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CONCEPTUAL MODEL OF THE QADAM DIGITAL PLATFORM AS A UNIFIED DIGITAL ECOSYSTEM FOR SMES

Abstract. The digital transformation of small and medium-sized businesses (SMEs) is a key factor in sustainable economic growth, increased competitiveness, and the integration of national economies into global value chains. In the developing platform economy, digital platforms act not only as technological solutions but also as institutional coordination mechanisms, facilitating interactions between businesses, government, financial institutions, and consumers. This article examines the conceptual model of the QADAM digital platform, focused on SMEs, as a unified digital ecosystem. The platform integrates a B2B portal, an AI assistant for businesses, a digital commercial platform, P2P interactions, and a set of business tools, creating an end-to-end chain of digital services – from business registration and support to management and commercial decision-making. The objective of this study is to develop and validate the conceptual model of the QADAM digital platform, including a business model, decision-making model, and monetization model, as well as to analyze its potential for SME development.

Keywords: digital platform, digital transformation, small and medium businesses, platform economy, digital ecosystem, artificial intelligence.

1. Introduction

1.1. Purpose and Objective of the Study

The digital transformation of small and medium-sized businesses (SMEs) is currently considered a key factor in sustainable economic growth, increased productivity, innovation, and the competitiveness of national economies. In the context of globalization and the development of the digital economy, SMEs face a number of systemic barriers, including limited access to financial resources, fragmented digital services, insufficient digital maturity, and high transaction costs when interacting with government agencies, financial institutions, and sales markets.

The current stage of development of the platform economy is characterized by a shift in focus from individual digital tools to complex digital ecosystems that integrate multiple participants and services within a single digital space. Digital platforms in this context act not only as technological solutions but also as institutional mechanisms for coordinating economic processes, shaping new models of interaction between businesses, government, financial institutions, and end consumers. For SMEs, this opens opportunities to reduce barriers to market entry, accelerate business processes, and improve the quality of

management decisions using data and intelligent services.

Despite the active development of digital platforms, a significant portion of existing solutions are focused on specific functions (e-commerce, accounting, fintech services, marketplaces) and do not provide comprehensive support for the SME lifecycle. As a result, entrepreneurs are forced to use disparate digital tools, which leads to increased operating costs and reduced efficiency of digital transformation. Therefore, a pressing scientific and practical challenge is the development of integrated platform models capable of functioning as unified digital ecosystems for SMEs.

This article examines the conceptual model of the QADAM digital platform, aimed at small and medium-sized businesses and implementing a unified digital ecosystem approach. The QADAM platform integrates a B2B portal, an intelligent AI assistant for supporting entrepreneurial decisions, a digital commercial platform, P2P interaction mechanisms, and a set of applied business tools. This architectural solution creates an end-to-end chain of digital services—from business registration and support to data analysis, management decision-making, and commercial operations.

The purpose of this study is to develop and theoretically substantiate a conceptual model of the



QADAM digital platform as a unified digital ecosystem for SMEs, as well as to analyze its potential for improving the performance of small and medium-sized businesses.

To achieve this goal, the article addresses the following research objectives:

- Analyze modern approaches to digital platforms and ecosystems in the context of SME development.
- Substantiate the architectural and functional components of the QADAM digital platform.
- Develop a conceptual business model for the platform, including key user groups and value propositions.
- Formulate a model for making management decisions based on data and AI tools.
- Propose a monetization model for the digital platform focused on the sustainable development of the ecosystem.
- Evaluate the potential effects of implementing the QADAM platform for SMEs.

1.2. Literature Review and Comparative Analysis

Contemporary research on the platform economy emphasizes the role of digital ecosystems as multi-sided markets that enable network effects and reduce transaction costs (Gawer, 2014; Parker et al., 2016). For small and medium-sized enterprises (SMEs), digital platforms are increasingly viewed as strategic instruments that provide access to markets, finance, data, and innovation capabilities (OECD, 2019). In contrast to traditional standalone digital tools, platforms facilitate coordinated interactions among multiple actors, thereby enhancing scalability and value co-creation [1]-[2].

A growing body of literature highlights the integration of artificial intelligence (AI) and machine learning (ML) into platform-based solutions as a key driver of automation, personalization, and operational efficiency (Brynjolfsson & McAfee, 2017; Davenport & Ronanki, 2018). In the context of B2B platforms, AI technologies are applied to demand analytics, credit scoring, recommendation systems, and supply chain optimization (Ransbotham et al., 2020). These developments reinforce the view that AI is no longer a peripheral add-on but an integral component of contemporary digital platforms [3]-[5].

Research on digital ecosystems further stresses the importance of modular architecture, API-oriented design, and open standards (Jacobides et

al., 2018). For SMEs, peer-to-peer (P2P) mechanisms and digital marketplaces are particularly relevant, as they enable horizontal linkages between ecosystem participants and lower entry barriers to collaboration and market participation (Kenney & Zysman, 2016) [6]-[7].

1.2.1. Digital Platforms and SME Digital Transformation: General Approaches

In a systematic literature review on business digital transformation, Suuronen et al. (2022) argue that for SMEs, digital platforms represent not merely automation tools but architectural foundations for business model transformation. The authors demonstrate that successful SME digital transformation requires a shift from fragmented digital solutions toward platform-based approaches that integrate processes, data, and partner relationships. Compared to traditional IT systems, platforms generate stronger scalability effects but simultaneously demand higher levels of organizational readiness [8].

