

RESILIENCE OF INDUSTRIAL ENTERPRISES IN UKRAINE REGIONS

Tetyana Calinescu¹, Olena Zelenko², Olena Khandii³

¹ Prof. National Aerospace University, Kharkiv, Ukraine, E-mail address: tetyana.calinescu@gmail.com

² Prof. Institute of Industrial Economics of the National Academy of Sciences of Ukraine, Kyiv, Ukraine, E-mail address: zelenko.olena@gmail.com

³ Prof. Volodymyr Dahl East Ukrainian National University, Kyiv, Ukraine, E-mail address: alkhandiy@ukr.net

Received 28 02 2025; Accepted 06 03 2025

Abstract

The article analyzes the concept of resilience of industrial enterprises as an important component of their ability to adapt to modern challenges, especially in the conditions of martial law in Ukraine. The restoration and development of business after crisis situations is particularly important for the stability of the regional economy and ensuring sustainable development. The purpose of the study is to determine the priority directions for achieving sustainable development goals for the formation of resilience of industrial enterprises in the Ukraine regions, taking into account foreign and already accumulated domestic experience. The study is based on a conceptual approach to definition of the socio-economic environment “resilience”, using general scientific methods of analysis and synthesis, induction and deduction, as well as the method of statistical analysis, systematization and grouping to identify modern development trends. The study identified a general list of recommended measures to support the sustainable development of industrial enterprises. Specific directions of their activity have also been identified to achieve sustainable development goals, build resilience of industrial enterprises in the regions of Ukraine, in particular to: ensure decent pay and proper working conditions, create opportunities for professional development, form a strong corporate culture in martial law, create a financial reserve, impact investing and public-private partnership between the enterprise and regional communities; implement innovations that contribute to the implementation of the principles of the circular economy.

Keywords: *resilience, industrial enterprises, regions, sustainable development goals, conceptual approach, partnership.*

JEL Codes: *L29, M14, O20, R58.*

Introduction

Business resilience is becoming a global trend today (Dobrowolski, 2024) and, of course, Ukrainian industrial enterprises in this regard are setting an example for other countries on how to survive in the conditions of full-scale aggression and military operations taking place in almost all regions of Ukraine. And if in 2022 the main goal of most business representatives was simply to survive, then in 2023 there was a process of recovery and further development. Thus, according to a survey conducted among business owners by Dija Biznes and Advanter Group (Andrukhov, 2023), 8% of enterprises reached the 2021 indicators, another 9% increased their volumes compared to the pre-war period, and a third of Ukrainian enterprises expect growth.

In addition, Ukrainian industrial enterprises are increasingly involved in the implementation of the United Nations Sustainable Development

Goals (SDGs), which form long-term strategies to achieve sustainable economic growth and address global challenges, such as poverty, regional development inequality, and climate change. Therefore, there is a need to implement and disseminate initiatives that promote responsible consumption and production, ensure decent working conditions, and support innovation and business infrastructure development.

Literature review

Many scientific and practical works on economic growth and development are devoted to the resilient development of enterprises in various industries (Dobrowolski, 2024; Andrukhov, 2023; Florkin, 2024; Bondarenko, 2023; Kolomiyets, Huznenkov, Hridina, Dotsenko, Le Minh, 2016; Shcho..., 2024; Kasych, Prokopenko, 2022). However, despite a thorough consideration of this issue among scientists,

problems related to non-traditional approaches to achieving sustainable development goals formed at the global and national levels remain unclear. Different authors focus on their own set of rules, tools and indicators that form the stable functioning of industrial enterprises in various spheres and industries. However, not all of them can be applied to Ukrainian enterprises, which today operate in war conditions, require the most significant decisions and attention to maintaining sustainability. Therefore, there is a need to identify modern trends in the development of industrial enterprises in the regions of Ukraine and determine priority directions for achieving sustainability goals.

Accordingly, *the main goal* of the research is to determine priority directions for achieving sustainable development goals for the formation of resilience of industrial enterprises in the regions of Ukraine, based on domestic and foreign experience of their observance.

