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BUILDING A FRAMEWORK FOR A DIGITAL MVP ECOSYSTEM FOR SERIAL LAUNCH OF TECHNOLOGY STARTUPS

ПОБУДОВА ФРЕЙМВОРКУ ЦИФРОВОЇ MVP-ЕКОСИСТЕМИ ДЛЯ СЕРІЙНОГО ЗАПУСКУ ТЕХНОЛОГІЧНИХ СТАРТАПІВ

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The article presents a conceptual and methodological framework for a digital MVP ecosystem aimed at supporting the serial launch of technology startups in the context of digital transformation and rapid innovation cycles. Structural-functional analysis and systematization of startup ecosystem practices demonstrate that modular digital business models, iterative development processes, and integrated analytical services are critical for MVP scalability. The study highlights key barriers such as fragmented technological environments, absence of integrated iteration mechanisms, and insufficient reuse of validated digital solutions. The proposed ecosystem framework prioritizes automation, standardization, and flexibility. Prospects for future research include developing architectural models, formalizing repeatable launch scenarios, and creating metrics for evaluating the efficiency of innovation processes.

Keywords: digital economy, technological startups, innovative entrepreneurship, digital business transformation, startup ecosystem, innovation management, digital business models.

Актуальність дослідження зумовлено потребою у створенні цілісної цифрової MVP-екосистеми, здатної забезпечувати серійний запуск технологічних стартапів в умовах динамічної цифрової трансформації, зростаючого попиту на інновації та високої турбулентності ринку. Відсутність інтегрованих механізмів перевірки гіпотез, масштабування MVP та повторного використання інновацій обмежує ефективність інноваційного процесу на ранніх стадіях стартап-розвитку. Мета статті – розробити науково обґрунтований фреймворк цифрової MVP-екосистеми, здатної забезпечити серійний запуск технологічних стартапів у контексті цифрової трансформації бізнесу та прискореного інноваційного розвитку шляхом інтеграції повторюваних, гнучких і масштабованих підходів. Методологія дослідження базується на структурно-функціональному аналізі цифрових бізнес-моделей, систематизації практик сучасних стартап-екосистем, порівняльному аналізі інструментів підтримки MVP-циклів і аналітичному узагальненні цифрової взаємодії між акторами інноваційного середовища. Результати дослідження засвідчили, що ефективність серійного запуску стартапів визначається трьома ключовими чинниками: технологічною інтеграцією, уніфікованістю ітеративних процесів та наявністю автоматизованих аналітичних сервісів. Проаналізовано структурні компоненти цифрових бізнес-моделей, які формують інфраструктуру для розробки MVP, зокрема роль модульності, масштабованості та інтеграції каналів зворотного зв'язку. Наукова новизна полягає в обґрунтуванні методологічних принципів організації серійних запусків із застосуванням циклів Lean-гіпотез, автоматизації ітерацій розробки та повторного використання

цифрових шаблонів у рамках єдиної екосистеми. Висновки підтверджують, що головними бар'єрами розвитку MVP-екосистеми є технологічна фрагментованість, відсутність наскрізної інтеграції сервісів, обмеженість механізмів швидкої ітерації та слабка інституціоналізація попереднього досвіду запусків. Перспективи подальших досліджень полягають у розробленні архітектурної моделі цифрової MVP-екосистеми, формалізації повторюваних сценаріїв запуску стартапів і визначенні метрик оцінювання ефективності інноваційних процесів у цифровій економіці.

Ключові слова: цифрова економіка, технологічні стартапи, інноваційне підприємництво, цифрова трансформація бізнесу, стартап-екосистема, управління інноваціями, цифрові бізнес-моделі.

Problem statement. The current conditions of digital business transformation put forward new requirements for creating innovative products, which requires integrating digital tools to rapidly test business hypotheses and scale minimum viable products (MVPs). The absence of an integrated MVP ecosystem that would ensure repeatability, automation, and flexibility of startup processes makes it difficult to build an infrastructure for the serial launch of technological solutions. This necessitates the development of a conceptual and methodological framework for building such an ecosystem that can support the innovation process at all stages, from idea to scale. The connection with scientific and practical tasks is to identify the key components of digital business models, integrate digital platforms to automate iterative processes, and develop tools to systematize the results obtained to reduce costs and accelerate time to market. This will increase the efficiency of MVP processes, minimize risks at the hypothesis testing stages, and ensure the adaptability of the startup ecosystem to the rapidly changing conditions of the digital economy.

Analysis of recent research and publications. The analysis of the sources allows us to identify four key areas that form the theoretical and applied foundations for building a digital MVP ecosystem framework for the serial launch of technology startups.

