

From evaluation to growth strategy: an AI-based conceptual framework for supporting High-Growth Firms in Innovation-Intensive Sectors

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Abstract: In the context of accelerated digitalization and increasing technological dynamics, the development of fast-growing enterprises is increasingly difficult to explain through traditional linear models and a limited set of factors. This study aims to formulate strategic recommendations for increasing the competitiveness and innovation potential of fast-growing enterprises operating in innovation-intensive industries, through the use of an AI-driven evaluation framework.

The study has a conceptual-analytical nature and combines a systematic literature review, AI-oriented analytical interpretation and application of the proposed model through aggregated data from the National Statistical Institute and Eurostat for the period 2018–2023. The statistical data used reflect the development and characteristics of over 400,000 active enterprises in Bulgaria and include indicators related to innovation activity, digitalization, business demography and the external business environment. The results show that competitiveness and the potential for sustainable growth are formed under the influence of a complex interaction between technological, organizational, financial and external factors. The analysis highlights a clear correlation between the level of digitalization, innovation activity, data-driven competencies and adaptability of enterprises. At the same time, limitations related to low digital intensity, limited access to resources and difficulties in integrating technologies into management processes are identified. On this basis, the study offers strategic recommendations to both public institutions and enterprises aimed at developing innovation capacity, technological adaptability and more sustainable growth models.

Key words: fast-growing firms, artificial intelligence, digitalization, competitiveness, innovation, AI-driven evaluation model

JEL: M21, O31, L25

I. INTRODUCTION

With rapid technological development, accelerated digitalization, and the widespread introduction of AI into business, the business environment is becoming increasingly difficult to predict and forecast. The growing technological dynamics are opening up many new opportunities for enterprises, in which each of them faces global competition. In this context, innovation is becoming one of the most important factors for maintaining market positions and sustainable development.

The entire business environment puts pressure for adaptability on enterprises, which is especially pronounced in innovation-intensive industries. In this sense, strategic resilience can become one of the most important conditions for an enterprise to be productive and competitive. The ever-increasing complexity of the business environment reflects the fact that traditional models for assessing and supporting companies are no longer sufficient.

Both in scientific circles and in practice, fast-growing firms are perceived as a fundamental factor for economic development. Their influence is particularly significant in industries with high innovation intensity, as their potential is even greater there. They contribute to the creation of new jobs, the acceleration of technological processes and the increase in competitiveness both at the company and national levels. At the same time, however, it should be noted that their development is the result of the interaction between multiple conditions – both purely internal organizational and those related to the environment – organizational, technological, financial, which makes the identification of sustainable growth models increasingly complex, and in recent years – an extremely difficult task.

Despite the growing interest in the causes and factors underlying the growth of fast-growing innovative enterprises, a significant part of the existing research examines individual determinants in isolation or focuses mainly on financial indicators. The application of integrated analytical models based on artificial intelligence methods, which would allow for a more in-depth assessment of the complex dependencies affecting the development of fast-growing companies, remains relatively limited.

In the context of extremely rapid digitalization and heightened international competition, the need for effective policies in the field of innovation and competitiveness is becoming increasingly important both at the European and national levels. This inevitably poses new, particularly large challenges both for public institutions involved in strategic planning and business support, and for enterprises themselves, which must develop higher adaptability, technological readiness and decision-making capabilities based on data and analytical models.

This article aims to formulate strategic recommendations related to innovation policies and increasing competitiveness in Bulgaria, based on an AI-driven model for assessing fast-growing companies operating in innovation-intensive industries. The study is aimed at both public institutions involved in the

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development and implementation of strategic policies, and enterprises striving for more sustainable and competitive development in the European economic environment.

II. LITERATURE REVIEW

In recent years, the scientific literature is extremely rich, and the discussion devoted to high-growth enterprises has expanded significantly and become more lively. In recent years, increasing attention has been paid to the factors that influence their competitiveness, sustainability and innovation potential. Along with traditional economic and financial explanations, modern research increasingly considers the role of technological transformation, artificial intelligence, organizational capabilities and the external business environment in shaping company growth. This leads to a gradual transition in the analysis of high-growth enterprises from single-factor to more integrated analytical approaches.

Yang, Lu and Shi (2026), as well as many other scholars, consider high-growth enterprises as an important source of economic dynamism and innovative development. In addition to their own performance, according to scholars, these companies also influence other enterprises through knowledge sharing, technological effects and improving productivity within individual industries and regions. Coad and Karlsson (2022) conclude that fast-growing enterprises are most often small in size, but the probability of achieving high growth varies significantly depending on the age and characteristics of the firms. Particularly low potential for accelerated growth is observed in small but long-existing enterprises, the scientists also comment.

A number of studies emphasize the importance of fast-growing enterprises for the sustainability and adaptability of individual economic sectors in conditions of crises and economic uncertainty. Even in an unfavorable external environment, these companies often retain a higher potential for growth and employment compared to other enterprises (Pletnev, Naumova; 2022). Dillen and Vandekerckhof (2021) prove that the characteristics and performance of fast-growing enterprises can differ significantly depending on the industry environment in which they operate. Scientists question the consideration of fast-growing firms as a homogeneous group and emphasize the importance of sector specificities in the analysis of growth and competitiveness factors.