The OECD (2021) highlights that digital platforms – including cloud services, e-commerce solutions, and digital financial services – constitute a critical factor in enhancing SME competitiveness. However, the report emphasizes that SMEs in emerging economies face asymmetric access to platform ecosystems, which constrains the depth and impact of digital transformation. Compared to developed economies, the effects of platform adoption in such contexts tend to remain fragmented and uneven [9].

Platform Ecosystems as a Value Creation Mechanism for SMEs

Hein et al. (2024) conduct a comparative analysis of business, innovation, and platform ecosystems and demonstrate that platform-based solutions exhibit the highest potential for SMEs due to reduced transaction costs and access to external resources. Platforms function as coordination mechanisms that allow small firms to compensate for internal resource constraints. At the same time, dependence on platform governance rules introduces new forms of risk for SMEs [10].

Khademi (2020) analyzes value creation and value capture processes in digital ecosystems and concludes that platforms targeting SMEs are most effective when they enable complementary services such as finance, training, and marketing. Without a well-developed partner ecosystem, a platform risks

devolving into a collection of isolated services that fail to generate transformational impact [11].

1.2.2. Artificial Intelligence as a Component of SME Digital Platforms

In a comprehensive review of AI applications in SMEs, Le Dinh et al. (2025) demonstrate that AI significantly amplifies the transformational potential of digital platforms through data analytics, forecasting, and automation of managerial decision-making. However, the authors emphasize that most SMEs are not prepared to independently implement AI solutions, thereby increasing the relevance of platform-based AI-as-a-Service models [12].

Kramarenko (2025) further argues that AI adoption among SMEs remains limited and largely experimental, particularly in emerging markets. Compared to large enterprises, SMEs suffer from data scarcity, financial constraints, and limited digital competencies, which diminish the realized benefits of AI-enabled platforms [13].

1.2.3. Empirical Studies on SME Digital Maturity in Kazakhstan

Yezhebay et al. (2021) develop a digital maturity model for SMEs in Kazakhstan encompassing technological, organizational, and institutional dimensions. Their findings indicate that the majority of SMEs remain at early stages of digitalization, which restricts their ability to leverage platform-based solutions. In contrast to digitally advanced economies, digital platforms in Kazakhstan are often used in a fragmented manner [14].

Empirical studies published in *Business Perspectives and Problems and Perspectives in Management* (2023) confirm that the primary barriers to SME digital transformation in Kazakhstan include limited financial resources, shortages of skilled personnel, and low levels of digital service integration. According to these studies, existing digital initiatives fail to form a coherent ecosystem for SMEs [15].

1.2.4. Comparative Analysis of Existing Solutions

A synthesis of international and national studies indicates that in developed economies, SME digital platforms are increasingly designed as integrated ecosystems that combine e-commerce, financial services, analytics, and business support. In contrast, in emerging markets – including Kazakhstan – digital solutions for SMEs are often offered as

disconnected services or support programs that do not facilitate systemic business transformation.

The U.S. e-commerce market began to take shape in the late 1990s with Amazon and eBay; however, a major shift occurred after 2010 with the introduction of Amazon's Fulfillment by Amazon (FBA) model, which outsourced logistics, warehousing, and customer service for entrepreneurs. Subsequently, platforms such as Walmart Marketplace, Etsy, and Target Plus emerged, while Shopify developed a marketplace-like ecosystem integrating millions of independent stores. As a result, marketplaces effectively became a new form of digital retail infrastructure for SMEs [16,17].

The Kazakhstani trajectory differs significantly. Rather than a single dominant global player, platform development has been driven by a combination of factors, including:

- Kaspi.kz, which integrates marketplace functions with mobile payments, logistics, and lending.
- the entry of Wildberries and Ozon, which introduced new market standards.
- Satu.kz as a platform oriented towards SME catalogs and B2B trade.
- the parallel development of domestic logistics and courier infrastructure.

Notably, marketplace development in Kazakhstan has been closely intertwined with fintech expansion. Installment payments, instant transfers, and user-friendly mobile interfaces have accelerated the mainstream adoption of e-commerce. Consequently, marketplaces have evolved into comprehensive platforms for SMEs that previously lacked offline equivalents [18,19].

1.2.5. Summary and Research Gap Formulation

The literature review reveals a lack of comprehensive conceptual models of digital platforms specifically designed for SMEs and integrating an AI business assistant, a B2B portal, and a digital commerce platform within a unified ecosystem. This gap defines the core scientific novelty of the present study.

Despite the existence of successful international platform solutions and theoretically grounded models of SME digital transformation, key challenges remain unresolved in the Kazakhstani context. Low levels of SME digital maturity, fragmentation of existing digital services, and limited adoption of platform-based and AI-driven solutions hinder genuine digital transformation. This

research gap justifies the relevance of developing an integrated digital platform model as a systemic instrument for SME transformation.

