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Vertical AI Platforms as a Source of Competitive Advantage for Industry-Specific SaaS

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Abstract

The article presents an analysis of the mechanisms for creating competitive advantages in industry-specific SaaS solutions based on vertical AI platforms. The study is carried out within an interdisciplinary framework that combines digital ecosystem theory, strategic management, and developments in artificial intelligence. Particular attention is given to the architectural features of vertical platforms, their integration with industry-specific data, and their role in forming sustainable market entry barriers. The differences between horizontal and vertical platforms are compared: the former are oriented toward universal tasks, while the latter focus on specialized industry processes, hybrid computing environments, and the use of embedded mechanisms of professional knowledge. The study incorporates the author's experience in implementing large-scale engineering and SaaS projects in the telecommunications, healthcare, financial, and media sectors, which allows the theoretical analysis to be complemented with an applied perspective. This approach provides a comprehensive understanding of how vertical AI platforms can create long-term competitive advantages for corporate clients. It is shown that the use of unique industry-specific data, mechanistic models, and native APIs reduces integration costs and increases trust in digital solutions. At the same time, several limitations are highlighted—problems of interpretability, risks of monopolization, and sustainability challenges related to the energy consumption of data centers and environmental impacts. Promising directions include integration with IIoT ecosystems, the development of explainable AI, the deployment of lightweight models for edge computing environments, and the formation of a new business approach, "Strategy-as-a-Service."

Keywords: *Vertical AI Platforms, Industry-Specific Saas, Competitive Advantage, Digital Ecosystems, Explainable AI, IIoT Integration.*

INTRODUCTION

The modern software ecosystem is demonstrating a steady shift from universal cloud solutions to specialized platforms tailored for specific industries. While at the beginning of the digital transformation, the main driver of growth was horizontal SaaS solutions providing uniform functionality for a wide range of users, today the trend towards creating vertical AI platforms, embedded in domain-specific processes and possessing deep knowledge of the industrial context, is becoming increasingly prominent (Schneider et al. 2024).

This transition is driven by a combination of technological and organizational factors. On one hand, the development of foundation models and the emergence of new directions in artificial intelligence allow for the transfer of pre-trained system architectures into specialized fields, ensuring high accuracy and flexibility (Ren et al. 2025). On the other hand, there is a growing need for companies to reduce integration costs, accelerate innovation adoption, and create a long-term competitive advantage by leveraging unique industry data (Gao et al. 2024; Peretz-Andersson et al. 2024). Under these conditions, industry-specific AI platforms are viewed not just as a technological tool but as a strategic resource that creates a protective data-driven barrier and enhances business resilience to external market fluctuations.

Despite the rapid development of the industry, approaches to the design and use of vertical AI platforms remain fragmented. In academic and applied literature, there are isolated examples of analyses of architectural features (Dritsas & Trigka 2025), descriptions of integration possibilities with cloud and IIoT environments (Zhao et al. 2025), and forecasts for the development of industry-specific foundation models. However, to date, there has been no comprehensive systematization that would allow for an understanding of how architectural, organizational, and strategic factors are interconnected in shaping a competitive advantage for industry-specific SaaS.

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In the context of growing competition, increasing demands for model explainability, and the rising importance of sustainable development, there is a need for a comprehensive understanding of the role of vertical AI platforms. The task of identifying key architectural characteristics, sources of competitive advantage, and strategic directions for their development is of particular significance. Against this backdrop, the growing interest in vertical AI platforms requires a deeper analysis of their potential as the basis for a new business approach—"Strategy-as-a-Service (StaaS)." This is especially relevant in the transition to Industry 5.0, where technological differentiation is increasingly built not on the scalability of universal solutions, but on the ability to integrate AI into the specifics of particular industries.

The purpose of this study is to analyze the architectural features of vertical AI platforms, classify their key sources of competitive advantage, and identify promising directions for development in the context of industry-specific SaaS.

MATERIALS AND METHODS

The methodological foundation of this research is formed at the intersection of platform economics, digital ecosystem theory, and the concept of artificial intelligence foundation models, which is dictated by the interdisciplinary nature of the task of identifying sources of competitive advantage in specialized SaaS solutions. The main analytical tool is a review of scientific and applied literature on the transformation of SaaS through vertical AI platforms, the architectural features of cloud infrastructures, and the application of foundation models in industry.