Methodology

The basic component of the study is a conceptual approach to definition of the socio-economic environment "resilience". The term itself, which is currently used to characterize socio-economic systems of various levels, is found in the description of physical phenomena, in psychology, ecology, etc. This concept was first published in 1973 by C. Holling (Holling, 1973), who defined that resilience is a measure of the stability of a certain system, which demonstrates its ability to resist changes and destructive factors, maintaining its own balance. In modern conditions, resilience is considered as the main condition for the sustainable development of socio-economic systems, to which industrial enterprises belong.

In addition, the research methodology is based on general scientific, universal and special methods of achieving the set goals. Methods of analysis and synthesis are used to generalize approaches that are used in modern domestic and foreign science and practice to achieve the SDGs. Using induction and deduction methods, the development trends of modern industrial enterprises and the essence of current priorities for achieving sustainability in different conditions of their functioning were summarized. Thanks to systematization and grouping, the main principles

and key features of sustainability were summarized. Special methods helped to form the author's approaches to choosing today's priorities of the movement towards the SDGs based on the conditions of functioning of industrial enterprises in the regions of Ukraine.

Results

Currently, there is no universal formula for resilience, but it is possible to distinguish from 5 to 10 main areas of activity for industrial enterprises of Ukraine that help to survive in conditions of economic instability (Dobrowolski, 2024; Andrukhov, 2023; Florkin, 2024; Shcho ..., 2024):

1. You should pay attention to your team, because the team is the basis of any business and the implementer of all its processes. If the team is not stable and is not confident in its future development, then it will not be possible to ensure further stable development. And in this regard, you should pay attention to the factors that affect the effective work of a team of like-minded people:

a) material security, because wages in unstable conditions of regions and country development always become a more important factor, which causes employees' confidence in the future and gives a sense of security. Therefore, it is recommended, in some cases, instead of cutting earnings, to expand the functionality of the activity;

b) loyal attitude towards staff. It is when an employee feels some support from management staff that they perform their work more effectively. There are enough examples of loyalty development (Yukhnovska, Ryzhenko, 2022), however, within the framework of full-scale military operations, loyalty technologies have received new directions for implementation. Thus, since the beginning of military operations, some Ukrainian enterprises have allowed their specialists to move to safer regions and work remotely. This has enabled employees to adapt to existing conditions and later return to their workplaces, which certainly increased their loyal attitude towards the employer;

c) the possibility of training, which provides employees with tools for personal and professional growth. Thus, the conducted TalentLMS study showed (Andrukhov, 2023)

that employees, under conditions of regular training, work 22% more productively compared to others. Therefore, continuous improvement of the team's skills can help the business adapt to changes, in particular in technologies, legislation, consumption trends, etc.

2. It is necessary to form and accumulate reserves of their material and financial resources. Of course, an important component of business resilience and its readiness for risks is material resources. Thus, today 60% of companies in Europe and over 70% in the USA have reserve funds, and the average size of these funds is 17% of the company's annual turnover (Andrukhov,

2023). And this global practice began to operate at the beginning of the coronavirus pandemic, when businesses decided to create savings funds and invest about 20% of their profits there. This experience is currently being used in Ukraine, which provides an opportunity to relocate and diversify enterprises, purchase additional equipment, or create a reserve capital portfolio in case of radical economic changes. During 2022-2023, 18,944 enterprises relocated thanks to state support and their financial savings. Number of relocated enterprises by regions presented below (see Table 1).

Table 1. Relocation of enterprises by leading regions (March 2024)

From which regions are companies relocating?	Number	Where are companies relocating to?	Number
Kyiv	6291	Kyiv	5283
Dnipropetrovsk region	1816	Kyiv region	1947
Kyiv region	1616	Dnipropetrovsk region	1567
Odesa region	1194	Kharkiv region	1545
Donetsk region	1034	Odesa region	1420
Kharkiv region	990	Lviv region	1290
Lviv region	884	Zaporizhzhia region	498
Zaporizhzhia region	816	Mykolaiv region	492

**Source: formed by authors based on (Migal, 2024).*

It is worth noting that the main trend of enterprise relocation is the movement from east to west. Relocation is happening in all regions. Interestingly, the regions that lose the most are also the ones that receive the most relocated enterprises. The exception is Donetsk oblast (Migal, 2024). The largest number of enterprises was accepted by Dnipropetrovsk, Kharkiv, Odesa, Lviv, Kyiv regions and the city of Kyiv itself. The direction of movement is determined by the desire of the owners to preserve the assets of the enterprise and ensure its stable operation, which is impossible in areas close to hostilities.