1.2.6. Scientific Novelty and Practical Significance

The scientific novelty of the study lies in the development and justification of a platform-ecosystem model for the digital transformation of SMEs, adapted to the conditions of Kazakhstan and focused on the phased improvement of their digital maturity. Unlike works where the digitalization of small businesses is viewed primarily as the implementation of individual technologies or local automation of business processes, this study proposes a holistic approach where the digital platform acts as a mechanism for the structural transformation of the entrepreneurial environment.

The first aspect of scientific novelty is related to the transfer of platform logic to the context of a developing economy with a heterogeneous level of digital maturity among enterprises. The study shows that for Kazakhstan; the key task is not only expanding access to digital tools but also forming a unified environment capable of overcoming the fragmentation of current solutions. Thus, the article develops theoretical ideas about digital platforms, demonstrating their significance not only as a transaction channel but also as a tool for reducing institutional and organizational barriers to digitalization.

The second aspect of novelty consists of integrating platform and ecosystem approaches into a single analysis model. Within the article, QADAM is considered a coordination environment where value is created not in isolation within a single enterprise, but in the process of interaction between SMEs and external participants.

The third aspect of scientific novelty lies in the inclusion of AI components into the platform model as a systemic layer rather than a separate technological tool. In this study, AI is integrated into the structure of the QADAM platform as an embedded service circuit providing intelligent decision support, lowering the entry barrier to analytics, and increasing the accessibility of digital competencies for small businesses.

The scientific novelty of the study is also manifested in the development of an analytical framework for evaluating the effects of the platform transformation of SMEs. The article proposes a system of criteria including economic, technological, organizational, and ecosystem indicators.

Thus, the scientific novelty of the revised study is that it is the first, for the context under consideration, to propose and justify a comprehensive model of platform transformation for SMEs, combining multi-layered digital platform architecture, ecosystem coordination, an embedded AI circuit, and a system for measuring effects. This allows QADAM to be viewed not only as a project solution but also as a theoretically significant model for the digital modernization of the entrepreneurial sector.

2. Materials and Methods

2.1. Research Design and Methodological Framework

The methodological basis of the study combines theoretical analysis, conceptual modeling and pilot empirical validation. The first methodological foundation is based on systems approach that is used as the basic methodological position in the study. QADAM digital platform is viewed not as an individual software product, but as a complex multi-level socioeconomic system in which technological, organizational, and institutional components are interconnected. The systems approach allowed for the identification of the platform's internal structure, the determination of the interdependence of its levels, and the description of the mechanisms for forming the aggregate effect for SMEs.

The second methodological foundation is the ecosystem approach. The ecosystem framework allowed for QADAM to be interpreted not as a tool for the internal digitalization of a single company, but as a coordination mechanism providing stable ties between participants in the entrepreneurial environment. This is particularly important for Kazakhstan, where the digital transformation of SMEs is often limited by weak connectivity between market participants and support infrastructure.

The third methodological foundation is the platform approach, applied to analyze modularity, network effects, scalability, and service integration mechanisms. Using this framework allowed for a transition from describing functionality to explaining why a platform-based form of organizing digital solutions provides higher potential for SME transformation compared to the fragmented implementation of individual tools.

Additionally, the SME digital maturity framework is used in the study, allowing digital transformation to be viewed as a phased process. As a result, the QADAM platform is analyzed not only

as a technical environment but also as a tool for business transition from basic digitalization to more mature management models based on data and intelligent services.

The methodological structure of the study is built based on the following stages:

1. Analysis of scientific literature on SME digital transformation, the platform economy, and the use of AI in small business (identifying the research gap).

2. Comparative analysis of existing approaches to SME digitalization (fragmented solutions vs. marketplaces vs. platform-ecosystem approaches).

3. Development of the conceptual and formalized QADAM model.

4. Pilot empirical validation through an SME survey and assessment of expected effects.

5. Interpretation of results while accounting for research limitations.

To ensure methodological reproducibility, the criteria for the development of the QADAM model are separately developed and recorded. These include relevance to the conditions of Kazakhstan's SMEs, integration of digital services, modularity of implementation, accessibility of AI components in a service format, and ecosystem compatibility with external participants.

Also, the methodological framework of this work includes the research limitations too. First, the empirical part was performed in a pilot format and reflects a preliminary check of the model rather than a final statistical evaluation for the entire SME sector. Second, part of the assessments is scenario-based, as the platform is currently at the stage of conceptual and pilot implementation. Third, long-term network effects, including participant retention and ecosystem growth dynamics, require separate observation over time. Fourth, the impact of industry specifics on the effect of platform transformation requires further detailing in subsequent studies.

Thus, the methodological rigor of the study is ensured through the combination of four elements: theoretical substantiation, model formalization, pilot empirical verification, and explicit documentation of limitations.

2.2. Research Methods

To achieve the research objectives, a combination of complementary research methods was employed:

- ✓ Systematic literature analysis. A structured review of academic publications indexed in Scopus, Web of Science, and related databases was conducted to identify dominant trends, theoretical approaches, and limitations in SME digital transformation and platform research.

- ✓ Comparative analysis. Comparative analysis was applied to contrast international and Kazakhstani approaches to digital platforms for SMEs. This method enabled the identification of contextual differences between developed and emerging economies and informed the localization logic of the proposed model.