The first area covers structuring startup ecosystems in the context of digital transformation. In particular, O. M. Levkovets emphasizes the importance of strengthening the institutional framework to support innovation potential, focusing on coordination between universities, business, and the state [1]. T. I. Astistova proposes an information model of ecosystem monitoring that provides dynamic control over its state and adaptive development regulation [2]. V. Yakovenko describes organizational and infrastructural mechanisms of ecosystem functioning, including acceleration programs, startup hubs, and grant support [3]. V. Margasova, N. Ivanova, and O. Popelo emphasize the importance of implementing the best international practices in the Ukrainian ecosystem, particularly through international investment integration and adaptation of world models [4]. Further research in this area should focus on developing digital platforms for integrating startup ecosystem actors that allow tracking the life cycle of startups in real time.

The second area of research is devoted to adapting the Lean Startup methodology in digital entrepreneurship. O. M. Levkovets substantiates the transformation of the Lean methodology for the needs of large corporations, emphasizing the need for business consulting support at the stages of ideation and testing [5]. N. Tripathi, M. Oivo, K. Liukkunen, and J. Markkula demonstrate how the startup ecosystem affects the development of MVPs in the software industry, emphasizing the importance of community support and mentoring [6]. Models for validating business ideas in the early stages of a digital startup are analyzed by L. Göcke and R. Weninger, offering structured approaches to hypothesis evaluation [7]. K. Saarni, M. Kauppinen, and T. Männistö draw attention to the risks of digital ecosystem disruption due to unsystematic use of MVPs and insufficient alignment between technical development and market adaptation [8]. Further research should be aimed at formalizing Lean Startup models for digital platforms, particularly in high technological turbulence.

The third area of research focuses on the applied aspects of digital entrepreneurship in the context of MVPs. F. Edobor and A. Sambo-Magaji examine the opportunities and barriers to digital entrepreneurship in transformational economies, emphasizing the role of digital skills and innovation support policies [9]. A. Ghezzi explores the interaction of effectuation, bricolage and opportunity creation approaches that shape the adaptive behavior of startups during the creation of MVPs [10]. A new business model for creating startups with artificial intelligence is described by J. A. Hernandez and M. Colom, emphasizing the need for flexible MVP management in a fast-paced environment [11]. J. Melegati, R. Chanin,

A. Sales, R. Prikladnicki, and X. Wang, based on a qualitative study, find that iterative MVP testing with user involvement is a critical factor in the success of software startups [12]. Further research requires the development of tools to digitally support the MVP creation process, from hypothesis generation to validation of results with real users.

The fourth area of research focuses on unifying the MVP concept and its role in the serial launch of startups. V. Lenarduzzi and D. Taibi conduct a systematic mapping of MVP definitions, identifying differences in the understanding of the minimum viability of the product among practitioners and researchers [13]. X. Tang, S. Du, and W. Deng analyze how flexible MVP management allows the business model to adapt to new market challenges using the case of an artificial intelligence startup [14]. This area requires further development of a normative MVP model as a standardized module of the digital startup ecosystem framework suitable for serial scaling.

Thus, building a digital MVP ecosystem framework for the serial launch of technology startups is based on institutional coordination, Lean-oriented approaches, integration of MVPs into digital entrepreneurship practices, and the minimum product viability methodology unification.

Identification of previously unsolved parts of the overall problem. Despite the growing interest in digital entrepreneurship, aspects of the serial launch of MVPs within an integrated ecosystem remain unaddressed. In particular, there is insufficient research on how digital business models form an adaptive infrastructure in the early stages of the startup cycle, as well as how digital interaction between ecosystem participants affects the speed, scalability, and repeatability of the innovation process. Modern methodologies (lean, agile) do not fully cover the specifics of serial MVP development with a high degree of automation and integration. In addition, there are no generalized approaches to overcoming technological fragmentation and implementing unified iteration mechanisms. Insufficient integration of analytics, development, and financing tools makes building a sustainable digital infrastructure difficult. The proposed study aims to fill these gaps by comprehensively analyzing the structures, interactions, and methodologies within the digital MVP ecosystem, which will increase the efficiency of the innovation cycle.

Formulation of the objectives of the article (statement of the task). The purpose of the article is to develop a scientifically based framework for a digital MVP ecosystem capable of ensuring the serial launch of technology startups in the context of digital business transformation and accelerated innovation development.