Although fast-growing enterprises are often seen as the engine of economic dynamics, researchers increasingly emphasize that their growth does not actually follow a universal pattern. Du et al. (2025) argue that the development of fast-growing enterprises can hardly be explained by the influence of individual factors. Increasingly, growth is seen as the result of specific combinations of resources, organizational capabilities and strategic decisions. Research on fast-growing small and medium-sized enterprises emphasizes the importance of organizational culture, employee engagement and active interaction with partners and customers for the development of innovation. Increasingly, successful growth is associated with the ability of firms to build an environment that

encourages the sharing of ideas, feedback and continuous improvement (Walpole; 2025). For Öberg (2021), the growth of innovative enterprises is a comprehensive process, related not only to the availability of resources, but also to the ability of firms to develop and restructure their organizational and technological capabilities in a very dynamic, rapidly changing and unpredictable business environment. Wang, Zhang and Chi (2024) approach from a slightly different perspective. They consider the sustainable growth of enterprises as a result of their ability to combine digital technologies with traditional organizational resources and management practices. According to them, the adaptability of firms and their ability to change their strategies at different stages of their development is a particularly important prerequisite for achieving sustainable development. Coad and Srhoj (2023) question the possibility of explaining the development of fast-growing enterprises solely through sustainable regional or institutional characteristics. They draw attention to the importance of dynamic factors and the changing business environment in shaping the growth and competitiveness of enterprises. From this perspective, more and more research is drawing attention to the role of digitalization and technological transformation as fundamental factors for the development of fast-growing companies.

According to Yu, Chen and Ren (2026), AI innovations are not able to automatically lead to rapid growth. Their effect depends on management practices, organizational capabilities and the competitive environment in which enterprises operate. A study by Shahzad et al. (2026) argues that the implementation of AI technologies in small and high-tech enterprises depends not only on technological readiness, but also on managerial commitment, the regulatory environment and available resources. Particular importance is given to the ability of companies to use data in decision-making and to adapt to a dynamic competitive environment. Meyer et al. (2025) link the successful digital transformation of fast-growing enterprises to a combination of entrepreneurial orientation, technological readiness and the ability to adapt to a dynamic business environment. Scientists pay special attention to proactivity and willingness to take risks as factors supporting the development of effective digitalization strategies. According to Nykänen, Vuori and Luoma, J. (2026), the ability of enterprises to use data and develop data-driven competencies depends not only on technological resources, but also on purely managerial views and strategic decisions. According to scientists, the way in which organizations integrate data into decision-making processes and create added value in terms of organizational efficiency will be of increasing importance. Scientists increasingly associate the development of AI technologies with increasing innovation activity and long-term competitiveness of enterprises. A particularly strong effect is observed in high-tech and fast-growing companies, where AI supports adaptability, access to resources and sustainable development of innovation processes (Pan et al.; 2026).

Considerable attention in the literature is also paid to the financial prerequisites and financial policies for achieving sustainable growth and competitiveness. Financial

constraints can significantly hinder the development of fast-growing enterprises. According to scientists, access to sustainable financing is extremely important, since dependence on short-term resources often limits opportunities for investment, innovation and long-term development (Şengül, Pekin, Alkan; 2025). In turn, Long (2019) is of the opinion that access to external financing is of great importance for the development of fast-growing enterprises. According to the author, a favorable effect is observed when combining different financial sources, which expands opportunities for investment, innovation and accelerated growth. Access to external financing is considered an important factor for the development of innovative and growing enterprises, especially in conditions of economic uncertainty (Kacer, Wilson, Zouari; 2024). Research shows that different forms of financing create different levels of sustainability and risk for companies in the growth process. Mai et al. (2026) find that venture capital is important for innovative development and growth of enterprises, but its effect is not always unambiguous. While moderate support from investors can stimulate innovation activity, excessive dependence on external capital sometimes leads to negative effects on the long-term development of firms. According to Mukhoti, Guhathakurta and Li (2026), the impact of capital structure on enterprise growth can differ significantly depending on the industry environment and business specifics. They comment that AI and machine learning models are increasingly being applied to analyze the complex dependencies between financing, sustainability and company growth. Choi and Pyun (2026) argue that the external financial environment and global economic cycles have a different impact on enterprises depending on their size and sector affiliation. Smaller firms and enterprises operating in more vulnerable industries are often particularly sensitive to changes in financial conditions.

A number of studies examine the importance of inter-firm connections, external knowledge and the institutional environment for the development of enterprises. Wu, Sutherland and Anderson (2026) link the development of high-tech enterprises to access to external knowledge, innovation networks and international technological ecosystems. Scholars attach particular importance to the ability of firms to develop dynamic capabilities by attracting expertise, partnerships and integration into global innovation environments. Grillitsch and Nilsson (2019) add that access to external knowledge, as well as to knowledge disseminated within the business environment, affects enterprises differently depending on their growth potential. According to scholars, fast-growing firms often demonstrate a higher ability to discover, attract and use knowledge as a source of competitive advantage. In turn, Petrunia, Phan and Sánchez-Aragón (2026) emphasize the importance of inter-firm connections, access to resources and financial conditions for the development of enterprises. Scientists believe that, especially for younger companies, these factors often have a stronger impact on growth than the age or size of the company. Santos, for his part, adds that company growth and the sustainability of enterprises can be influenced not only by the size of the companies, but also by