However, it is necessary to have a certain amount of time to create financial reserves. Therefore, if enterprises do not have such a savings fund, then, as the experience of Ukrainian and world business shows, it should already be started to create it.

3. You should always be ready for changes. Yes, modern conditions for the development of enterprises dictate the need to make quick decisions, and not only their managers, but also

employees should be ready for this. Under such conditions, constant monitoring of new products, solutions, materials and suppliers is required, which means that without a flexible approach to analyzing the environment of the enterprise's functioning and decision-making, it will be difficult to survive and strengthen your economic security.

4. It is necessary to create powerful internal communication. However, you should also pay attention to what is the key to team cohesion - there is a strong leader. The constant stresses arising from the shelling of almost all regions of Ukraine in conditions of military operations cause people to have doubts and a sense of danger, so the bright work of such leaders who manage to work fruitfully and provide assistance to the military, displaced persons, and charitable organizations allows you to change the environment around them. As a rule, a motivated circle of employees gathers around such people who are ready to overcome all obstacles together. In such a circle of people, there is a powerful

internal proactive communication that can inspire employees and create a sense of security in them.

5. Formation of faith in one's own strength, competence and experience. Ukrainian industrial enterprises have already demonstrated their ability to work in the most difficult conditions and even improve their performance indicators: almost 10% of Ukrainian enterprises indicated an increase in volumes compared to the period before the full-scale invasion. And the studies conducted by Payoneer (Andrukhov, 2023) stated that 84% of business leaders indicate that joint volunteering and support for the army help to increase team spirit, that is, faith in Ukraine and our Armed Forces, which is a determining element of the stability of not only business.

6. Investing in sustainable development, which is becoming an increasingly important and widespread step. Such investment means investing capital, using the SDGs (Calinescu, Likhonosova, Zelenko, 2024), and aims to positively influence (impact investing) social and environmental changes. The impact investment market is currently growing rapidly and making rapid progress. Most international financial funds

that invest in Ukraine today have made changes to their investment strategies, prioritizing impact investments. Today, the total volume of impact investment capital reaches 2.3 trillion US dollars [Shcho..., 2024], and more than 400 billion US dollars are already managed following the SDGs. However, for investments in sustainable development to work, it is necessary to provide both long-term and inclusive approaches, it is necessary to have not only local solutions and projects, but also to create favorable conditions for financing, which is currently impossible to implement in the conditions of military operations (Calinescu, Likhonosova, Zelenko, 2024). But it is possible to form a roadmap for obtaining long-term investments that combine profitability and sustainability of industrial enterprises, to achieve socio-economic well-being of regions and the country itself, combined with prosperous continents for all people, today.

In the conditions of Ukraine, it is possible to talk about impact investing at the level of individual industrial enterprises. The direct loss statistics can be a guideline for investment directions (see Figure 1).

