

UDC 658(075.8)

DOI: <https://doi.org/10.32782/business-navigator.75-27>

Tarasiuk Mikhaïlo

Doctor of Economic Sciences, Professor,
Head at the Department of Management and Marketing
Kyiv National Linguistic University

Kulinich Tetiana

Candidate of Economic Sciences, Docent,
Associate Professor at the Department of Management of Organizations
Lviv Polytechnic National University

Тарасюк М.В.

доктор економічних наук, професор,
завідувач кафедри менеджменту і маркетингу
Київський національний лінгвістичний університет

Кулініч Т.В.

кандидат економічних наук, доцент,
доцент кафедри менеджменту організацій
Національний університет «Львівська політехніка»

IMPACT OF ARTIFICIAL INTELLIGENCE ON MANAGEMENT OF ENTREPRENEURIAL STRUCTURES

ВПЛИВ ШТУЧНОГО ІНТЕЛЕКТУ НА УПРАВЛІННЯ ПІДПРИЄМНИЦЬКИМИ СТРУКТУРАМИ

The article highlights the increasing complexity of management processes within entrepreneurial structures and the connection between these complexities and the expansion of business entities' interactions with various internal and external factors (such as the market, competition, technological and personnel changes, etc.). The article emphasizes the potential to streamline targeted interventions in managing entrepreneurial business structures amidst the influence of various factors. It also discusses the significant potential for enhancing the rationale behind managerial decision-making by utilizing artificial intelligence systems. The article aims to outline the content and overall characteristics of how artificial intelligence influences the management of entrepreneurial structures. The significance of the research is underscored by the fact that the impact of artificial intelligence on this specific domain lies in the ability to employ intelligent machines capable of performing managerial tasks typically requiring human intelligence.

Key words: managerial decision-making, machine learning models, process programming, tactical response, development trajectory.

У статті звернуто увагу на висхідній складності процесів управління підприємницькими структурами та на зв'язок окреслених ускладнень із розширенням залежностей та характеру взаємодій суб'єктів господарювання з різними внутрішніми та зовнішніми факторами. У статті наголошується на можливостях полегшення змісту цільових впливів, що формують базовий акцент управління бізнесом підприємницьких структур в умовах впливу цих факторів, а також на можливостях значного підвищення обґрунтованості прийняття управлінських рішень за їх виконання із залученням систем штучного інтелекту. Відповідно до наведених положень метою статті є визначення змісту та загальних властивостей впливу штучного інтелекту на управління підприємницькими структурами. Значущість дослідження обумовлена тим фактом, що специфіка впливу штучного інтелекту на визначену сферу полягає у можливості використання інтелектуальних машин, які здатні виконувати ті управлінські завдання, які зазвичай потребують людського інтелекту. Доведено, що вказана дія зумовлена тим, що штучний інтелект може: використовувати інформацію та знання з попередніх ситуацій для формування аналогій у майбутньому, сприяючи знаходженню оптимальних управлінських рішень; бути альтернативою логічного мислення, здатною до формулювання висновків та синтезування рішень на підставі наявних фактів або спостережень; накопичувати та використовувати базові знання з різних галузей для вирішення різноманітних управлінських проблем. Зроблено висновок, що управлінський вплив підприємницьких структур наразі коригується штучним інтелектом на основі застосування різних комбінаторних конфігурацій стратегічного та тактичного реагування, траєкторій розвитку, господарських портфелів структурних підрозділів, виконання операцій та процесів, дій і рекомендацій, спрямованих на зростання ефективності функціонування бізнесу, організаційної діяльності. При цьому пер-

спективи подальших досліджень можуть полягати у розробці методики детального аналізу впливу штучного інтелекту на різні аспекти управління підприємницькими структурами.

Ключові слова: прийняття управлінських рішень, моделі машинного навчання, програмування процесів, тактичне реагування, траєкторія розвитку.