The study draws on publications that reflect various approaches to the problem. For instance, the research by Alghamdi O. (Alghamdi et al. 2024) examines the impact of data-driven innovation and marketing agility on the formation of a sustainable competitive advantage, which allows for linking the capabilities of vertical AI platforms with organizational factors. The work of Cozzolino A. (Cozzolino et al. 2021) analyzes the evolution of collaboration and competition in digital ecosystems, while Nerbel J. (Nerbel & Kreutzer 2023) focuses on the transition from closed platforms to broad ecosystems. These sources are set as the theoretical framework for the study.

Key attention is paid to technical and infrastructural aspects. The study by Dritsas E. (Dritsas & Trigka, 2025) presents cloud computing models for the industrial internet of things, which allows for considering hybrid architectures as the basis for vertical platforms. Duan W. (Duan et al. 2024) investigates the configuration of platform ecosystems and their impact on performance, whereas Gao R. (Gao et al. 2024) systematizes the current state of artificial intelligence applications in manufacturing and outlines prospects. In the work of Luitse D. (Luitse, 2024), the phenomenon of the "power position" of platforms in the digital economy is analyzed, showing how cloud infrastructures become key elements of political and economic processes in the AI field.

Special attention is given to research focused on the implementation of artificial intelligence in narrowly specialized industry conditions. The work of Peretz-Andersson E. (Peretz-Andersson et al. 2024) analyzes the use of AI in small and medium-sized manufacturing enterprises through a resource-orchestration approach, which helps to identify the importance of managerial coordination of resources. The study by Ren L. (Ren et al. 2025) emphasizes the need to develop specialized foundation models for the process industry and notes the limitations of universal models in the context of highly complex production mechanisms. The article by Schneider J. (Schneider et al. 2024) interprets foundation models as a new paradigm of artificial intelligence, highlighting their key properties—emergent capabilities, homogenization, and prompt sensitivity. The review by Zhao S. (Zhao et al. 2025) systematizes the concept of industry-specific foundation models for intelligent manufacturing, which forms the analytical basis for their integration into specialized SaaS solutions.

To ensure methodological rigor, a structured literature search was conducted across IEEE Xplore, ACM Digital Library, Scopus, SpringerLink, and Google Scholar between January and March 2025. The search terms included: "vertical AI platforms," "industry-specific SaaS," "foundation models," "digital ecosystems," "explainable AI," "IIoT integration," and "Strategy-as-a-Service." The review was limited to the period 2020–2025, focusing on peer-reviewed journal articles, conference proceedings, and selected industry reports. Publications were excluded if they addressed only horizontal AI platforms or lacked relevance to SaaS ecosystems.

The initial literature search was conducted across major databases (IEEE Xplore, ACM Digital Library, Scopus, SpringerLink, Google Scholar). At the first stage, selection was based on titles and abstracts, which made it possible to identify publications relevant to the topic of vertical AI platforms and industry-specific SaaS solutions. This was followed by a full-text analysis, resulting in a final set of sources covering three key areas: organizational perspectives (e.g., Alghamdi et al. 2024; Cozzolino et al. 2021; Nerbel & Kreutzer 2023), architectural and infrastructural aspects (e.g., Dritsas & Trigka 2025; Duan et al. 2024; Gao et al. 2024; Luitse 2024), and developments in domain-specific foundation models (e.g., Peretz-Andersson et al. 2024; Ren et al. 2025; Schneider et al. 2024; Zhao et al. 2025).

Thus, the methodological strategy is based on a comparative analysis of theoretical concepts, architectural models, and applied examples described in the sources. This structured approach has allowed for the identification of stable analytical blocks, from strategic factors of competitive advantage to the technological characteristics of vertical AI platforms, which form the basis for further analysis of their role in the development of specialized SaaS.

RESULTS

An analysis of the architecture of vertical AI platforms demonstrates that their key distinction is the integration of artificial intelligence foundation models with industry knowledge and specialized datasets. The study by Ren L. (Ren et al. 2025) emphasizes that universal models, trained on general information sources, have a limited ability to be applied in complex industrial scenarios where high forecast accuracy and strict interpretability are necessary. In contrast, vertical solutions rely on domain-specific data and the mechanistic knowledge of a particular industry, which allows for increased information processing effectiveness and the formation of a sustainable competitive advantage for companies using such platforms (Alghamdi et al. 2024).