the degree of dependence on a limited number of customers or markets. According to the author, high concentration of revenues often increases the sensitivity of enterprises to external risks and economic shocks. From a different angle, Mo et al. (2026) examine the development of high-tech enterprises. They conclude that geopolitical and technological conflicts can have a significant impact on the sustainability and development of high-tech enterprises. According to the authors, companies facing financial constraints, high technological dependence or limited diversification of their activities are particularly sensitive to such external shocks. Bergeaud, Schmidt and Zago (2026) point out that companies that manage to position themselves close to emerging technological standards often achieve temporary competitive advantages associated with higher market share, sales and innovation activity. However, in the long run, standardization also creates conditions for adaptation and catching up by other market participants.

At the same time, analytical models and machine learning methods are increasingly used in assessing and forecasting company growth. Machine learning methods are increasingly being applied in research on fast-growing companies to assess and forecast company growth. Among the most used models are XGBoost, Random Forest and logistic regression, which show good results in distinguishing between fast-growing and non-fast-growing companies based on financial and organizational indicators (Pekin, Şengül; 2024). Some of the studies use financial indicators such as liquidity, solvency, cash flows and working capital to predict the probability of companies achieving accelerated growth. In most cases, the authors comment on the possibility of identifying early indicators of future company development through analytical models (Megaravalli, Sampagnaro; 2018). Yang et al. (2026) prove that the influence of the external economic environment on the development and productivity of companies is often nonlinear. Factors such as access to finance, innovation activity, and international economic ties can both create opportunities for growth and give rise to constraints, depending on the specific conditions in which firms operate.

Some studies also emphasize the role of public policies and the regulatory environment in promoting innovation and competitiveness. Du, Xu and Ren (2026) emphasize the importance of public policies and fiscal incentives for the development of innovative and growing enterprises. Especially for smaller and developing companies, such mechanisms can support access to resources, expansion of activities and willingness to take strategic risk. According to Stojčić, Mikulić and Vizek (2022), the external economic environment and sectoral characteristics can have a significant impact on the development of high-growth enterprises. Factors such as seasonality, income volatility and sensitivity to external shocks often limit the potential for sustainable growth.

The review of the scientific literature shows that the development of high-growth enterprises is determined by a complex interaction between technological, organizational, financial and business environment factors. The scientific discussion increasingly emphasizes the need for integrated analytical approaches that take into account the dynamic

nature of the business environment, the role of AI technologies and the specificities of individual industries. Despite the growing interest in the topic, there is still a need for models that both support the assessment of fast-growing enterprises and provide practically oriented guidelines for public policies and strategic business development.

III. METHODOLOGY

The main objective of this study is to identify and analyze the main factors influencing the development and competitiveness of fast-growing enterprises in innovation-intensive industries, as well as to formulate strategic recommendations to public institutions and enterprises based on an AI-driven approach to assessing company growth.

The present study has a conceptual-analytical nature and combines literature analysis, AI-oriented analytical interpretation and testing of the proposed model using aggregated data from the National Statistical Institute and Eurostat. Given its complex specificity, the study is based on an interdisciplinary analytical approach aimed at studying the factors influencing the development and competitiveness of fast-growing enterprises in innovation-intensive industries. The methodological logic of the study combines literature analysis, conceptual synthesis and AI-oriented analytical interpretation, in order to formulate strategic recommendations to public institutions and enterprises.