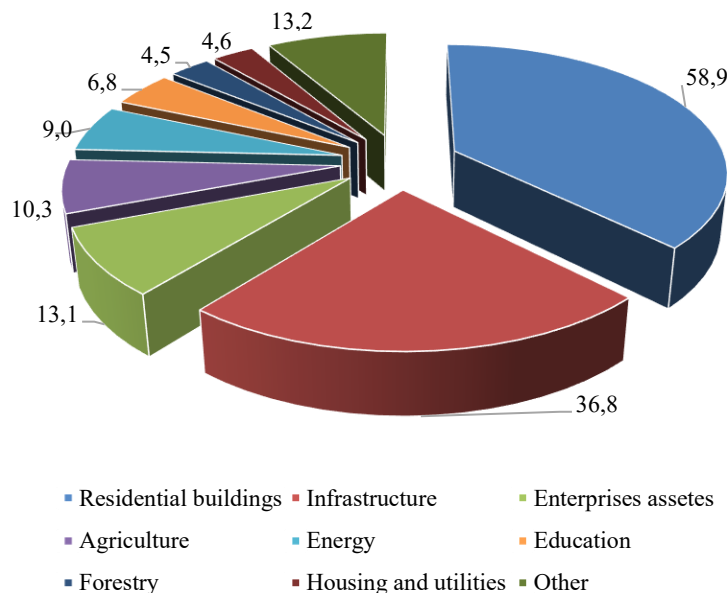


Figure 1. Direct losses due to the military aggression of the Russian Federation as of the beginning of 2024, \$ million

**Source: built by authors based on (Zvit..., 2024).*

Total amount of losses is 157,2 \$ million (Zvit..., 2024). According to Figure 1, it can be noted that the main spheres of impact investment can be infrastructure projects, projects for the

production of materials for the construction of modular houses from environmentally friendly materials, projects for the revitalization of industrial facilities damaged by hostilities. Some

successful examples of such investment activities already exist in Lviv, Odessa, Kyiv.

7. New approaches to innovation and the application of sustainable development technologies are needed. It can be integrated into all spheres of business and social activity. It is necessary to choose powerful publicly available methods for creating breakthrough ideas designed to change people's lives, such as design thinking, which is based on the human ability to think intuitively. Design thinking itself represents innovation in the form of three components (Dyzayn-myslennya..., 2019): 1) inspiration, which motivates people to find the right solutions; 2) idea generation, which involves generation, development and testing, and 3) implementation, which is the journey from idea to implementation and use. This approach allows you to create something new, not just achieve minor improvements. The design thinking process resembles the creative process, which is based on the analysis and synthesis of collective actions that allow you to combine elements into a single idea to create a breakthrough innovation. The most important thing in this process is the social and spatial environment in which people take risks and test their skills in practice. A significant role is played by creativity, which is created in the enterprise and revealed in the production culture, where success is encouraged, mistakes are allowed, and employees are given the freedom to act, but at the same time remain holistic and focused on the SDGs.

8. Strong cooperation between the public and private sectors should be established. It is the policy being implemented by the government today to encourage businesses to use green technologies and sustainable practices that contribute to innovation in construction and energy. Such initiatives are spelled out in the Sustainable Development Strategy of Ukraine until 2030 (Stratehiya..., 2017), which aims to position Ukrainian initiatives in the domestic and foreign markets to attract international financial assistance and investment to address the development issues of industrial enterprises in the post-war period.

9. Continuous monitoring, transparent reporting and broad public discussion are necessary to maintain the pace of development and achieve long-term sustainability goals. It is also important that sustainability practices are adopted not only by large enterprises, but also by small and medium-sized businesses.

10. The use of circular economy models in the practice of building resilience of industrial enterprises, which provides opportunities to reduce waste, sustainable use of resources, minimize environmental impact through waste recycling and the use of low-emission technologies, and ensure SDG management.

From the presented list of measures, it is possible to systematize priority actions to achieve sustainable development goals for building resilience of industrial enterprises in the regions of Ukraine (see Figure 2).