An important element of the architecture is the use of hybrid cloud solutions, combining centralized and distributed resources. The study by Dritsas E. (Dritsas & Trigka, 2025) shows that it is precisely the hybrid model, including cloud and edge computing, that provides the necessary performance for the industrial internet of things. This enables vertical AI platforms to simultaneously process large arrays of data in real time and maintain scalability, which is particularly important for industry-specific SaaS focused on integration with production and service chains.

The adaptation of service levels—Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)—takes on a specific character in vertical solutions. The research by Schneider J. (Schneider et al. 2024) notes that artificial intelligence foundation models are becoming a new layer of the technology stack, and their adaptation to applied tasks requires deep integration into business processes. This means that SaaS products within vertical AI platforms cannot be limited to standard functions but must include native mechanisms for processing industry-specific data, model tuning algorithms, and tools for integration with the client's local infrastructure. A comparative analysis of the key architectural characteristics of horizontal and vertical AI platforms is presented in Table 1.

Table 1. Comparison of architectural characteristics of vertical and horizontal AI platforms (Compiled by the author based on sources: (Dritsas & Trigka 2025), (Ren et al. 2025), (Schneider et al. 2024))

Characteristic	**Horizontal platforms (GPT, BERT, etc.)**	**Vertical AI platforms**
Type of data	General, multi-domain	Domain-specific, industry-focused
Architecture	Centralized	Hybrid (cloud + edge)
Customization	Prompt engineering/light fine-tuning	Embedded mechanisms of industry-specific knowledge
Applicability	Universal tasks	Specialized SaaS processes

The data presented in Table 1 allow for the identification of fundamental differences in architectural approaches. Horizontal platforms, such as GPT or BERT, are developed as universal tools aimed at a wide range of tasks. However, when used in specific business processes, the need for complex additional tuning procedures arises, which increases the cost of integration and reduces efficiency. In contrast, vertical AI platforms are designed from the outset with the specifics of a particular industry in mind.

Analysis of vertical AI platforms shows that their key source of competitive advantage is the use of unique industry-specific data. The study by Gao R. (Gao et al. 2024) emphasizes that the integration of proprietary information arrays creates a so-called data moat—a barrier that significantly complicates market entry for competitors.

