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INTEGRATION OF BLOCKCHAIN TECHNOLOGIES IN THE FOOD SUPPLY CHAIN – REGULATORY FRAMEWORKS IN THE EUROPEAN UNION

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Abstract. This study examines the regulatory frameworks for blockchain technology integration in the food supply chain across the European Union (EU). Through a comprehensive analysis of national regulatory documents and strategies, the research categorises EU member states based on their approach to blockchain regulation in six distinct categories. The analysis reveals significant variations in regulatory maturity, enforcement mechanisms, and sectoral focus among EU countries. The findings provide valuable insights for policymakers and industry stakeholders seeking to leverage blockchain's potential in enhancing transparency, traceability, and efficiency in the food supply chain.

Keywords: food supply chain; regulatory frameworks; digital innovation
JEL Codes: K23, O33, Q18

Introduction

Blockchain technology has emerged as a transformative tool across various industries, including the food supply chain. Its ability to enhance transparency, traceability, and efficiency has garnered significant interest from both industry stakeholders and policymakers. In the European Union (EU), the adoption of blockchain in the food supply chain is influenced by diverse regulatory frameworks across member states. The primary purpose of this report is to analyse the current regulatory frameworks governing the implementation of blockchain technology in the food supply chains across EU member states. By identifying best practices and gaps, the study aims to propose recommendations for harmonising regulations to enhance transparency, traceability, and efficiency in the EU's food sector.

The scope of the report is limited to the analysis of national regulatory frameworks related to blockchain technology in all EU member states. Blockchain technology, known for its decentralised, immutable nature, is increasingly being viewed as a solution to the inefficiencies and transparency issues in global food

supply chains. This report evaluates how blockchain's adoption in the food industry, specifically within the EU, can support improved product traceability and regulatory compliance.

1. Literature Review

The increasing complexity of global food supply chains has heightened the need for enhanced transparency and traceability. Recent literature highlights the challenges and potential solutions in this domain. Yadav et al. (2021) conducted a comprehensive review of traceability systems in the food industry, emphasising the role of emerging technologies like blockchain. They found that while traditional traceability systems have limitations in data integrity and real-time information sharing, blockchain offers promising solutions for enhanced transparency and traceability.

Behnke and Janssen (2020) explored the concept of boundary objects in food supply chains, focusing on how these objects can improve traceability and transparency. Their study suggests that blockchain technology can serve as an effective boundary object, facilitating information exchange and collaboration among diverse stakeholders in the food supply chain. In a case study approach, Kayikci et al. (2020) examined the implementation of blockchain technology for traceability in the Turkish food sector. Their findings indicate that blockchain can significantly improve supply chain visibility, product authenticity verification, and overall food safety. Similarly, in a case study of the Italian agri-food sector, Baralla et al. (2021) explored the potential of blockchain to combat food fraud and improve supply chain integrity.

Saurabh and Dey (2021) conducted a systematic literature review on blockchain adoption in agri-food supply chains. They identified key drivers and barriers to blockchain implementation, highlighting the technology's potential to enhance traceability, reduce fraud, and improve consumer trust. Astill et al. (2022) investigated the challenges of implementing traceability systems in the Canadian food sector. Their research emphasises the need for standardised data collection and sharing protocols, suggesting that blockchain could play a crucial role in addressing these challenges.

Kouhizadeh et al. (2021) highlights the potential of blockchain to enhance transparency and traceability but identifies significant obstacles including technological complexity, cost implications, and organisational resistance. The authors offer a comprehensive framework for understanding these barriers and propose strategies for overcoming them.

The regulatory landscape for blockchain technology is rapidly evolving, with various approaches being adopted across different jurisdictions. Yeung (2021) provided a critical analysis of regulatory approaches to blockchain technology, focusing on the European Union's efforts. The study highlights the tension between

fostering innovation and ensuring adequate consumer protection, suggesting a need for balanced, technology-neutral regulations.