- ✓ Conceptual modeling. Conceptual modeling served as the core research method and was used to develop the QADAM digital platform architecture, define its structural layers, and formalize interactions between platform components and ecosystem actors.

- ✓ Analytical synthesis. Analytical generalization was employed to integrate findings from the literature and modeling stages and to formulate design principles for SME-oriented digital platforms.

- ✓ Prospective empirical validation. – Empirical testing and quantitative assessment of the proposed model are identified as directions for future research, including pilot implementation and performance evaluation of the platform.

This combination of methods ensures methodological rigor while remaining appropriate for the conceptual nature of the study.

2.3. Conceptual Model of the QADAM Digital Platform and Its Formalization

Within the methodological framework, an original conceptual model of the QADAM digital platform is designed and proposed its formalization principles. The model is designed to support the comprehensive digital transformation of SMEs through the integration of key digital services and decision-support tools within a single platform ecosystem.

Conceptually, the QADAM platform consists of four interrelated layers (Fig. 1).

Infrastructure layer. This layer represents the cloud-based digital environment that обеспечивает data storage, computing capacity, scalability, and platform reliability. It forms the technological foundation of the QADAM ecosystem.

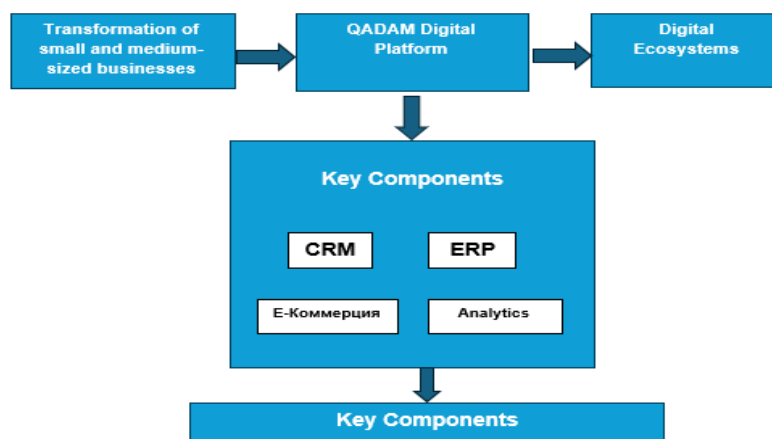


Figure 1. QADAM Digital Platform Structure

Functional services layer. This layer includes modular digital services for SMEs, such as:

- ✓ customer and sales management (CRM),
- ✓ core ERP functionalities (accounting, inventory management),
- ✓ e-commerce and digital sales channels,
- ✓ financial and FinTech services,
- ✓ analytical dashboards for managerial decision support.

Intelligent layer (AI components). The intelligent layer implements AI technologies in the form of AI-as-a-Service, including:

- ✓ predictive analytics and demand forecasting,
- ✓ personalized business recommendations,
- ✓ automated support chatbot,
- ✓ intelligent assessment of SME digital maturity.

Ecosystem layer. This layer facilitates interaction between SMEs and external stakeholders, including government services, educational platforms, consulting firms, investors, and technology partners. It enables network effects and contributes to the long-term sustainability of the platform.

The original QADAM model is presented not merely as a description of platform modules, but as a formalized multi-layered system with defined structures, value creation mechanisms, network effect logic, and performance evaluation criteria. QADAM platform is viewed as a multi-layered system including infrastructure, functional, intellectual, and ecosystem levels. The infrastructure level provides the basic technological conditions for platform functioning, including data storage, integration interfaces, information security, and scalability. The functional level integrates

applied services for SMEs, such as accounting, sales, customer interaction, a digital showcase, and basic analytics. The intellectual level includes AI modules designed for recommendations, forecasting, automated support, and digital maturity assessment. The ecosystem level ensures the interaction of SMEs with external participants, including partners, financial institutions, educational structures, and government support mechanisms

That is, from the perspective of formalizing this structure, the platform is viewed not simply as a technological development, but as a system of interconnected subsystems, not as a set of individual functions. This means that QADAM's value is formed not at the level of each individual module, but rather through their combined use within a unified environment. This principle distinguishes the platform model from the traditional approach, which builds SME digitalization through the sequential integration of disparate services.

A key element of formalization is the description of the value creation and distribution mechanism. The study identifies the main groups of participants in the platform ecosystem:

- SME entities,
- clients and counterparties,
- partners and service providers,
- institutional participants.

For each group, the platform creates its own type of value. However, the SME remains the central object of the study as the primary recipient of the transformational effect.

The value of the platform for SMEs in the QADAM model is defined as a combination of five

components: access to digital services, reduction of transaction costs, access to data and analytics, intelligent decision support, and the network effect from the expansion of the number of platform participants. From the perspective of economic logic, the QADAM model relies on the principle of network effects. The utility of the platform for an individual enterprise increases as the number of active clients, partners, and service providers within the ecosystem grows.

The logic of enterprise transition through digital maturity levels is formalized separately. The work shows that the digital transformation of SMEs is not a one-time event. It develops in stages, starting from the basic digitalization of individual processes and ending with an integrated ecosystem model of operation, where analytics and AI are used in regular management. In this logic, the QADAM platform acts as an accelerator for the transition between maturity levels, as it reduces the cost and complexity of implementing each subsequent digital level.