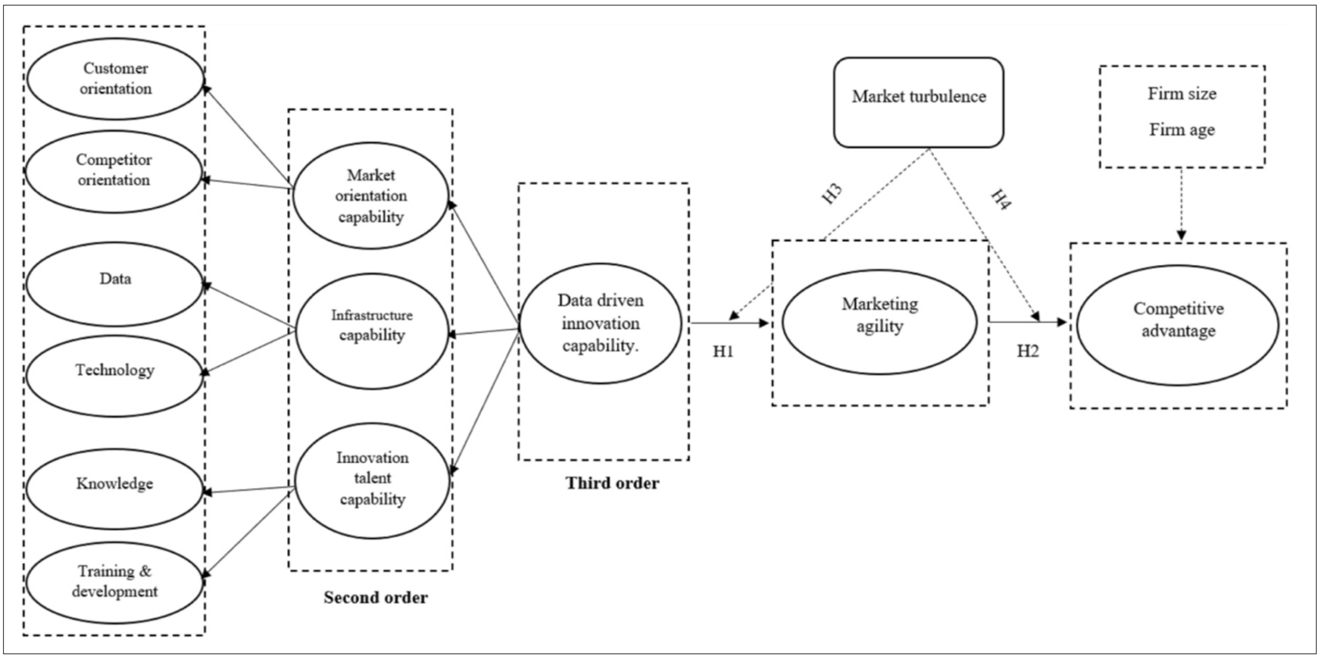

Figure 1. Framework of data-driven innovation, marketing agility, and competitive advantage (Source: Alghamdi, O. (2024))

The conceptual framework proposed by Alghamdi and Agag (2024) provides a structured view of how data-driven innovation capabilities act as mediators between organizational resources and sustainable competitive advantage. As shown in Figure 1, second-order capabilities such as market orientation, infrastructure development, and innovation talent combine to form higher-order data-driven innovation capacity. This, in turn, enhances marketing agility, enabling firms to adapt quickly to market turbulence. Moderating factors such as firm size and age also influence the extent to which these capabilities translate into long-term competitive advantage. In the context of vertical AI platforms, this model highlights how proprietary industry data and embedded innovation mechanisms strengthen agility and resilience, thereby reinforcing strategic differentiation in highly dynamic markets.

Access to specialized datasets allows for the generation of more accurate forecasts and individualized recommendations, which becomes a decisive factor for success in an environment of intensifying digital competition. For instance, in the manufacturing sector, industrial platforms integrate operational data accumulated over decades of equipment use, creating barriers that are difficult for new entrants to replicate (Gao et al. 2024; Zhao et al. 2025).

The second important source of competitive advantage is the embedding of mechanistic models and industry-specific rules into the platform architecture. The research by Peretz-Andersson E. (Peretz-Andersson et al. 2024) demonstrates that using knowledge specific to a particular field increases client trust and reduces the risks of implementing new digital solutions. For corporate customers, the accuracy of analytics and the transparency of the mechanism for obtaining it are of particular importance. Embedding models based on domain laws and regulated procedures allows clients to perceive the system's recommendations as validated and compliant with professional standards. A practical illustration can be found in industrial engineering, where vertical AI platforms embed physics-based digital twin models to replicate production processes with high fidelity. Similarly, in financial services, compliance-driven platforms integrate regulatory rule sets directly into their analytics engines, ensuring that recommendations automatically align with sectoral legal frameworks. This strengthens the role of vertical AI platforms as a reliable tool for digital transformation.

Another factor is the reduction of integration costs for corporate clients. The study by Zhao S. (Zhao et al. 2025) notes that the presence of native APIs and industry-specific modules significantly reduces the costs of implementing and maintaining SaaS solutions. Unlike universal platforms, which require considerable resources for adaptation to business specifics, vertical systems ensure rapid compatibility with existing infrastructure. This allows companies to achieve operational efficiency faster and reduce the total cost of ownership of digital solutions. For instance, in logistics SaaS, providers of AI-driven fleet management systems offer pre-built APIs compatible with popular ERP platforms, reducing the burden of custom development for clients. In energy, vertical AI solutions designed for grid optimization provide native connectors to SCADA systems, allowing utilities to deploy advanced forecasting tools without reconfiguring their legacy infrastructure. A systematization of the identified factors is presented in Table 2.

Table 2. Key sources of competitive advantage of vertical AI platforms (Compiled by the author based on sources: (Gao et al. 2024), (Peretz-Andersson et al. 2024), (Zhao et al. 2025))

Factor	Implementation mechanism	Effect for SaaS
Data moat	Integration of proprietary industry-specific data	Entry barrier for competitors
Domain alignment	Embedding industry knowledge and rules	Increased customer trust
Custom integration	Native APIs and industry-specific SaaS modules	Reduced integration costs

As can be seen from Table 2, the competitive advantage of vertical AI platforms is formed not through universality, but through their ability to account for the specifics of a particular industry. These platforms use closed data, integrate mechanistic models, and provide ready-to-use solutions, which create comprehensive value for corporate clients.