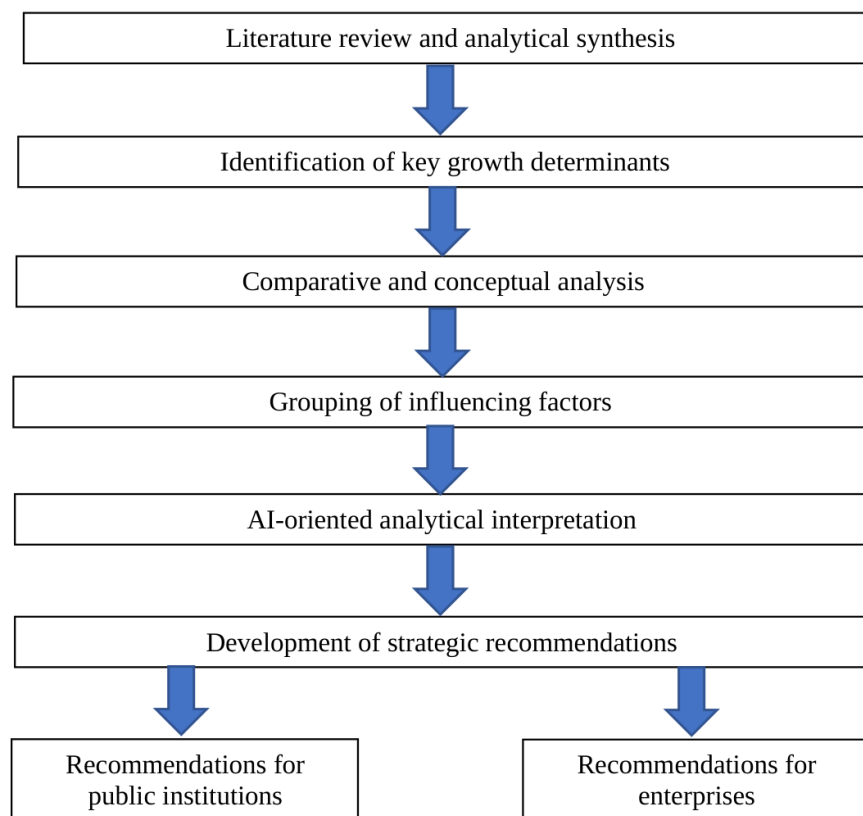


Fig.1. Research framework of the study

The study was carried out in several consecutive stages (Fig. 1). At the first stage, a systematic review of the scientific literature was carried out, covering publications related to fast-growing enterprises, innovative development, digital transformation, the application of artificial intelligence, financial factors and the influence of the external business environment on the competitiveness of enterprises. The analysis considered both traditional economic and management approaches and modern research using machine learning and data-driven models in the assessment and forecasting of company growth. At the

second stage, a comparative and conceptual analysis of the factors identified in the literature was carried out. The aim of this stage is to highlight the recurring dependencies, the fundamental dimensions of company growth and the relationships between the technological, organizational, financial and specific characteristics of enterprises. The analysis shows that the development of fast-growing enterprises can hardly be explained by the action of single factors. It would be more correct to consider it as the result of the complex interaction between various factors and elements of the internal and external business environment.

At the next stage, the identified factors are grouped into several main analytical directions - technological and innovation characteristics, organizational capabilities, financial prerequisites, influence of the external environment and institutional conditions. This approach allows for a clearer identification of the interrelationships between the various factors and creates a basis for subsequent AI-oriented analytical interpretation.

Within the framework of the study, an AI-oriented perspective has also been applied, taking into account the growing importance of data-driven approaches and machine learning methods in assessing company growth and the competitiveness of enterprises. Special attention is paid to the possibilities of using AI models in identifying dependencies between various indicators, discovering hidden patterns and supporting strategic decision-making at both the company and institutional levels.

In the final stage of the study, based on the synthesized results and the identified dependencies, strategic recommendations have been formulated in two main directions. The first group of recommendations is aimed at public institutions engaged in the development and implementation of policies in the field of innovation and competitiveness. The second group of recommendations is oriented towards enterprises striving for sustainable growth, higher adaptability and competitiveness in the conditions of a dynamic national, European and global economic environment.

IV. AI-DRIVEN EVALUATION FRAMEWORK FOR FAST-GROWING FIRMS

The development of fast-growing enterprises in innovation-intensive industries is increasingly difficult to explain by the action of one, two or even several main factors. In the modern economic environment, companies operate under the influence of many interconnected

processes – accelerated digitalization, technological changes, dynamic competitive environment, changing consumer expectations and increasing uncertainty. This is precisely why traditional approaches, which consider growth mainly through financial indicators or through linear dependencies, often fail to capture the real complexity of the processes behind the development of fast-growing enterprises.

In the scientific literature, the understanding that company growth is the result of the interaction between different groups of factors is increasingly becoming apparent. Technological readiness, innovation capacity, organizational culture, access to financing, management practices and the influence of the external environment do not operate in isolation. On the contrary – they are in constant interrelation, often reinforcing or limiting each other's effect. This necessitates a more flexible analytical framework that allows for the simultaneous tracking of multiple dependencies and the identification of more complex development patterns.

The proposed AI-driven model is based on such logic. It considers competitiveness and growth potential as a result of a complex interaction between technological, organizational, financial and specific characteristics of the business environment of enterprises. In this context, AI-oriented approaches are used not only as a technological tool, but also as an opportunity for a more in-depth analysis of the relationships between various factors influencing the development of companies.

Particular importance within the model is given to the ability to identify dependencies that are difficult to highlight through traditional analytical approaches. This includes both tracking interactions between individual indicators and discovering patterns related to the sustainability, adaptability and innovation potential of enterprises. Thus, AI-driven logic allows for a more comprehensive view of the factors that support or limit the development of fast-growing companies.