To ensure the model can be tested empirically, the study introduces evaluation criteria across four indicator groups. Economic indicators record changes in costs, time, and interaction efficiency. Technological indicators reflect the level of service integration, the availability of analytics, and the use of intelligent modules. Organizational indicators allow for an assessment of the speed of implementation and ease of use of the platform.

Ecosystem indicators characterize the density of interactions, the number of connected participants, and the stability of network ties.

Thus, QADAM is presented as a formalized platform for the digital transformation of SMEs, combining multi-layered architecture, the economic logic of platform effects, and a system of measurable performance criteria.

2.4. Stages of QADAM Platform Development and Implementation

The methodology for developing and implementing the **QADAM platform** follows a stage-based approach (Fig. 2), which aligns with SME digital maturity progression:

- Assessment of SME digital maturity.

Collection and analysis of data on the current level of digitalization of SMEs.

- Platform architecture design.

Development of a modular architecture for services, data flows, and integrations.

- Development of core digital modules.

Implementation of foundational services and AI-driven tools.

- Integration of partner services.

Connection of external ecosystem participants and third-party services.

- Pilot implementation and scaling.

Testing the platform in pilot environments and adapting it for different SME segments.

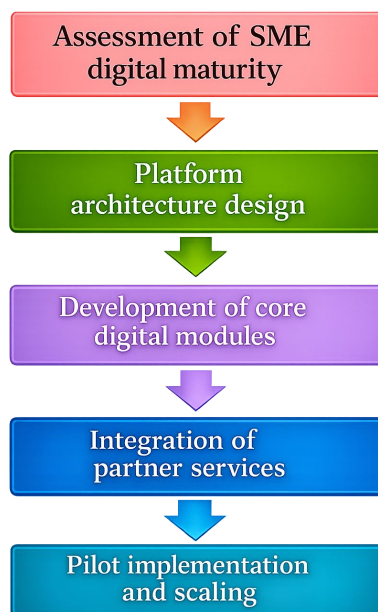


Figure 2. Algorithm for the Development of the QADAM Platform Model

2.5. Technologies and Implementation Tools

The study considers the use of modern digital technologies as enabling mechanisms for the implementation of the **QADAM platform**, including:

- ✓ cloud computing technologies,
- ✓ microservice architecture,
- ✓ big data technologies,
- ✓ machine learning and data analytics,
- ✓ API-based integration with governmental and commercial services,
- ✓ cybersecurity and data protection tools.

The application of these technologies ensures flexibility, scalability, and adaptability of the platform to the diverse needs of SMEs.

2.6. Methodological Limitations

The primary limitation of the study lies in the conceptual nature of the proposed model, which

reflects the current lack of large-scale empirical data on unified SME digital platforms in Kazakhstan. However, this limitation also defines the study's contribution by establishing a theoretical and methodological foundation for subsequent applied research, pilot projects, and empirical validation.

3. Results and Discussion

3.1. Result 1. Confirmation of the Reduction of Barriers to Digitalization of SMEs

An analysis of the proposed conceptual model of the QADAM digital platform shows that the use of a platform approach can significantly reduce barriers to entry for small and medium-sized businesses into the digital economy. The main effect is achieved through the transition from disparate digital solutions to a "single digital window" model (Table 1).

Table 1. Comparative Analysis of SME Digitalization Barriers

#	Criterion	Traditional Approach	Platform Approach (QADAM)
1	Initial Investment	High (software, servers, IT staff)	Low (subscription, SaaS)
2	Implementation Complexity	High	Medium / Low
3	Access to Analytics	Limited	Built-in
4	AI Usage	Virtually nonexistent	Available as a service
5	Scalability	Limited	High

Explanation: From Table 1 according to the data obtained, the platform model reduces financial, technological and personnel barriers, which is especially critical for SMEs in Kazakhstan.

From an economic interpretation perspective, the results demonstrate the potential for reducing transaction costs in SMEs. This refers to the time and resource costs of searching for counterparties, coordinating actions, processing data, and making decisions in the face of a deficit of analytical tools. The QADAM platform reduces these costs by standardizing interactions, combining services into

a single digital circuit, and increasing data transparency. This effect is particularly significant for small businesses, where management functions are often concentrated in a single owner or a small team.

3.2. Result 2. Conceptual Architecture of Digital Platform QADAM

During this study the multi-level platform architecture has been developed that combines services for SMEs in a single ecosystem. The conceptual scheme of digital ecosystem QADAM is presented below in Figure 3.