Collectively, these factors allow such platforms to strengthen their market positions and form long-term barriers to entry for new participants. This is why vertical AI platforms are becoming a strategic resource for industry-specific SaaS, transforming the rules of competition and opening new horizons for sustainable growth.

DISCUSSION

The development of vertical AI platforms is accompanied by a whole spectrum of limitations that hinder their full integration into industrial ecosystems. One of the most significant issues remains the problem of interpretability and trust in the models. The study by Ren L. (Ren et al. 2025) notes that the use of complex algorithms in the process industry is associated with a high degree of uncertainty and the risk of errors in forecasts or control actions. In the absence of decision transparency, even minor deviations can lead to technological failures or accidents. For example, in healthcare diagnostics, AI-driven platforms that lack explainability face strong resistance from clinicians, since black-box predictions cannot be trusted in life-critical decision-making. By contrast, explainable systems that link outputs to clinical guidelines and mechanistic disease models are more readily adopted, demonstrating how interpretability directly impacts implementation success. In conditions of strict regulatory requirements and the high cost of errors, trust in the model becomes a critical factor, which necessitates the development of methods for explainable analysis and independent validation of algorithms.

Alongside this, vertical AI platforms are being formed in the context of increasing centralization in the development of foundation models, which creates risks of monopolization. The research by Schneider J. (Schneider et al. 2024) emphasizes that the dependence of industries on a limited number of global providers leads to algorithmic homogenization. In such a situation, innovative solutions are built on the same set of architectural principles, which reduces diversity and strengthens barriers to entry for new participants. Furthermore, errors, vulnerabilities, or hidden biases embedded in the fundamental algorithms are scaled across a wide range of industry applications. This creates a threat of systemic failures, where the shortcomings of one platform affect a multitude of production processes.

The issue of sustainability deserves separate attention. The study by Zhao S. (Zhao et al. 2025) shows that the growth in the number and scale of foundation models leads to a significant increase in the energy consumption of data centers. The operation of such platforms is accompanied by substantial carbon dioxide emissions and increased use of natural resources. This issue is already evident in large-scale hyperscaler data centers operated by companies such as Google and Microsoft, where the training of foundation models consumes gigawatt-hours of electricity per year. In response, some providers are experimenting with renewable-powered facilities and liquid cooling technologies to mitigate environmental impact, highlighting the importance of aligning vertical AI platforms with green computing practices. In the context of the global move towards ecological transformation, this becomes one of the key obstacles to the long-term prospects of vertical AI platforms. Solving this problem requires the implementation of energy-efficient architectures, the optimization of algorithms, and a transition to green computing practices, which will allow for a reduction in the load on infrastructure and an increase in environmental sustainability.

The current dynamics of the development of vertical AI platforms indicate the formation of new directions that will define their strategic importance for industry-specific SaaS in the coming years. One of the key trends is the integration with the Industrial Internet of Things (IIoT). The research by Dritsas E. (Dritsas & Trigka, 2025) shows that combining cloud and edge computing with distributed ledger technologies creates the conditions for real-time data processing and ensuring its trustworthiness. Such a combination makes it possible to merge the scalability of cloud solutions with the security and autonomy of the peripheral level, which is particularly important for critical production processes.

Another direction is the development of explainable artificial intelligence and lightweight models for operation in environments with limited computational resources. The study by Ren L. (Ren et al. 2025) emphasizes that for industries with a high degree of regulation and a critical role for the human factor, the interpretability of algorithms is a necessary condition for implementation. The use of mechanistic models in conjunction with XAI technologies provides the ability to explain the system's behavior in the language of domain processes, which increases trust and facilitates the scaling of solutions. Simultaneously, the task of creating lightweight models that can operate efficiently on peripheral devices becomes relevant, reducing the load on data centers and ensuring the autonomy of analysis.

An important strategic vector can be considered the transition from providing tools to forming a new business approach—"Strategy-as-a-Service (StaaS)." This concept goes beyond delivering functional software or AI modules and positions vertical AI platforms as providers of strategic guidance embedded directly into digital solutions. Unlike traditional SaaS, which focuses on offering standardized services, StaaS integrates industry-specific knowledge, regulatory frameworks, and predictive analytics into the very architecture of the platform.