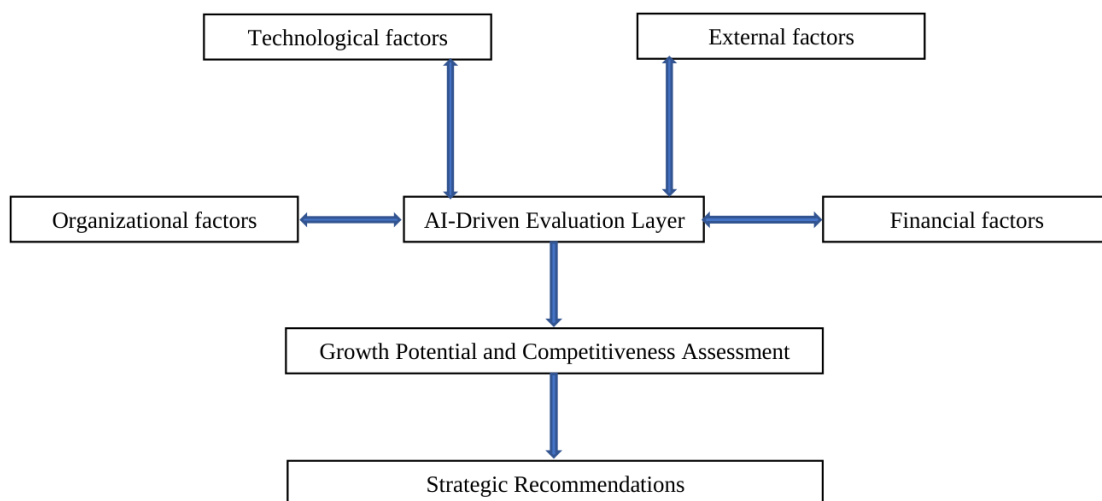


Fig.2. Conceptual Structure of AI-driven evaluation model.

The model also considers the fact that fast-growing enterprises do not represent a homogeneous group. Differences between industries, the degree of digitalization, access to resources, the institutional environment and external economic conditions can significantly change both the growth opportunities and the degree of competitiveness of enterprises. That is why the proposed analytical framework is aimed first of all at assessing company development, but secondly - at creating a basis for formulating more adequate strategic recommendations both to public institutions and to the enterprises themselves.

Table 1. Key dimensions and indicators within the AI-driven evaluation framework

Dimension	Main factors	Strategic relevance
Technological	AI adoption, digitalization, innovation intensity	Innovation capacity
Organizational	Adaptability, leadership, culture	Strategic flexibility
Financial	Access to finance, liquidity, VC	Growth sustainability
External environment	Competition, policies, ecosystems	Market positioning

4.1. Technological and innovation dimension of the model.

Technological and innovation factors occupy a central place in the development of fast-growing enterprises, especially in industries with high innovation intensity. In conditions of accelerated digitalization, the ability of companies to implement new technologies, to use data in decision-making and to adapt their business models to the changing environment is becoming an important prerequisite for sustainable growth and competitiveness. From this perspective, AI solutions and data-driven have recently been established as part of the strategic logic of company development.

Technological development is not only a process of implementing digital tools. The ability of companies to integrate technologies into organizational and management processes is gaining increasing importance, so that they support value creation, increased efficiency and adaptation to a dynamic business environment. An essential place in this process is occupied by the development of data-driven competencies, which allow for more precise tracking of market trends, identification of risks and discovery of new development opportunities.

Also of great importance is the ability of enterprises to build an environment that encourages innovation, knowledge exchange and organizational adaptability. In the proposed AI-driven model, technological and innovation factors are a dynamic system of interconnected elements, in which the level of digitalization, the use of AI technologies, innovation activity and access to technological knowledge can simultaneously support company growth and create new challenges for enterprises. Beyond technological and

financial resources, organizational creativity should also be considered an important dimension of innovation readiness, as it reflects firms' capacity to generate new ideas and respond to changing business conditions (Angelova, 2024).

Table 2. Technological and innovation factors within the AI-driven evaluation model

Technological and innovation factors	Analytical focus	Potential impact on competitiveness and growth
Level of digitalization	Degree of digital integration in business processes	Higher operational efficiency and adaptability
AI adoption	Use of AI-based tools and analytical systems	Improved decision-making and predictive capabilities
Data-driven competencies	Capacity for data collection, processing and interpretation	Better identification of market trends and risks
Innovation intensity	Level of innovation activity and development efforts	Increased innovation capacity and market positioning
Technological readiness	Ability to implement and adapt new technologies	Faster adaptation to environmental changes
Digital infrastructure	Availability of technological and digital resources	Improved organizational flexibility and scalability
Knowledge integration	Ability to absorb and apply external technological knowledge	Enhanced learning and innovation potential
Participation in innovation ecosystems	Collaboration with partners, networks and innovation hubs	Access to resources, expertise and strategic partnerships
Organizational support for innovation	Internal environment supporting experimentation and learning	Stronger innovation culture and continuous improvement
Technological adaptability	Capacity to adjust technological processes and systems	Greater resilience in dynamic market conditions

The presented factors should be considered in their entirety. In the proposed AI-driven model, they form an interconnected system in which technological characteristics interact with organizational, financial and external environmental factors, which lead to different dimensions of company development.

4.2. Financial and investment dimensions of the model.

Financial factors are essential for the development of fast-growing enterprises, especially in industries characterized by high innovation activity and the need for constant investment. Access to financial resources often determines the ability of enterprises to innovate, expand their activities and maintain a sustainable growth rate. In addition, financial sustainability directly affects the ability of companies to respond to external shocks and market changes.

Research proves that not only the availability of financing, but also its structure has an impact on the

development of enterprises. Excessive dependence on short-term financial resources, limited liquidity or high indebtedness can hinder the long-term development and investment activity of companies. At the same time, access to risk financing, investment networks and various forms of external support often support the innovation potential and adaptability of enterprises.

Financial and investment factors are part of a broader system of interconnected elements. AI-oriented analytical approaches allow for deeper tracking of dependencies between the financial condition of enterprises, investment activity, access to resources and the potential for sustainable growth. This creates the opportunity for a more precise assessment of the risks, constraints and prospects for the development of fast-growing enterprises.