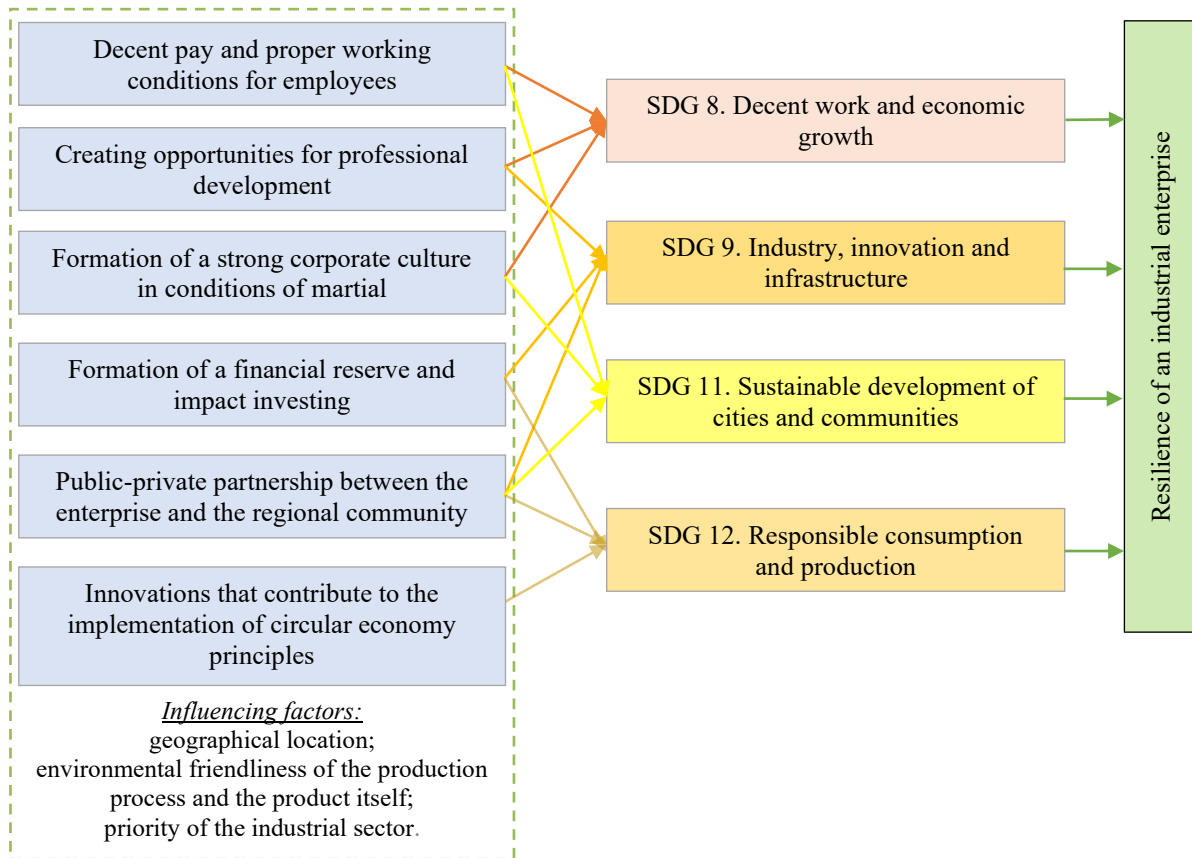


Figure 2. Priority measures and factors for implementing the SDGs for building the resilience of industrial enterprises in the regions of Ukraine

**Source: developed by authors.*

Among the main areas of action: ensuring decent pay and proper working conditions, creating opportunities for professional development, forming a strong corporate culture in conditions of martial law, creating a financial reserve and impact investing; public-private partnership between the enterprise and the community of a specific region; implementing innovations that contribute to the introduction of circular economy principles.

In the context of forming the resilience of industrial enterprises of Ukraine in terms of regions, it is also worth considering the geographical aspect. It is impossible to talk about the sustainability of production in the conditions of combat zones (parts of Odessa, Mykolaiv, Kherson, Zaporizhia, Kharkiv, Sumy, Chernihiv regions; Donetsk, Luhansk regions). Also, the factor of environmental friendliness of existing production technologies and products of the enterprise is important: if the enterprise works with environmentally harmful technologies and raw materials, then their replacement is one of the priority tasks that must be paid attention to. This

is one more factor of influence – the priority of an industrial activity sector to which the enterprise belongs. Experts (Promising sectors of..., 2024) include the following as the most promising in Ukraine: metallurgy, IT industry, agricultural industry, light industry, and renewable energy.