Bodó and Giannopoulou (2021) examined the regulatory challenges posed by blockchain technology in the EU context. Their research emphasises the need for adaptive governance models that can accommodate the decentralised nature of blockchain while ensuring compliance with existing legal frameworks. In a comparative study, Fenwick et al. (2021) analysed regulatory sandboxes for blockchain and other fintech innovations across different jurisdictions. Their findings suggest that regulatory sandboxes can be effective tools for promoting innovation while managing risks associated with new technologies. Zetzsche et al. (2020) explored the concept of "embedded regulation" in the context of blockchain and other distributed ledger technologies. They propose a framework for incorporating regulatory requirements directly into blockchain protocols, potentially streamlining compliance processes.

Ferrari (2020) conducted an in-depth analysis of the EU's regulatory approach to crypto-assets and blockchain technology. The study highlights the challenges of creating a unified regulatory framework across member states and suggests potential pathways for harmonisation. Biolcheva and Sterev (2024) propose a model for evaluating the added value of AI in business that could help managers integrate AI by quantifying both material and non-material benefits, such as productivity and reputation.

The application of blockchain technology in the EU food supply chain is an area of growing interest, with several studies exploring its potential benefits and challenges. Kamilaris et al. (2021) provided a comprehensive review of blockchain applications in agriculture and food supply chains within the EU context. Their study identifies key use cases, including traceability, smart contracts, and decentralised marketplaces, while also highlighting implementation challenges. Kokina et al. (2021) examined the role of blockchain in enhancing food safety and quality control in the EU, suggesting that blockchain can significantly improve the efficiency of food recall processes and enhance consumer trust through increased transparency.

Talavera et al. (2022) investigated the integration of blockchain with Internet of Things (IoT) technologies in EU food supply chains. Their study highlights the synergies between these technologies in creating more resilient and transparent supply chains. Petropoulos et al. (2023) underlined the importance of introducing the intelligent animal husbandry approach into traditional sectors such as sheep farming industries to adapt it to the dynamics of the environment. The collaborative approach between farmers and government is of upmost importance.

This literature review highlights the growing body of research on blockchain integration in the EU food supply chain. The studies collectively emphasise the potential of blockchain to enhance transparency, traceability, and regulatory compliance. However, they also identify challenges in implementation,

standardisation, and regulatory harmonisation across the EU. Future research could focus on addressing these challenges and exploring the long-term impacts of blockchain adoption on food supply chain sustainability and resilience.

Further studies have highlighted the importance of blockchain technology in enhancing supply chain processes. Caro et al. (2018) present a comprehensive framework for blockchain-based supply chain management, emphasising the need for regulatory support to facilitate widespread adoption. Lastly, Pearson et al. (2019) provide a case study on the implementation of blockchain in the food supply chain, illustrating the regulatory hurdles and potential solutions.

2. Methodology

The research involved a comprehensive review of national regulatory documents, strategies, and plans related to blockchain technology across EU member states. Sources included official government websites, legal databases, and scholarly articles. This approach ensured a thorough understanding of the current regulatory landscape and its implications for the food supply chain.

The research focused on the regulatory maturity and approach toward blockchain technology. By categorising countries into six groups based on regulatory maturity and specific blockchain-related legislation, the study systematically identifies patterns that inform the development of harmonised regulations. The comparative analysis of these frameworks allows for a thorough evaluation of the challenges and best practices in blockchain adoption across the EU. This methodological approach provides a robust framework for evaluating the scientific results, highlighting both regulatory challenges and technological opportunities, thereby providing a solid foundation for actionable policy recommendations.

3. Results

The analysis reveals significant variations in the regulatory approaches to blockchain technology across the EU. Countries like France and Malta are at the forefront, with comprehensive regulatory frameworks and high penalties for non-compliance. In contrast, countries like Bulgaria and Croatia lack specific regulations, which may hinder the adoption and integration of blockchain technologies in their food supply chains.