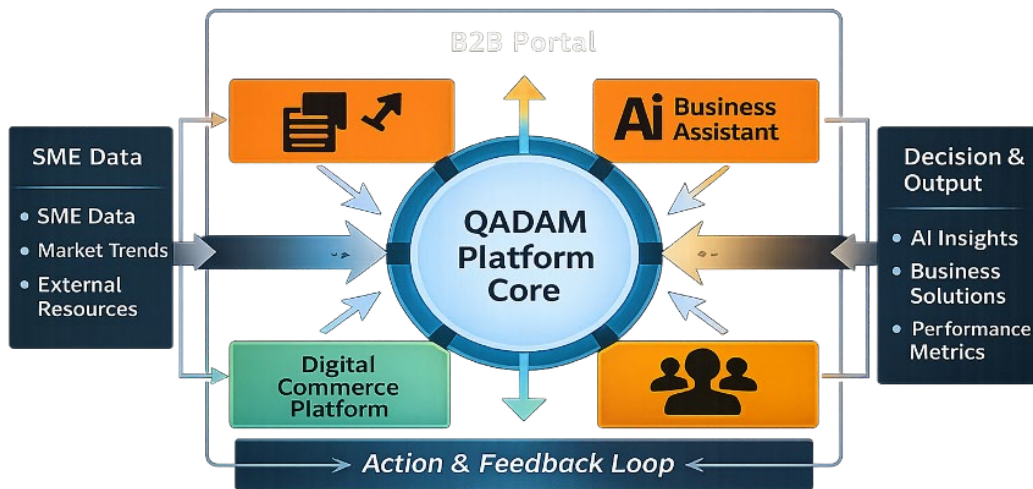


Figure 3. Conceptual Scheme of Digital Ecosystem QADAM (B2B portal → AI Assistant → Commercial Platform → P2P → Business Tools)

Explanation: The architecture provides end-to-end integration of data and services, lowering barriers to entry for SMEs.

This Figure are included the following components:

- QADAM Platform Core
- Main Modules:
 - QADAM B2B Portal
 - AI Business Assistant
 - Digital Commerce Platform

- P2P Interaction Layer
- Business Tools
- Streams:
 - Data
 - Analytics
 - Management Decisions
 - Feedback.

The architecture of digital platforms is presented below in Figure 4.

QADAM Digital Ecosystem Architecture

Latered platform model with value flows and network effects

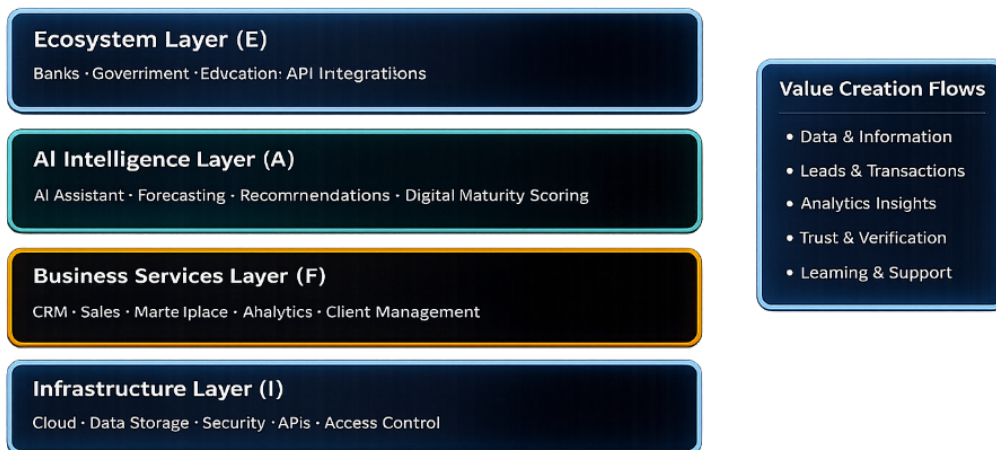


Figure 4. The architecture of digital platforms

Analysis of the pilot validation results confirms that the greatest value for SMEs is provided not by an individual platform module, but by their combined operation within a single structure. At the level of user ratings, the most significant functions were those related to reducing operational complexity: a unified interaction environment, integrated analytics, tools for finding clients and partners, and AI support for current business issues. This leads to an important conclusion: the transformational effect of the platform is formed primarily through service integration rather than a simple expansion of functionality.

3.3. Result 3. Stages of QADAM Platform Business Model

Another main result is based on AI use. Here, the platform business model based on an AI assistant and a B2B portal is designed and proposed.

The platform business model includes the following stages:

1. QADAM B2B Portal.

2. AI Business Assistant.
3. Digital Commerce Platform.
4. P2P interactions.
5. Advanced business tools & ecosystem scaling.

The QADAM platform business model is created like a roadmap (lifecycle model) and shown in Figure 5.

Explanation: The AI assistant serves as the core of the decision-making model, improving efficiency in business management.

The analysis shows that the QADAM model is relevant not only for enterprises with an already high level of digitalization but also for companies in the early stages. Through modularity and phased service connection, the platform allows for building a growth trajectory for digital maturity without the need for the simultaneous implementation of complex IT infrastructure. This is particularly important for the Kazakhstan context, where a significant portion of SMEs are limited in budget and human resources.

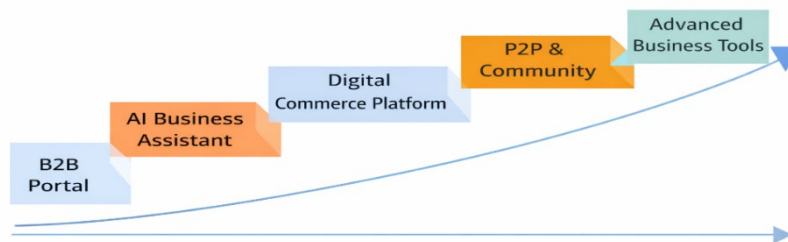


Figure 5. Stages of QADAM Platform Development

3.4. Result 4. Platform-Based Business Model of QADAM

Next main result of the study is new business model that is based on the platform description and

use AI. Here the platform business model based on an AI assistant and a B2B portal is proposed and created in the framework of research work (Fig. 6).