Objectives of the article:

– to analyze the key components of digital business models and the peculiarities of digital interaction between innovative entrepreneurship actors within the startup ecosystem, identifying their role in forming an adaptive infrastructure for creating and scaling MVPs in the early stages of the startup cycle;

– to substantiate the methodological principles of building a process of serial launch of startups in the digital environment, taking into account the criteria of speed, repeatability, iterativity and technological integration of tools;

– to identify the main barriers that hinder the development of the digital MVP ecosystem and formulate practical recommendations for its framework improvement in order to increase the efficiency of the innovation cycle and reduce the cost of launching startups.

Summary of the main research material. Digital business models in modern conditions act not only as profit generation tools but also as systemic platforms for rapidly creating and testing innovative solutions within startup ecosystems. Their structure allows for integrating digital communication channels, decision-making algorithms, automated services, and user feedback, which is critical in the MVP phase. A minimum viable product is not a final product but a tool for testing business hypotheses with minimal time and resources. Digital business models create the conditions for effective iteration, scaling, and adaptation of such products in real time. Table 1 shows the key components of digital business models in the context of supporting the MVP process.

In a dynamic digital environment, the effectiveness of the early stages of startup development is largely determined by the ability of the business model to quickly test hypotheses, adapt functionality to real user needs, and scale solutions at minimal cost. The value proposition as the core of a digital business model allows to formulate the main idea of the MVP and focus development on those features that are of the highest priority for the target audience. An example of a successful implementation of this approach is the Airbnb platform [15], which

Table 1

Key components of the digital business model and their role in building the infrastructure for creating an MVP in the early stages of the startup cycle

A component of the digital business model	Functional role in the formation of MVP infrastructure	Implementation tools
Digital value proposition	Shapes the product idea and its relevance to user needs	Customer journey map, value proposition canvas
Data architecture and analytics	Collects, processes and interprets MVP user feedback	CRM systems, analytics tools (Google Analytics, Mixpanel)
Digital distribution channels	Allows you to quickly deliver MVP to the user and collect feedback	Web platforms, marketplaces, mobile applications
Digital monetization model	Tests user solvency in the early stages of launch	Freemium, subscription, advertising, transaction fees
Scaling mechanisms	Allows you to expand MVP to a full-fledged product or adapt it to new markets	API integrations, cloud infrastructure, CI/CD approaches

Source: compiled by the author based on [1; 5; 6; 7; 10; 14]

initially tested only the basic functionality of booking accommodation through a one-page website. Analytical tools, such as Mixpanel [16] or Hotjar [17], collect user behavioral data, which is important for making informed decisions about product development. Digital distribution channels - including Product Hunt [18], mobile marketplaces, or social platforms – allow for quick delivery of MVPs to the target audience, while built-in monetization mechanisms, such as Stripe [19] or Paywall API, allow for testing the model's ability to generate revenue. MVP scaling is supported by flexible digital tools, such as Firebase [20], Amazon Web Services [21], or Heroku [22], which provide technical elasticity and the ability to continuously integrate changes.

To visualize the MVP ecosystem in the context of digital business transformation, the diagram below shows the key structural components, digital distribution channels, iteration cycles, and monetization mechanisms integrated into a single innovation process (Figure 1).

The diagram demonstrates the relationship between the main components of the MVP ecosystem, including the value proposition, iteration cycle, digital distribution channels, monetization mechanisms, and scaling tools. Their integration helps to ensure the integrity of the innovation process, reduce costs, and accelerate the MVP's time to market. Digital interaction between innovative entrepreneurship actors within the startup ecosystem is a key factor in creating an environment conducive to creating, validating, and scaling minimum viable products (MVPs). Successful startups do not operate in isolation, but in an interdependent environment that includes founders, mentors, investors, digital platforms, technology brokers, users, and other stakeholders. Digital technologies provide a flexible and scalable environment for communication, co-development, testing, and real-time improvement of MVPs. In such an environment, not only are technological tools essential, but also the logic of their integration, the degree of communication automation, service interoperability, and the ability to adapt to market changes. MVP solutions can only be scaled up if an appropriate infrastructure supports repeated iterative cycles of product creation, validation, data collection, and adaptation. Table 2 summarizes the primary forms of digital interaction in the startup ecosystem and the corresponding technological conditions that enable MVP scaling.

In practice, digital incubation and acceleration allow startups to go through key stages of development in a virtual format, using platforms such as Y Combinator Startup School [23], which integrates mentoring, online workshops, and real-time progress assessment. Collaborative digital design using Figma [24], Notion [25], or Webflow [26] allows teams to quickly develop visual prototypes, make changes without coding, and enable flexible iteration. To validate ideas with the involvement of users, the Maze [27] and Typeform [28] platforms are actively used to automate the collection of feedback and analysis of behavioral patterns. Integration through RapidAPI [29] or Postman [30] allows MVPs to connect with external digital services, speeding up functionality deployment in new markets.