Table 3. Financial and investment factors within the AI-driven evaluation model

Financial and investment factors	Analytical focus	Potential impact on competitiveness and growth
Access to finance	Availability of external financial resources	Support for investment and expansion activities
Financial stability	Sustainability of financial performance	Higher resilience in uncertain market conditions
Liquidity level	Ability to cover short-term obligations	Improved operational flexibility
Capital structure	Balance between debt and equity financing	Influence on investment capacity and risk exposure
Investment capacity	Ability to finance innovation and development activities	Support for long-term growth
Venture capital access	Availability of risk-oriented investment support	Increased innovation and scaling potential
Financing diversification	Use of multiple financial sources	Reduced dependence on single funding channels
Debt dependence	Reliance on external borrowing	Potential financial vulnerability and growth limitations
Financial adaptability	Ability to respond to changing financial conditions	Improved resilience and strategic flexibility
Investment efficiency	Effectiveness of resource allocation	Better utilization of financial and innovation potential

4.3. External environment and institutional dimensions of the model.

The development of fast-growing enterprises is also strongly influenced by the characteristics of the external environment in which companies operate. Market dynamics, the degree of competition, access to innovation ecosystems, international economic processes and the institutional environment can both create opportunities for growth and impose constraints on enterprises. The ability of companies to adapt to external changes becomes an extremely important element of their competitiveness, especially

considering the unpredictable nature of the business environment, global competition and geopolitical uncertainty.

Factors such as the regulatory environment, public policies, access to innovation infrastructure and the degree of integration into technological and business networks have a significant impact on the development potential of enterprises. In addition, geopolitical processes, technological conflicts, sectoral differences and changes in global markets can increase the uncertainty and sensitivity of companies to external shocks.

In the presented model, external and institutional factors form a dynamic environment that interacts with the technological, organizational and financial characteristics of enterprises. This suggests the need for more flexible analytical approaches capable of taking into account the complex dependencies between the internal firm environment and external economic and institutional conditions when assessing the growth and competitiveness of enterprises.

Table 4. External and institutional factors within the AI-driven evaluation model

External and institutional factors	Analytical focus	Potential impact on competitiveness and growth
Market dynamics	Changes in market conditions and demand	Influence on growth opportunities and adaptability
Competitive intensity	Level of market competition	Pressure for innovation and strategic flexibility
Regulatory environment	Institutional and legal conditions	Impact on business stability and investment activity
Public innovation policies	Government support mechanisms and incentives	Stimulation of innovation and firm development
Access to innovation ecosystems	Participation in networks, clusters and partnerships	Improved access to knowledge and resources
Geopolitical uncertainty	External political and economic risks	Increased vulnerability and operational instability
International market integration	Participation in global markets and value chains	Expansion opportunities and competitive positioning
Sector-specific conditions	Industry characteristics and development patterns	Differences in growth potential and competitiveness
Technological environment	Availability of technological infrastructure and support	Facilitation of digital transformation and innovation
Institutional adaptability	Capacity of institutions to support innovation and growth	Influence on long-term competitiveness and resilience

4.4. AI-oriented analytical integration of factors.

One of the main ideas of the proposed model is that different groups of factors are not considered independently. Technological, organizational, financial and external factors

are in constant interrelation and very often the influence of one of them changes the effect of the others. It is this complexity that makes the analysis of fast-growing enterprises significantly more difficult, especially in the conditions of a dynamic and rapidly changing business environment.

AI-oriented approaches create an opportunity for a more in-depth tracking of dependencies between different characteristics and indicators of enterprises. Data-driven logic allows for the identification of recurring patterns, identification of connections between individual factors and analysis of dependencies that are difficult to establish through more traditional analytical approaches. This is especially important when assessing fast-growing enterprises, in which development processes are often influenced by multiple simultaneously acting factors.

The possibility of combining different types of indicators within a single analytical environment – financial, organizational, technological and business environment factors – is also of great importance. In addition, AI-oriented analytical integration helps identify risks, constraints, and opportunities for development, which creates a basis for more informed strategic decision-making at both the company and institutional levels.

Table 5. AI-oriented analytical integration of the evaluation model

AI-oriented analytical elements	Analytical focus	Potential contribution to evaluation and decision-making
Data integration	Combination of multiple data sources and indicators	More comprehensive analytical perspective
Pattern identification	Detection of recurring relationships and trends	Improved understanding of growth dynamics
Predictive interpretation	Identification of potential development scenarios	Support for strategic planning
Relationship analysis	Exploration of interactions between different factors	Better assessment of complex dependencies
Risk identification	Detection of vulnerabilities and instability factors	Improved resilience and adaptability
Dynamic evaluation	Continuous assessment of changing business conditions	Faster response to environmental changes
Strategic interpretation	Translation of analytical results into strategic insights	Support for managerial and institutional decisions
AI-supported decision-making	Use of analytical outputs for strategic actions	More informed competitiveness and growth strategies

4.5. Strategic implications of the AI-driven evaluation model.

The presented AI-driven model creates an opportunity for a more comprehensive assessment of the factors influencing the development and competitiveness of fast-growing enterprises. By integrating technological, organizational, financial and external characteristics, the

model allows for better tracking of the dependencies between the individual elements and highlighting the factors that support or limit company growth.