Table 1. Strategic documents and severity of fines in EU Member states

Country	Regulatory Framework	Fines for Non-Compliance
Austria	Generic regulations with specific tax legislation	Moderate
Belgium	Several initiatives but not specific legislation	Moderate
Bulgaria	No specific legislation	None

Croatia	No specific legislation	None
Cyprus	Several directives and initiatives	Not defined
Czechia	Regulatory mandates introduced	Limited
Denmark	Several sectorial initiatives, strong foundations	High
Estonia	E-Residency program, first to introduce legislation	Moderate-High
Finland	Early adopter, but regulations are still lacking	Significant
France	Numerous initiatives across the private and public sectors, proactive stance on legislation	High
Germany	National Blockchain Strategy, Future Finance Act	Severe
Greece	Developing regulatory framework, no specific law	Moderate
Hungary	Existing legislation and sectorial legislative packages	Moderate-High
Ireland	Adopting EU related legislation	Moderate
Italy	National Blockchain Strategy, additional legislative initiatives	High
Latvia	No specific regulations	Not defined
Lithuania	Comprehensive set of regulations, fintech and sandbox strategies	Moderate-High
Luxembourg	Developed regulatory framework	Significant
Malta	"Blockchain Island" initiative, Digital Innovation Act, comprehensive legislation	High
Netherlands	Amendments based legislative approach, Dutch Blockchain Coalition	Moderate-High
Poland	Comprehensive set of regulatory mechanisms	Moderate
Portugal	Adopting EU related legislation, National Blockchain Strategy	High
Romania	No specific regulatory framework	Not defined
Slovakia	Specific regulations for blockchain, Strategy of Digital Transformation	Moderate
Slovenia	Advanced regulations, Strategy for Digital Transformation	High
Spain	Several legislative initiatives	Significant
Sweden	No specific legislation, numerous governmental initiatives	Moderate-High

For instance, France aims to build trust in the digital economy by clarifying legal aspects of blockchain technology. It encourages innovation through light-touch regulation, streamlining legal processes, facilitating investment, and promoting French blockchain development. This progressive approach positions France as a leader in blockchain adoption.

Germany, on the other hand, adopted a supportive, yet non-regulatory approach with its Blockchain Strategy. This strategy focuses on fostering innovation through research, development, and pilot projects across various industries, including supply chains. While it lacks direct regulations, it shows strong government interest in exploring blockchain potential.

Spain includes measures to promote blockchain adoption across industries, emphasising digitalisation and modernisation. Similar to Germany's strategy-based approach, it indicates broader interest in the technology rather than imposing direct regulations. Italy's National Blockchain Strategy outlines a multi-pronged approach focusing on public services, innovation support, and legal clarity. While it lacks specific supply chain regulations, it highlights government interest in targeted applications of blockchain technology.

The EU's blockchain regulatory landscape can be divided into six distinct groups, each representing different levels of regulatory development and approach:

1) Comprehensive Regulatory Framework – Countries in this group have implemented specific blockchain regulations with high penalties for non-compliance and a broad regulatory focus.

2) Developing Regulatory Framework – These countries are actively working on blockchain-specific regulations, with moderate penalties and a focused approach.

3) Adaptation of Existing Regulations – Countries in this group are applying existing regulations to blockchain, with variable penalties and sector-specific focus.

4) Observational Approach – These countries are monitoring blockchain development without specific regulations, typically with low penalties and a broad focus

5) Blockchain-Friendly with Limited Regulation – Countries in this group are actively promoting blockchain with minimal regulation, typically low penalties, and broad encouragement.

6) Early Stages of Consideration – These countries are in the early stages of considering blockchain regulations, with minimal or no specific rules.

A heatmap showing the level of regulatory maturity across the EU could be observed in Figure 1.

The severity of fines and penalties for non-compliance with blockchain regulations also varies across the EU. For example, France imposes high penalties for non-compliance with traceability requirements, reflecting its stringent regulatory approach. Germany's severe penalties for breaches of food safety regulations underscore the country's commitment to ensuring blockchain technology enhances compliance and safety.