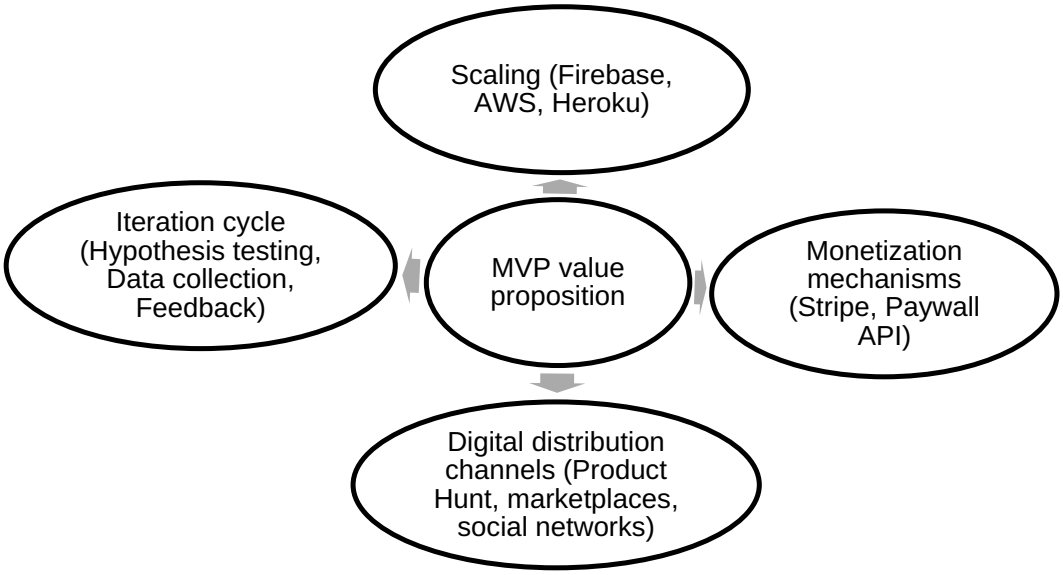

Figure 1. Diagram of the MVP ecosystem

Source: author's own development

Table 2

Forms of digital interaction in the startup ecosystem and technological conditions for scaling MVP solutions

A form of digital interaction	Participants in the process	Technological conditions for MVP scaling	Examples of platforms and services
Online incubation and acceleration	Startups, mentors, investors	Modularity of digital services, support for cloud environments, tracking results	Y Combinator Startup School, Seedstars, Uventures
Digital co-design	Founders, developers, designers	Integration with low-code/ no-code platforms, support for collaborative work	Figma, Miro, Notion, Webflow
Feedback and validation platforms	Users, product managers	Microservice architecture, event analytics, automated forms	Typeform, Instabug, Maze
API economy and service integration	Developers, partners, integrators	API access, interoperability, CI/CD infrastructure	RapidAPI, Postman, Firebase Functions
Digital investment channels	Startups, venture capital funds, crowdfunding platforms	Smart contracts, digital identification, risk analytics	Seedrs, Republic, AngelList

Source: compiled by the author based on [3; 4; 7; 9; 11]

Digital investment channels, such as Republic [31] or AngelList [32], provide access to venture capital without geographic restrictions and risk analytics and a digital identification system. Thus, effective MVP scaling depends not only on individual technological solutions, but also on coordinated real-time digital interaction between all participants in the startup ecosystem, which creates conditions for sustainable innovative growth and reduces barriers to entry for new products in global markets.

The serial launch of startups within the digital MVP ecosystem requires a clear methodological justification of processes that ensure the rapid creation of innovative solutions and their scaling, validation, and reuse, considering limited resources. In today's environment, the following principles are becoming key: iterativity, which

allows you to quickly respond to user feedback and change product functionality; scalability, which ensures the transition from MVP to a full-fledged digital solution; and speed, which allows startups to bring new products to market faster than competitors. The methodology for serial startups should be based on digital lean innovation practices, agile development management, automation of hypothesis testing cycles, and standardized architectural approaches that minimize integration and adaptation time. Table 3 summarizes the main methodological principles that form the basis of the framework for the serial launch of technology startups in the digital environment.