The above list of rules, recommendations and proposals can be continued further, adding to it the traditional rules for ensuring effective and socially responsible activities. This study highlights only those that are most relevant for industrial enterprises in different regions of Ukraine (Calinescu, Likhonosova, Zelenko, 2024; Calinescu, Likhonosova, Zelenko, 2023), have been tested and implemented in recent years, and have already proven their practical results and economic effect. However, it should be noted that the proposed recommendations should be organically adapted to each specific enterprise and may have even wider application than is provided in achieving the SDGs. Therefore, each enterprise chooses for itself its own set of priority resistance rules, based on the conditions of its operation in the regions of Ukraine.

Conclusions

So, it is necessary to highlight:

1. Already today, in the central and western regions of the country, sustainable business practices for the development of industrial enterprises under martial law have been developed, which are aimed at increasing the socio-economic well-being of the regional community (at least, individual members of it employed at the enterprise), investing in projects related to the SDGs and integrating sustainability principles into everyday activities should become an example for other regions to balance economic growth across the country and increase social and environmental responsibility.

2. Modern industrial enterprises prioritize sustainability, which includes both themselves and environmental problems, implementing the most interesting environmental practices, reducing carbon emissions and focusing on circular economy models that minimize waste and maximize resource use.

3. The formation of roadmaps for the implementation of long-term impact investments in industrial enterprises of the Ukraine regions in order to achieve the SDGs is becoming increasingly relevant, but at this stage, attracting

well-known funds engaged in this type of activity is impossible due to active hostilities, so this remains exclusively a task for the industrial enterprises themselves.

4. Another direction is the harmonization of industrial enterprise development strategies with the regional development strategy to attract international financial assistance and investments to address issues of industrial enterprises development of the regions of Ukraine in the post-war period.

5. The choice of priority areas for achieving the SDGs by each industrial enterprise is based on the conditions of its modern development in the region and should be organically adapted to the internal and external operating environment. The identified areas should contribute to the effective use of its assets, optimize costs, maximize profits and ensure certain values of the functioning of the enterprise itself, regional and Ukrainian society in general.

Further research lays the foundation for the search for new technologies, the identification of relevant priorities for achieving the SDGs in connection with the changing values of the functioning of industrial enterprises in the regions of Ukraine in the post-war period.

References

- Andrukhov, Viktor (2023). 5 pravyl stiykosti ukrayins'koho biznesu [5 rules of sustainability of Ukrainian business]. Business-censor. May 26th. URL: https://biz.censor.net/columns/3420701/5_pravyl_stiyikosti_ukrayinskogo_biznesu
- Bondarenko, S.M. (2023). Metodolohichni osnovy upravlinnya yakistyu biznes-protsesiv na pidpryemstvakh lehkoyi promyslovosti v konteksti realizatsiyi tsiley staloho rozvytku [Methodological foundations of quality management of business processes at fashion industry enterprises in the context of the implementation of sustainable development goals]. Dissertation for the degree of Doctor of Economic Sciences, specialty 08.00.04 - economics and management of enterprises (by types of economic activity). Kyiv: Kyiv National University of Technologies and Design, 633.
- Calinescu, Tetyana; Likhonosova, Ganna; Zelenko, Olena (2023). Circular Economy: Ukraine's Reserves and the Consequences of the Global Recession. In: Koval, V., Kazancoglu, Y., Lakatos, ES. (eds) Circular Business Management in Sustainability. ISCMEE 2022. Lecture Notes in Management and Industrial Engineering. Springer, Cham. Published 01 January 2023. Publisher Name Springer, Cham, 238-251. URL: https://doi.org/10.1007/978-3-031-23463-7_16
- Calinescu, T., Likhonosova, G., Zelenko O. (2024). Complex socio-economic solutions regarding the sustainable ecological development of the Ukraine regions. ICSF-2024. IOP Conf. Series: Earth and Environmental Science. Issue 1. Volume 1415. IOP Publishing, 797 – 805. Retrieved from: <https://iopscience.iop.org/issue/1755-1315/1415/1>
- Dobrowolski, M. (2024). Styka biznes-praktyka v Chyli: zrostayucha tendentsiya [Sustainable business practices in Chile: a growing trend]. My Global Zone. August 1st. URL: <https://mgz.com.tw/uk/2024/08/01/%D1%81%D1%82%D1%96%D0%B9%D0%BA%D0%B0-%D0%B1%D1%96%D0%B7%D0%BD%D0%B5%D1%81-%D0%BF%D1%80%D0%B0%D0%BA%D1%82%D0%B8%D0%BA%D0%B0-%D0%B2-%D1%87%D0%B8%D0%BB%D1%96-%D0%B7%D1%80%D0%BE%D1%81%D1%82%D0%B0%D1%8E/>