Statement of the problem. The relevance of the research is determined by the fact that over time, the management processes of entrepreneurial structures are becoming increasingly complex, attributed to the expanding interactions among business entities within such structures and internal and external factors (such as the market, competition, technological advancements, and personnel changes, etc). Considering the above, since the early 2010s, artificial intelligence has been increasingly used by entrepreneurial structures to streamline targeted interventions amid the influence of these factors and improve managerial decision-making rationale. The initial applications included the development of expert systems capable of analyzing large volumes of data and providing recommendations for managerial decisions. For instance, from the late 2010s, there was a surge in the use of machine learning and big data analytics for forecasting and optimizing various management aspects. Then, from 2012 onwards, there was widespread adoption in management practices of natural language processing systems and automation of routine operations based on sensor feedback. The specificity of artificial intelligence's impact on this particular sphere lies in the ability to employ intelligent machines capable of performing managerial tasks that typically require human intelligence.

Analysis of recent research and publications. There is a substantial body of scientific literature exploring the application of artificial intelligence in managing entrepreneurial structures. Researchers such as Bannikov V., Lobunets T., Buriak I., and Maslyhan O. have explored the programming intricacies of systematic and tactical response processes within entrepreneurial structures, along with the trajectories of potential participant behavior. Furthermore, Shevchuk L., Kraus K.M., Kraus N.M., and Osetskyi V.L. have identified key concepts and issues emerging from the implementation of artificial intelligence in enterprises. They have also investigated modern approaches to improving the economic portfolio of structural departments or operational tasks. Moreover, AI in managing entrepreneurial structures integrates rule-based systems, machine learning, natural language processing, robotics, expert systems, and strong AI, performing a broader range of tasks than currently envisioned by researchers.

Formulation of the research task. The article aims to outline the content and overall characteristics of how artificial intelligence influences the management of entrepreneurial structures.

Summary of the main research material. Note that the entrepreneurial structure is a complex organizational form of business existence and management, interpreted as a composition of market relationship subjects.

In her research, I.N. Herchykova emphasizes that such a structure operates as a composition of subjects within market relationships, aiming for profit as the ultimate result [5]. Similarly, G.A. Hershchanok and D.G. Shishkin indicate that this concept includes organizational and economic units seeking entrepreneurial income [5].

Considering the outlined specifics, the structure may encompass levels of management, responsibility, and functional departments, as well as decision-making mechanisms. Moreover, this structure continually transforms in response to shifts in its external and internal environments, acting as a catalyst that has influenced the impact of artificial intelligence systems on its management.

Indeed, there are ongoing processes of partially delegating strategic and tactical tasks to artificial intelligence systems. These tasks demonstrate evolutionary traits as they can evolve through learning from experience, pattern recognition, and processing input data [3]. Among them:

1. Programming systematic and tactical response processes within an entrepreneurial structure and predicting potential participant behavior in conditions of incomplete information about the future development of its environment. Addressing this task is accomplished through algorithms formed using a set of rules or if-then operators, enabling decision-making based on specific conditions. The situation is illustrative when such a business entity produces a product and makes decisions regarding price changes depending on the forecasted demand, relying on a set of rules for programming tactical response [4]:

Rule 1. If the forecasted demand is high and inventory levels are low, then the product price increases.

Rule 2. If the forecasted demand is low and inventory levels are high, then decrease the product price.

Rule 3. If the forecasted demand is average and inventory levels are average, then maintain the product price without changes.

2. Adjusting the developmental trajectory of entrepreneurial structures using machine learning algorithms formed from dynamic input data (including activities of participants within the structure, its environment, and other factors [2]), to enhance managerial influence productivity over time. The situation is illustrative when a business entity aims to maximize profit by optimizing its pricing strategy for a product, relying on machine learning algorithms to analyze a large volume of dynamic data (such as sales, competitor prices, and seasonal variations), and continuously adjusting its pricing strategy over time. The application of machine learning algorithms involves the following steps [1]:

Step 1. Collecting data on product sales, competitor prices, seasonal variations, and other factors affecting demand and supply.

Step 2. Developing a machine learning model to analyze this data and predict the optimal pricing strategy for maximizing profit.

Step 3. Validating the model using data not used during training to ensure its effectiveness.

Step 4. Continuously updating the model using new data to adapt to changes in the environment and market conditions.

3. Enhancing the economic portfolio of structural departments or operational tasks through data exchange focused on interaction between computers and human languages. In this case, artificial intelligence helps utilize

numerical assistant programs. One example of using artificial intelligence to enhance the economic portfolio and operational tasks is the utilization of Customer Relationship Management (CRM) systems. These systems can analyze data from various sources such as emails, phone calls, social media, etc., and automatically classify them based on importance and topics [1; 4].