The model can also be used as a tool to support strategic planning and decision-making. At the institutional level, it creates prerequisites for more precise identification of enterprises and industries with high growth potential, as well as for developing more targeted policies in the field of innovation, digitalization and competitiveness. In this way, the model can support the processes related to the planning of support measures, the allocation of resources and the construction of more effective mechanisms to stimulate innovative development.

At the company level, the application of the model allows for a better understanding of the strengths, limitations and potential risks to the development of enterprises. This creates an opportunity for more informed strategic planning, more efficient use of resources and higher adaptability to the changing economic and technological environment. In this sense, the AI-driven model can be considered not only as an analytical framework for assessment, but also as a tool that helps increase the sustainability and competitiveness of enterprises. At the same time, it should be borne in mind that the model does not represent a universal solution that can be applied in an identical way in all industries and economic conditions. The influence of individual factors may vary depending on the specifics of the business environment, the degree of digitalization, institutional conditions and the characteristics of the enterprises themselves. It is for this reason that the application of the model implies a certain degree of adaptation to the specific economic and organizational context.

4.6. Application of the model based on NSI and Eurostat data.

In order to test the proposed AI-driven model, an analytical application of the framework was carried out using aggregated data from the National Statistical Institute and Eurostat for the period 2018–2023. The analysis covers over 400,000 active enterprises in Bulgaria, as well as indicators related to innovation activity, the level of digitalization, sectoral structure, investment activity and business demographics of enterprises.

Table 6. Indicators used in the empirical application of the AI-driven model

Indicator group	Example indicators	Data source
Innovation activity	Share of innovative enterprises	NSI / Eurostat
Digitalization	Digital intensity index	Eurostat
Business demography	Active and newly created enterprises	NSI
Sector characteristics	Knowledge-intensive sectors	Eurostat
Competitiveness factors	Investment and technological indicators	NSI / Eurostat

Within the framework of the application of the model, the individual indicator groups are used for analytical tracking of the interrelationships between innovation

activity, the level of digitalization, business demography and the competitiveness of enterprises. The analysis is aimed at identifying recurring trends and factors that are consistently associated with a higher potential for sustainable growth.

The results show that during the period 2018–2023, only 26.1% of enterprises in Bulgaria with 10 or more employees carried out innovation activity. At the same time, serious differences are observed between the individual economic sectors and groups of enterprises. The share of innovatively active enterprises in industry reaches 32.9%, while in services it is only 19.6%. Significantly higher innovation activity is observed in large enterprises – 72.3% in industry and 66.5% in the service sector.

The data also outline serious limitations regarding the digital transformation of enterprises in Bulgaria. According to Eurostat, in 2023, 70.6% of Bulgarian enterprises are characterized by a very low level of digital intensity, which places the country among the least digitized economies in the European Union. In addition, only 28% of small and medium-sized enterprises in Bulgaria reach a basic level of digital intensity, with significantly higher values for a number of other European countries.

Within the framework of the application of the model, a clear relationship emerges between the level of digitalization, innovation activity and the development potential of enterprises. Companies with higher technological readiness, more active use of digital solutions and better integration of data-driven approaches demonstrate higher adaptability and better prerequisites for sustainable growth. At the same time, a significant part of enterprises continue to experience difficulties in integrating technologies into organizational and management processes, which limits their opportunities to increase competitiveness.

The analysis of the NSI data also shows that the number of active enterprises in Bulgaria continues to grow, reaching 404,257 in 2023, with 43,353 newly established enterprises. However, the data outlines the presence of serious differentiation between enterprises in terms of innovation activity, digital readiness and the ability to adapt to a dynamic economic environment.

The results obtained confirm the logic of the proposed AI-driven model, according to which competitiveness and the potential for sustainable growth are formed under the influence of a complex interaction between technological, organizational, financial and external factors. The data show that enterprises with a higher degree of digitalization, more active innovation activity and better organizational adaptability have more favorable prerequisites for development and integration in a more competitive international economic environment.

V. STRATEGIC RECOMMENDATIONS

5.1. Strategic recommendations to public institutions.

One of the main recommendations arising from the analysis and application of the model is related to the need for institutions to gradually move to a more data-driven model in the development, monitoring and evaluation of policies in the field of innovation and competitiveness. In

practice, relatively general criteria are still often used in determining the enterprises that receive support, without sufficiently taking into account their technological readiness, organizational adaptability or potential for sustainable growth. This limits the effectiveness of some public support mechanisms. In this regard, institutions should develop AI-based analytical systems that allow for more precise identification of enterprises with high development potential, as well as better tracking of the results of the implemented policies. Such an approach would allow not only a more efficient allocation of resources, but also an earlier identification of enterprises with the potential for international competitiveness.

Public policies need to place a significantly stronger emphasis on building technological and data-driven capabilities in enterprises. In many cases, the problem is not only limited access to technologies, but also the insufficient ability of companies to integrate them into organizational and management processes. Therefore, support measures should not be concentrated only on the purchase of equipment or software. It is necessary to develop programs aimed at increasing digital skills, management competencies and the ability of companies to use data in strategic decision-making. Of particular importance here is support for small and medium-sized enterprises, where limited access to expertise and resources often hinders digital transformation processes.