In practice, this means that clients do not merely receive a set of instruments for process automation but gain access to a continuously updated decision-making framework. For example, in healthcare, a StaaS-oriented platform could combine proprietary clinical data with evidence-based treatment guidelines to generate strategic recommendations for hospital management. In manufacturing, platforms embedding digital twin models and supply chain analytics can provide strategic insights into capacity planning, risk mitigation, and sustainability practices. In finance, StaaS platforms can align AI-driven analytics with evolving regulatory requirements, effectively acting as compliance co-pilots for decision makers.

By embedding themselves in corporate value creation chains, such platforms establish standards for strategic alignment—defining not only how processes are executed but also how companies design their long-term growth trajectories. This radically changes the role of SaaS products in the digital economy ecosystem, moving them beyond an instrumental function and toward becoming partners in strategic governance. As a result, Strategy-as-a-Service can be viewed as the next stage in the evolution of vertical AI platforms, where competitive advantage arises not only from data and technology but also from the ability to codify, orchestrate, and continuously adapt corporate strategy. A systematization of future directions for the development of vertical AI platforms is presented in Table 3.

Table 3. Future directions of vertical AI platforms (Compiled by the author based on sources: (Cozzolino et al. 2021), (Dritsas & Trigka 2025), (Nerbel & Kreutzer 2023))

Direction	Key technology	Potential effect
IIoT integration	Edge + Blockchain	Real-time processing and data trust
Explainability	XAI + mechanistic models	Increased user trust
Sustainability	Lightweight models + green computing	Reduced energy consumption

As can be seen from Table 3, the further evolution of vertical AI platforms is determined by technological progress as well as institutional and environmental factors. Integration with IIoT opens up possibilities for building a trusted digital infrastructure in real time. The development of XAI and mechanistic models forms the basis for increasing transparency and interpretability, which becomes a key condition for widespread application in highly regulated sectors. In parallel, optimizing energy consumption through lightweight architectures and "green" computing practices responds to the challenges of sustainable development, allowing platforms to remain competitive in the long term.

The combination of these directions sets strategic implications for corporate users. Vertical AI platforms are beginning to play the role not just of a technological base, but also of a systemic resource for forming competitive strategies. Their ability to unite industry-specific data, interpretable models, and energy-efficient solutions transforms such platforms into key actors of digital transformation, capable of setting new standards for the functioning of industry-specific SaaS.

CONCLUSION

The conducted research has established that vertical AI platforms form a sustainable competitive advantage for industry-specific SaaS through architectural features, the integration of industry data, and the capacity for deep domain customization. It has been determined that their distinctive characteristic is the combination of artificial intelligence foundation models with industry knowledge and mechanistic representations, which provides higher accuracy of forecasts and relevance of recommendations compared to universal horizontal solutions.

A comparative-analytical review of the sources confirmed that unique industry data serves as a strategic barrier to entry, strengthening the market position of providers. Embedding mechanistic models into algorithms increases trust from corporate clients, and the use of native APIs and specialized modules reduces implementation costs, facilitating integration into existing infrastructure. This configuration makes vertical platforms not just a technological tool, but a systemic resource capable of setting the standards for SaaS functionality in specific industries.

At the same time, it was found that the potential of vertical AI platforms is limited by problems of interpretability, risks of monopolization, and sustainability challenges. A lack of transparency in solutions reduces trust in models, the concentration of resources in the hands of a few providers creates the threat of an algorithmic monoculture, and the high energy consumption of data centers calls into question the long-term ecological viability of this approach. These challenges require the development of new methods for explainable analysis, diversification of the provider ecosystem, and the implementation of "green" computing practices.

Special attention in this work was given to future directions of development, including the integration of vertical platforms with IIoT ecosystems, the spread of explainable AI and lightweight models for peripheral environments, and the formation of a new "Strategy-as-a-Service" business approach. These trends allow for viewing vertical AI platforms as the technological and strategic foundation of digital transformation, defining the architecture of industry-specific solutions and business models.

Thus, vertical AI platforms should be considered as a multi-layered tool that combines technical, organizational, and strategic advantages. Their effectiveness depends on the power of the foundation models and the ability to account for industry specifics, reduce integration barriers, and adapt to the requirements of sustainable development. Prospects for further research are related to clarifying the mechanisms of trust in models, developing energy-efficient architectures, and conducting an institutional assessment of the strategic role of vertical platforms in shaping the global digital economy.

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