4. Automation of routine physical and intellectual operations and processes within entrepreneurial structures, such as manufacturing, warehouse management, data processing, etc. In this case, artificial intelligence helps machines perform complex tasks, recognize patterns, analyze data, and make decisions based on these analyses (using sensor feedback) [2]. One example of using artificial intelligence to automate routine operations in manufacturing entrepreneurial structures is the utilization of computer vision systems on production lines.

5. Formation of actions and recommendations aimed at enhancing the efficiency of entrepreneurial structures' operations through qualitative suggestions for decision-making and recommendations aimed at improving the efficiency of the participants within the entrepreneurial structure. In this case, artificial intelligence is programmed with rules and knowledge to analyze conditions and offer recommendations.

6. Organizational activity is based on the utilization of strong artificial intelligence. In this context, AI can comprehend and resolve a broad spectrum of management challenges and, in certain instances, demonstrate human-like capabilities in reasoning, action planning, and communication. One example of using artificial intelligence to provide recommendations for enhancing the efficiency of entrepreneurial structures is data analytics and resource management systems. These systems can analyze data on material costs, production processes, and logistical expenses, and then recommend optimal strategies for inventory management, production planning, and supply routing [5].

It is evident that artificial intelligence in entrepreneurial structures serves as a tool capable of using data and knowledge from past situations to address analogous scenarios in the future, thereby devising optimal managerial decisions according to the specifics outlined in Table 1.

The role directions specified in the table allow artificial intelligence to adapt to managerial influence (considering the complexity and unpredictability of the modern business environment), and to generate effective recommendations and decisions for entrepreneurial structures.

Managerial influence is adjusted by artificial intelligence based on the application of various combinatorial

configurations (see Figure 1) across segments such as strategic and tactical response processes, developmental trajectory, the content of the economic portfolio of structural departments or operational tasks, routine physical and intellectual operations and processes, a set of actions and recommendations aimed at enhancing business efficiency, and organizational activities.

Let's explore each of these highlighted influence segments more thoroughly, focusing on their inherent combinatorial characteristics.

The impact on the strategic and tactical response processes of an entrepreneurial structure is shaped by solving tasks related to option selection, data analysis, and measures to identify key trends and signals in the external environment, options for risk forecasting, and options for optimizing resource utilization (such as time, money, and human resources). The result of this influence is the construction of a combinatorial response framework, which helps the entrepreneurial structure enhance its flexibility and efficiency.

The impact on the development processes of the entrepreneurial structure is shaped by the flexibility of metrics and business development directions, as well as the flexibility of automating and optimizing various production processes, cost accounting, and quality control of products or services. The result of this impact is the construction of a development trajectory, which assists the entrepreneurial structure in maintaining optimality in all aspects of its operations and effectively competing in the market.

The impact on the economic portfolio of structural departments or operational tasks within the entrepreneurial structure is shaped by the flexibility of analyzing data on departmental activities and operational tasks, as well as the flexibility in resource allocation across various departments. The outcome of this impact is the definition of an economic profile that enables the entrepreneurial structure to efficiently utilize resources and accelerate the achievement of strategic objectives.

The influence on the execution processes of routine physical and intellectual operations and processes within entrepreneurial structures is determined by the possibilities of automating data processing, carrying out specific administrative tasks or monotonous production processes, and analyzing equipment status data. The result of this impact is the formation of an automation system, which helps the entrepreneurial structure increase the productivity of individual operations and processes while reducing the costs associated with their implementation.