Dyzayn-myslennya v biznesi. Vid rozrobky novykh produktiv do proektuvannya biznes - modeley [Design is thinking in business. From the development of new products to the design of business models]. Kyivstar Business Hub. January the 1st 2019. URL: <https://hub.kyivstar.ua/reviews/dizajn-mislennya-v-biznesi-vid-rozrobki-novykh-produktiv-do-proektuvannya-biznes-modelej>

Florkin, J. (2024). Biznes: 7 aspektiv vykorystannya danykh i tekhnolohiy dlya staloho zrostannya [Business: 7 Aspects of Using Data and Technology for Sustainable Growth]. URL: <https://julienflorkin.com/uk/бізнес/бізнес/>

Holling C. (1973). Resilience and Stability of Ecological Systems. *Annu. Rev. Ecol. Syst.*, vol. 4, Issue 1, pp. 1–23. URL: <https://pure.iiasa.ac.at/id/eprint/26/1/RP-73-003.pdf>

Kasych, A. O., Prokopenko M. O. (2022). Identyfikatsiya tendentsiy rozvytku biznes-protseсів na promyslovykhpidpryyemstvakh Ukrainy: haluzevyy aspekt [Identification of trends in the development of business processes at industrial enterprises of Ukraine: industry aspect]. *Academic Visions*, No 14. Retrieved from: <https://www.academy-vision.org/index.php/av/article/view/484/444>

Kolomiyets, G. M., Huznenkov, Yu. H., Hridina, H. V., Dotsenko, M. Yu., Le Minh, Huyen (2016). Suchasni drayvery rozvytku biznesu v kryzovykh umovakh [Modern Drivers of Business Development under Crisis Conditions]. *Business Inform*, No 4, 256-263.

Migal, M. (2024). Relokatsiya biznesu v umovakh viyny: u yaki rehiony pereyizhdzhayut' pidpryyemstva [Business relocation in wartime: which regions are companies moving to]. Institute of Analytics and Advocacy. May 31st. URL: <https://iaa.org.ua/articles/business-relocation-in-times-of-war-what-regions-are-companies-moving-to/>

Perspektyvni haluzi ekonomiky, prohnozy rozvytku pislya viyny [Promising sectors of the economy, post-war development forecasts]. YC Market. 26.01.2024. URL: <https://blog.youcontrol.market/pierspektivni-ghaluzi-ieekonomiki-proghnozi-rozvitku-pislia-viini/>

Shcho take impakt-investuvannya? [What is impact investing?] (2024). URL: https://business.dii.gov.ua/entrepreneur-handbook/item/scho_take_impakt_investuvannya

Stratehiya staloho rozvytku Ukrainy do 2030 roku (Proyekt 2017) [Sustainable Development Strategy of Ukraine until 2030 (Draft 2017)] URL: https://www.undp.org/sites/g/files/zskgke326/files/migration/ua/UNDP_Strategy_v06-optimized.pdf

Yukhnovska, Yulia; Ryzhenko, Oleksii (2022). Rozvytok sotsial'noho pidpryyemnytstva yak napryam ukrayins'koho biznesu [Development of social entrepreneurship as a trend of Ukrainian business]. *Galician economic journal*, No 5–6, 84 – 95.

Zvit pro pryami zbytky infrastruktury vid ruynuvan' vnaslidok viys'kovoyi ahresiyi Rosiyi proty Ukrainy stanom na pochatok 2024 roku [Report on direct infrastructure damage from destruction as a result of Russia's military aggression against Ukraine as of early 2024]. Kyiv School of Economics. April 2024. URL: https://kse.ua/wp-content/uploads/2024/04/01.01.24_Damages_Report.pdf