Significant attention should also be paid to access to financing for enterprises with high innovation activity and growth potential. The results of the analysis show that financial constraints continue to be among the main factors hindering the development of fast-growing enterprises in Bulgarian conditions. This is especially true for companies at an earlier stage of development, where the high degree of uncertainty often limits access to external financing. In this regard, it is necessary to expand the mechanisms for risk and investment financing, as well as develop more flexible financial instruments tailored to the specifics of innovation-intensive industries. An appropriate direction is also the stimulation of public-private partnerships in the financing of technological and innovation projects. Another important recommendation is related to the construction of more effective innovation ecosystems and mechanisms for interaction between business, scientific organizations and the public sector. Enterprises that manage to integrate into broader networks for knowledge exchange, technology transfer and partnerships, significantly more easily develop innovation potential and adaptability. That is why institutions should actively promote the creation of innovation hubs, technology centers and joint initiatives between universities, scientific organizations and enterprises. Such structures can support not only the transfer of knowledge, but also the faster implementation of technological solutions in the real business environment.

The results show the need for a more adaptive and sector-oriented approach in the development of competitiveness policies. The impact of technological, financial and external factors on enterprises varies significantly depending on the specifics of individual industries. Therefore, the use of uniform support

mechanisms actually leads to limited effectiveness. It is necessary to develop more flexible policies that take into account the level of technological intensity, the characteristics of the competitive environment and different models of company development. This would allow for more precise targeting of resources and higher efficiency of support measures in the long term.

5.2. Strategic recommendations for companies.

In the context of accelerated digitalization, one of the biggest mistakes that companies continue to make is to view technology primarily as a technical resource, rather than as part of the strategic development of the organization. The analysis shows that the implementation of AI solutions or digital tools in itself rarely leads to a sustainable competitive advantage. Much more important is the ability of the company to change the way decisions are made, organize its processes and use available information. That is why one of the first recommendations is for companies to gradually build a data-driven management logic, in which data is used as a real tool for forecasting, planning and strategic adaptation.

Companies should also pay significantly more attention to supporting and building a sustainable internal organizational environment. In many cases, the limitations to innovation do not stem from a lack of technology, but from low organizational flexibility, highly centralized management models or insufficient readiness for change. This makes it particularly important to build an environment that encourages knowledge exchange, inter-team interaction, and faster adaptation to new market and technological conditions. Companies that manage to develop such an organizational culture usually respond more easily to external shocks and integrate new business models and technological solutions more quickly.

A significant problem for some fast-growing enterprises remains excessive dependence on short-term goals and accelerated scaling without sufficient attention to the sustainability of growth. In this regard, enterprises should seek a more balanced approach between growth, investments and risk management. This includes better planning of financial resources, diversification of financing sources and limiting excessive dependence on single markets, customers or investment sources. The analysis shows that it is precisely enterprises with a higher degree of financial and organizational adaptability that more easily maintain their competitiveness in an unstable environment.

The next important recommendation concerns the more active participation of enterprises in innovation and technology networks. In the modern economy, sustainable competitive advantages are much less often built entirely within the organization itself. Access to external knowledge, partnerships with scientific organizations, technological ecosystems and the ability of companies to exchange information and expertise are of great importance. That is why companies should perceive their participation in such networks not so much as some additional optional activity, but as a purposeful part of their long-term development and innovation strategy.

Of increasing importance is the issue of the strategic sustainability of companies. The dynamic economic environment, geopolitical processes, technological changes and increasing uncertainty make the ability to adapt critically important for fast-growing companies. This implies that companies should not only pursue short-term growth, but also build mechanisms for better risk management, monitoring the external environment and preparing for different development scenarios.

VI. CONCLUSION

The present article examines the development of fast-growing enterprises through the prism of the complex interaction between technological, organizational, financial and external factors. The literature review shows that sustainable company growth can hardly be explained by the influence of single determinants, since the development of enterprises is formed under the influence of multiple interconnected processes. It is for this reason that the study proposes an AI-driven evaluation framework, which allows for a more comprehensive tracking of the factors influencing the competitiveness and development potential of enterprises in innovation-intensive industries.

The application of the model using aggregated data from the National Statistical Institute and Eurostat outlines the presence of significant differences between enterprises in terms of the level of digitalization, innovation activity and organizational adaptability. The results obtained show that enterprises with a higher degree of technological readiness, more active use of data-driven approaches and better integration into innovation ecosystems demonstrate more favorable prerequisites for sustainable growth and competitiveness. At the same time, the analysis also highlights a number of limitations related to insufficiently developed digital competencies, limited access to resources and difficulties in integrating technologies into management processes.

On this basis, the study emphasizes the need for a more integrated and adaptive approach to the assessment and support of fast-growing enterprises. The proposed AI-driven model can be used both as an analytical framework for tracking the factors influencing company development and as a tool for supporting strategic planning and policy formulation in the field of innovation and competitiveness. In this sense, the study contributes to the development of the discussion on the role of AI-oriented analytical approaches in the assessment of enterprises in the context of accelerated digital and economic transformation.

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