Table 1

The role of AI in managing entrepreneurial structures

The system of roles	Characterization of the role system
Utilization of historical data and knowledge for forthcoming analogous situations	Analysis of information collected from past events or situations, and its application for forecasting and seeking optimal managerial decisions in future analogous scenarios
Employment of logical reasoning for drawing conclusions and synthesizing decisions	Utilizing logical reasoning to analyze facts (deduction) or observations and research findings (induction) to form analytical conclusions and managerial decisions
Accumulation and utilization of fundamental knowledge across diverse domains	Accumulating and applying fundamental knowledge from diverse fields to tackle a range of management challenges, facilitating well-informed decision-making across various scenarios

Source: formed based on [1; 3; 5]

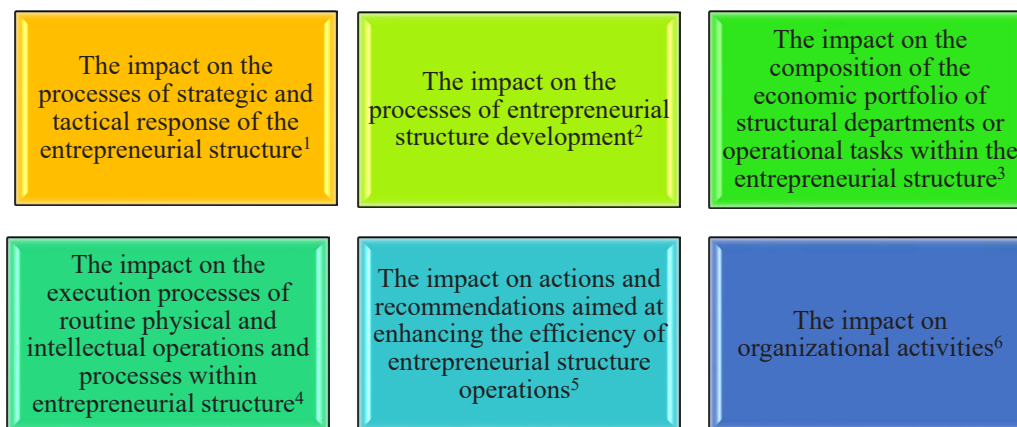


Figure 1. The differentiation of artificial intelligence impact on entrepreneurial structure by management segments

Note:

¹ The outlined impact alters actions and decisions to adapt participants within the entrepreneurial structure's internal and external environment changes, achieving strategic objectives, and optimizing daily operations.

² The outlined impact shifts the trajectory or direction of business development over time.

³ The outlined impact changes the set of characteristics of business units based on their projections and activity strategies.

⁴ The outlined impact changes the series of actions and procedures performed daily or regularly to ensure the normal functioning of the entrepreneurial structure.

⁵ The specified impact modifies the array of actions and recommendations aimed at improving the efficiency of entrepreneurial structure operations.

⁶ The outlined impact changes the set of processes, procedures, methods, and actions aimed at managing and coordinating various aspects of business operation

Source: formed based on [1; 5–6]

The impact on the set of actions and recommendations aimed at enhancing the efficiency of entrepreneurial structure operations is shaped by options for data analysis and information processing, as well as options for competency and skill systems for personnel (in terms of professional training directions and adaptability to changes in the work environment [3]). The result of the impact is the formation of timely measures that help improve the productivity and competitiveness of its business.

The impact on organizational activity is shaped by options for analyzing and adjusting the content of business processes within the entrepreneurial structure, as well as expanding the options of predictive models to aid in making informed managerial decisions. The result of the impact is the formation of an organizational structure within the delineated scope, capable of quickly adapting to changes in the environment and customer demands.

Thus, the managerial impact of artificial intelligence on entrepreneurial structures is a combinatorial category formed through the resolution of tasks related to selecting configurations for response, development, economic portfolios, approaches to operation and processes execution, actions, recommendations, and organizational activity formats.

Conclusions. The research's significance stems from AI's unique impact, enabling the use of intelligent machines for managerial tasks typically requiring human intelligence. The following conclusions have been drawn

regarding the interaction of artificial intelligence with the management system of entrepreneurial structures:

1. AI can leverage data and knowledge from past situations to find optimal managerial decisions for similar future situations.

2. AI can employ logical reasoning to draw conclusions and synthesize solutions based on available facts (deduction) or observations and research (induction).

3. AI can accumulate and utilize foundational knowledge from various fields to aid in resolving diverse management issues.

These role-specific characteristics enable artificial intelligence to adjust managerial influence, considering the complexity and unpredictability of the modern business environment, and providing effective recommendations and solutions for entrepreneurial structures.

