integration model; global integration model. Among the integration models developed by foreign researchers, models of quantitative assessment of the impact of enterprise integration on the results of its activities were selected; information model; model of design and implementation of an integrated enterprise system; model of "three lenses"; model of business cases that are most relevant in the context of the COVID-19 pandemic. Each integration model has its own advantages and disadvantages, which should be taken into account when choosing directions and forms of integration of enterprises and forming business structures. The creation of business structures is one of the most effective areas that would help Ukrainian enterprises overcome the crisis caused by the COVID-19 pandemic, restore functioning, obtain additional working capital and investment funds, take a large share of the competitive market, increase sales, increase the level of training of management personnel and profitability of the enterprise. Further research in this area will be aimed at evaluating and developing performance indicators for each business model based on synergy and integration with the development of a business structure.

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Моделі інтеграції підприємств: переваги та проблеми реалізації в умовах пандемії COVID-19

Зорина Ярославівна Шацька

Київський національний університет технологій та дизайну
01011, вул. Немировича-Данченко, 2, м. Київ, Україна

Анотація. Актуальність дослідження питання вибору моделі інтеграції підприємств пов'язана з необхідністю вирішення різноманітних проблем, які постали перед українськими підприємствами в умовах пандемії COVID-19, серед яких: зниження прибутковості, скорочення інвестицій, підвищення рівня витрат на забезпечення захисту та безпеки працівників, перехід до екологічного та ощадного виробництва та інші. Мета статті полягає в аналізі наявних українських і закордонних моделей бізнесу, заснованих на синергії та інтеграції, які дають змогу сформуванню підприємницької структури. Теоретико-методологічною основою дослідження є загальнонаукові та специфічні методи, за допомогою яких вирішується проблема функціонування, інтеграції та розвитку підприємств в умовах пандемії COVID-19. У статті узагальнено проблеми, з якими стикнулися українські підприємства в умовах пандемії COVID-19. Запропоновано як один із напрямів виходу українських підприємств із кризи після пандемії COVID-19, перехід до моделей бізнесу, заснованих на синергії та інтеграції з формуванням підприємницької структури. Для цього узагальнено українські та закордонні моделі формування підприємницьких структур, заснованих на синергії та інтеграції. Виокремлено такі моделі, що розроблено українськими дослідниками: модель горизонтально-інтегрованої підприємницької структури; модель вертикально-інтегрованої підприємницької структури; модель глобально-інтегрованої підприємницької структури; модель конгломератно-інтегрованої підприємницької структури. Також узагальнено такі моделі, які розроблено закордонними дослідниками: модель кількісної оцінки впливу інтеграції підприємства на результати його діяльності; інформаційна модель; модель проектування та впровадження інтегрованої системи підприємств; модель «Трьох ліній»; модель бізнес-кейсів; модель між- та внутрішньоорганізаційного співробітництва

Ключові слова: підприємницькі структури, моделі бізнесу, системний підхід, коронавірусне захворювання, ланцюги поставок