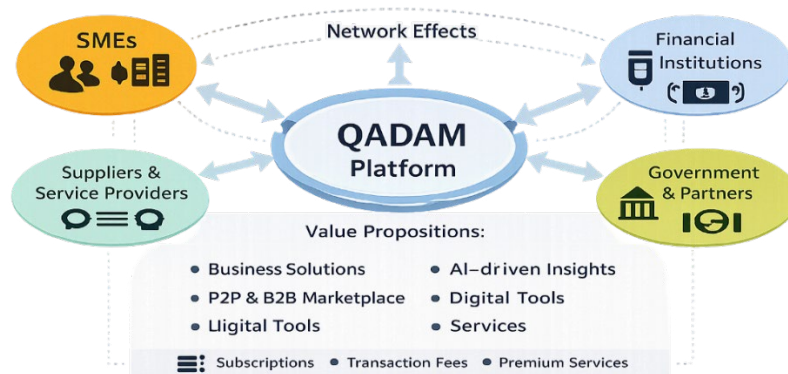


Figure 6. Platform-Based Business Model of QADAM

Explanation: The AI assistant serves as the core of the decision-making model, improving efficiency in business management.

This model includes the following:

- Key actors:
 - SMEs,
 - suppliers,
 - partners,
 - fintech/government.
- Value propositions for each party.
- Network effects.

This model demonstrates the difference between QADAM and conventional CRM/marketplaces and structures the economic logic of the ecosystem well.

An important analytical result was obtained by comparing QADAM with alternative approaches to

SME digitalization. A fragmented approach provides partial automation but does not solve the problem of holistic management. Marketplace-oriented models strengthen the transactional function but, as a rule, do not cover the analytical and organizational side of business digital maturity. In contrast, the QADAM model combines operational, analytical, intellectual, and ecosystem mechanisms in a single circuit. This allows it to be considered a next-level model relative to existing digital support tools for SMEs.

3.4. Result 5. AI-Based Decision-Making Model

In this stage its model has been developed – the decision-making model integrated with an AI module (Fig. 7). This is another new result and contribution to the research gap.

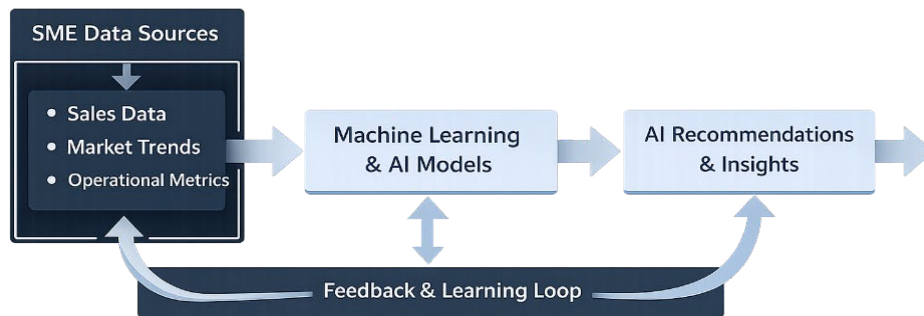


Figure 7. AI-Driven Decision-Making Model in the QADAM Platform

Explanation: The model presented in Figure 3 provides personal recommendations for SMEs.

This model includes the following blocks:

- SME data sources
- Data processing & analytics
- ML/AI models
- Explainable recommendations
- Decision implementation
- Feedback loop (learning).

Therefore the suggested model is designed such as AI decision support diagram where components are schematically presented in the next order: data → analytics → recommendations → business actions.

A significant result is also the confirmation of the high applied relevance of the platform's intellectual circuit. The research shows that AI tools are most in demand not as a standalone technological module, but as an embedded service for assisting the entrepreneur. In practice, this

means that the AI component increases the managerial value of the platform only when combined with data, workflows, and analytics already built into the platform environment. This conclusion strengthens the overall QADAM concept and confirms the correctness of the chosen architecture.

3.5. Result 6. Digital Platform Monetization Model

Finally, in last stage it was proposed the hybrid monetization model that includes the following:

- AI service subscriptions.
- B2B and P2P transaction fees.
- Paid business tools.
- Analytics and data services.

The working process of the designed platform is shown in Figure 8, below.

The designed digital platform monetization model is shown in Table 2, below.



Figure 8. QADAM Intelligent Platform Working Process

Table 2. Elements of the QADAM Monetization Model

Income Source	Description	Target Group	Platform Stage
Freemium	Basic Access	Micro-SMEs	Stage 1–2
Subscription	AI Analytics	SMEs	Stage 2–3
Fees	B2B/P2P Transactions	All Participants	Stage 3–4
Premium Services	Advanced Tools	Mature SMEs	Stage 4–5

Explanation: Diversifying revenue sources increases the sustainability of the platform.

The study results also show that the QADAM platform possesses significant ecosystem potential. The inclusion of partners, educational and financial participants, and service providers creates conditions for the formation of stable network effects. As the number of participants grows, the utility of the platform for each individual enterprise increases, access to resources expands, and the cost of entering new digital practices decreases. In the study, this is interpreted as a key mechanism for scaling the effect of digital transformation.