It is worth noting that the content of the research has demonstrated that managerial influence is adjusted by artificial intelligence through the application of various combinatorial configurations of strategic and tactical responses, developmental trajectories, economic portfolios of structural units or operational tasks, execution of routine operations and processes, actions, and recommendations aimed at enhancing the efficiency of business operations and organizational activities. Furthermore, the prospects for further research may involve developing a methodology for detailed analysis of the impacts of artificial intelligence on various aspects of managing entrepreneurial structures.

References:

1. Bannikov V., Lobunets T., Buriak I., Maslyhan O., Shevchuk L. (2022) On the question of the role of project management in the digital transformation of small and medium-sized businesses: essence and innovative potential. 2022. *Amazonia Investiga*, no. 11(55), pp. 334–343.

2. Hrazhevska N. I., Chyhyrnskyi A. M. (2021) Tsyfrova transformatsiia ekonomiky v umovakh posylennia hlobalnykh ryzykiv i zahroz [Digital transformation of the economy in conditions of increased global risks and threats]. *Ekonomika ta derzhava*, no. 8, pp. 53–57.

3. Hnylyans'ka O. V., Karyu O. I. (2023) Efektyvne vykorystannya internetu rechey (IoT) v administrativnomu menedzhmentі: zavdannya ta mozhlyvosti dlya orhanizatsiy u suchasnomu biznes-seredovyschi. Pidpryyemnytstvo i torhivlya [Effective use of the Internet of Things (IoT) in administrative management: tasks and opportunities for organizations in the modern business environment]. *Pidpryyemnytstvo i torhivlya*, no. 39, pp. 58–66.

4. Kraus K. M., Kraus N. M., Osets'kyi V. L. (2021) Tsyfrove pidpryyemnytstvo v umovakh dynamichnosti hlobal'noho seredovyscha i pohlyblennya yoho virtualizatsiyi [Digital entrepreneurship in the conditions of the dynamism of the global environment and the deepening of its virtualization]. *Pryazovs'kyi ekonomichnyy visnyk*, no. 4(27), pp. 3–10.

5. Kulinich T., Bilets'ka N., Halachenko O. (2023) Stale pidpryyemnytstvo: analiz tendentsiy tsyfrovoho obliku, menedzhmentu ta marketynhu v rehional'nomu ta hlobal'nomu vymiri [Sustainable entrepreneurship: an analysis of trends in digital accounting, management and marketing in a regional and global dimension]. *Ekonomichnyy prostir*, no. 186, pp. 54–61.

6. Shats'ka Z. Ya. (2018) Sutnist' definitsiy ponyattya "pidpryyemnyts'ka struktura" ta pidkhody do yiyi traktuvannya [The essence of the definition of the concept of "entrepreneurial structure" and approaches to its interpretation]. *Visnyk Kyivivs'koho natsional'noho universytetu tekhnolohiy ta dyzaynu. Seriya Ekonomichni nauky*, no. 6 (129), pp. 111–123.

Список використаних джерел:

1. Bannikov V., Lobunets T., Buriak I., Maslyhan O., Shevchuk L. On the question of the role of project management in the digital transformation of small and medium-sized businesses: essence and innovative potential. 2022. *Amazonia Investiga*. № 11(55). P. 334–343

2. Гражевська Н.І., Чигиринський А.М. Цифрова трансформація економіки в умовах посилення глобальних ризиків і загроз. *Економіка та держава*. 2021. № 8. С. 53–57.

3. Гнилянська О.В., Карий О.І. Ефективне використання інтернету речей (іот) в адміністративному менеджменті: завдання та можливості для організацій у сучасному бізнес-середовищі. *Підприємництво і торгівля*. 2023. № 39. С. 58–66.

4. Краус К.М., Краус Н.М., Осецький В.Л. Цифрове підприємництво в умовах динамічності глобального середовища і поглиблення його віртуалізації. *Прийзовський економічний вісник*. 2021. № 4(27). С. 3–10.

5. Кулініч Т., Білецька Н., Галаченко О. Стале підприємництво: аналіз тенденцій цифрового обліку, менеджменту та маркетингу в регіональному та глобальному вимірі. *Економічний простір*. 2023. № 186. С. 54–61.

6. Шацька З.Я. Сутність дефініції поняття «підприємницька структура» та підходи до її трактування. *Вісник Київського національного університету технологій та дизайну. Серія Економічні науки*. 2018. № 6 (129). С. 111–123.