Table 3 presents the key methodological principles that ensure the effective implementation of the process of serial launch of startups in the digital environment with a focus on speed, scalability, and iterativity. In practice, the lean approach allows developers and product managers to focus only on the most necessary functionality for initial hypothesis testing, for example: create an MVP of a mobile application with a single booking function using Adalo [33], test user behavior using Mixpanel [27], and make changes to the interface in two days based on the results of analytics. Thanks to CI/CD-based pipelines such as GitHub Actions [34], a startup can update the product weekly without risking loss of stability, while Kubernetes [35] or Firebase [30] allow you to scale the load automatically as the number of users grows. Reusing templates, modules, and platform elements through Bubble [36] or Webflow [26] significantly reduces the time and cost of deploying similar projects, especially in serial startup studios. As a result, the methodology provides systemic flexibility, accelerates time-to-market, and allows entrepreneurs to effectively respond to market signals and user feedback at scale.

Despite the active development of digital tools and the growth of startup initiatives, the formation of a full-fledged ecosystem for the serial launch of MVP solutions faces several systemic limitations that hinder the scalability of innovation processes. First, it is a technological disconnect between different participants' platforms, services, and tools [3]. The absence of a unified architecture or data exchange standards makes seamless integration at the level of development, analytics, marketing, and financing impossible, which leads to duplication of functions, loss of compatibility time, and slower MVP validation [7]. This is especially true for startups in the pre-incubation phase, which often use tools without CI/CD, API integration, or automatic feedback collection, which delays iterative hypothesis testing [12].

The second obstacle is limited access to fast iteration mechanisms based on automated data analysis and MVP updates. In the practice of Ukrainian and European startup studios, this is due to the lack of digital templates, weak involvement in open-source communities, and a lack of internal innovation cycle management policies [4]. The isolated functioning of technological, financial, and marketing subsystems prevents the creation of an end-to-

Table 3

Methodological principles of serial launch of startups in the digital MVP ecosystem and their implementation in practice

Methodological principle	Content and functional purpose	Implementation tools in the digital ecosystem
Lean hypothesis cycle (Build-Measure-Learn)	Ensures constant validation of assumptions through MVP runs and analysis of user behavior	Lean Canvas, Trello, Google Analytics
Quick iteration	Allows you to implement changes based on user feedback with minimal time spent	CI/CD, GitHub Actions, Retool
Unification of digital modules	Creates repeatable templates for launching similar projects or new functional blocks	No-code/low-code platforms (Bubble, Adalo), AWS templates
Scalability control	Evaluates the ability of the MVP to adapt to the growth in the number of users and service requests	Kubernetes, Firebase, AWS Auto Scaling
Analytics automation	Provides continuous monitoring of MVP metrics for prompt decision-making	Mixpanel, Amplitude, Looker Studio

Source: compiled by the author based on [5; 6; 8; 10; 12; 13]

end MVP flow with continuous feedback, which leads to gaps between the phases of planning, implementation, testing, and commercialization [1; 9; 11].

The third barrier is the poor integration of digital infrastructure elements for knowledge preservation, experience sharing, and risk management. There is a lack of consistent template databases, scaling scenarios, forecasting tools, and formalized best practices [2; 15]. As a result, new startups often act in isolation, not using the accumulated data and previous experience, significantly reducing the efficiency of serial MVP launch within the ecosystem [6].

The practical formation of a digital MVP ecosystem framework involves the creation of an integrated environment that covers the full cycle of startup development, from idea to scale, with minimal transaction costs and high adaptability. The key is a modular architecture with open APIs that provides flexible integration of new services and unified digital access for all participants, from founders to users.

The second element should be a rapid MVP validation infrastructure based on automated iterations using dashboards, A/B tests, and behavioral analytics to identify errors early and optimize solutions. This is complemented by a centralized knowledge management system that accumulates templates, mistakes, and successful practices from previous launches. It is also necessary to create a partner digital environment with access to proven tools – payment APIs, logistics, crowdinvesting, legal services and contract templates – which significantly reduces the entry threshold for startups.

The framework should be based on the principles of scalability, openness, and iterativity, being implemented both within corporate accelerators and at the level of government support for innovation, turning the launch of an MVP into a manageable, reproducible process.

Conclusions. The study found that the serial launch of technology startups requires a holistic digital MVP ecosystem capable of providing integrated support at all stages of the innovation cycle, from ideation to scaling. It is found that the key conditions for the effectiveness of such an ecosystem are the modularity of digital business models, well-established inter-entity interaction, support for rapid iteration, and automated analytical support. Several systemic problems have been identified, including technological disconnection of platforms, lack of unified mechanisms for reusing solutions, poor integration of validation tools, and the lack of an end-to-end digital infrastructure, which reduces the efficiency of serial launches. Based on the generalization of current practices, the author substantiates the need for further research into the architecture and functional principles of building an MVP ecosystem framework. Prospects for further scientific research are to develop structural models of digital interaction, formalize scenarios of repeated launches and determine indicators of the effectiveness of the innovation process in the digital economy.

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