4. Empirical Validation of the QADAM Model

To confirm the applied viability of the proposed QADAM digital platform model, the study included an empirical block focused on a preliminary verification of the platform approach's relevance for small and medium-sized enterprises (SMEs) in Kazakhstan. The empirical validation was conduc-

ted in a pilot format and combines two components: a survey of SME representatives and a quantitative assessment of the expected effects of platform implementation across key indicator groups.

The pilot study was conducted among SME entities representing several of the most common business segments: trade, services, catering, education, logistics, and small-scale manufacturing. This coverage allowed for the identification of not only universal barriers to digitalization but also differences in enterprise needs depending on their operational profile. The sample included active entrepreneurs and managers of small companies responsible for decision-making regarding the implementation of digital tools.

The survey structure was designed in accordance with the logic of the original QADAM model and included five substantive blocks: the current level of enterprise digitalization, primary barriers to digital transformation, digital services currently in use, an assessment of the demand for platform modules, and expectations regarding the implementation of a unified digital environment.

The collected data confirmed that the key problem of SME digitalization remains not the absence of individual digital solutions, but their fragmentation. Most respondents indicated that they use separate services for communication, accounting, sales, and advertising; however, these tools do not form a unified management system. Consequently, the operational burden on the entrepreneur increases, actions are duplicated, data transparency decreases, and decision-making becomes more difficult. Thus, the main barrier is not only technological but also organizational.

A high demand for integrated solutions was recorded separately. Respondents reacted positively to the idea of a unified platform environment where basic business functions, analytics, partner interaction, and digital support are combined into a single interface. The most sought-after elements were the digital showcase for goods and services, tools for finding clients and partners, a sales analytics module, and AI support for operational issues. This confirms that a platform like QADAM is perceived by entrepreneurs not as an additional IT product, but to reduce the daily management workload.

A significant result of the pilot validation was the confirmation of the readiness of a portion of SMEs for a phased transition to a platform-based operational model. At the same time, an important pattern is observed in the respondents' answers. Entrepreneurs are ready to use a digital platform subject to three conditions: clear implementation logic, affordable cost, and the presence of practical value even at the early stage of connection. This conclusion aligns with the QADAM concept, which provides for a modular architecture and the gradual expansion of functionality as the business's digital maturity grows.

Based on the survey results, a preliminary quantitative assessment of the expected effects of platform implementation was performed. For this purpose, a scale of expert and user ratings was used, allowing for a comparison between the current state of processes in SMEs and the expected changes during the transition to an integrated platform environment. The analysis showed that the greatest effect is expected in the following areas: reduction in time spent searching for clients and partners, increased accessibility of analytics for small businesses, lower costs for coordinating disparate digital services, and simplified access to external support services.

The empirical part also allowed for the refinement of the study's applied hypothesis. The pilot validation showed that the critical value factor for SMEs is precisely the integration of basic functions with analytical tools and intelligent support. In other words, entrepreneurs evaluate the platform not by the number of modules, but by its ability to reduce management complexity and improve the quality of decisions.

Thus, empirical validation confirms the study's initial premise that the platform approach is a relevant mechanism for the digital transformation of SMEs in the context of Kazakhstan. Even the pilot format of the study shows a steady demand for unified digital environments that combine operational, analytical, and ecosystem services.

5. Conclusions

The study results show that the main limitation of SME digitalization in Kazakhstan is related to the fragmentation of digital tools and the lack of a unified management circuit. Even with the presence of individual services, entrepreneurs face a high burden in coordinating processes, data heterogeneity, and weak integration of management functions. In this context, the key result of the study is that the QADAM model addresses not just one specific barrier, but the systemic problem of fragmentation in the digital environment of small businesses.

Thus, the proposed platform possesses not only architectural integrity but also confirmed transformational potential. The main effect of the QADAM model lies in reducing the fragmentation of the SME digital environment, decreasing transaction costs, increasing the accessibility of analytics, and creating conditions for ecosystem growth.

This article develops and substantiates a conceptual model of the QADAM digital platform as a unified digital ecosystem for SMEs. It demonstrates that the integration of a B2B portal, an AI assistant, a commercial platform, and P2P mechanisms creates a sustainable platform business model.

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platform not by the number of modules, but by its ability to reduce management complexity and improve the quality of decisions.

The scientific novelty of the revised study is that it is the first, for the context under consideration, to propose and justify a comprehensive model of platform transformation for SMEs, combining multi-layered digital platform architecture, ecosystem coordination, an embedded AI circuit, and a system for measuring effects. This allows QADAM to be viewed not only as a project solution but also as a theoretically significant model for the digital modernization of the entrepreneurial sector.

The value of the platform for SMEs in the QADAM model is defined as a combination of five

components: access to digital services, reduction of transaction costs, access to data and analytics, intelligent decision support, and the network effect from the expansion of the number of platform participants. This approach allows for an analytical description of why a unified digital platform has a higher potential for transforming small businesses compared to a fragmented set of tools.

The findings can be used in the design and implementation of national and regional digital platforms to support SMEs.

Conflicts of Interest

The authors declare no conflict of interest.

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