In contrast, countries like Bulgaria and Croatia, which lack specific blockchain regulations, do not impose fines for non-compliance, leading to potential legal uncertainty and slower adoption of blockchain technologies. However, these countries are likely to align with broader EU regulations, such as the Markets in

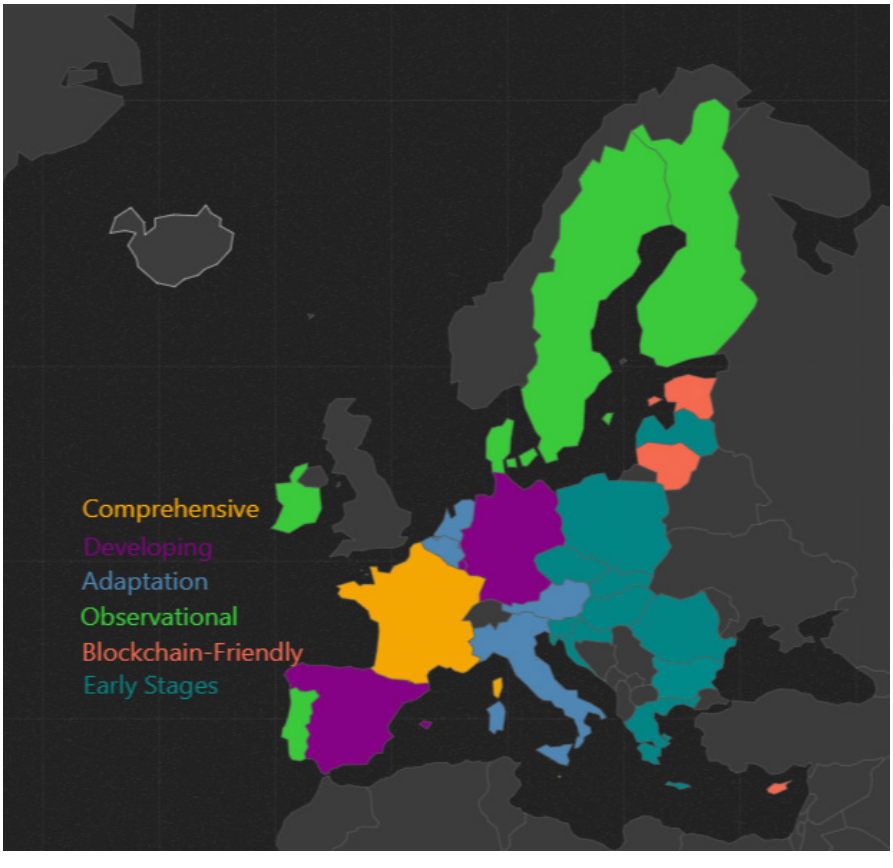

Figure 1. Heatmap of EU's blockchain regulatory landscape

Crypto-Assets (MiCA) regulation, which could impact blockchain use in financial services and indirectly affect the food supply chain sector.

4. Discussion

The comparative analysis reveals a diverse regulatory landscape across the EU, with varying degrees of regulatory maturity and enforcement. Countries leading in blockchain adoption impose significant penalties for non-compliance, reflecting their commitment to maintaining high standards in the use of blockchain technology. In contrast, the lack of specific regulations may hinder the adoption of blockchain technologies in other countries' food supply chains.

Blockchain technology offers significant benefits for supply chains, particularly in the food sector. Enhanced traceability is achieved through blockchain's ability to

create a permanent record of every transaction and movement in the supply chain, enabling full traceability from production to consumption. Improved transparency allows all supply chain participants to access the same information, reducing information gaps and fostering greater trust among partners. Increased efficiency is facilitated by smart contracts, which streamline processes, reduce paperwork, and speed up transaction times. Food safety is enhanced as quick traceability enables the fast identification of contaminated products, allowing for swift recalls and reducing food safety risks. Fraud prevention is strengthened by the immutable nature of blockchain records, making it difficult to falsify information about a product's origin or quality.

The best practices identified in the analysis highlight the importance of comprehensive frameworks, collaborative initiatives, and focused strategies. France and Malta provide robust examples of comprehensive regulatory frameworks that support blockchain innovation while ensuring compliance. Collaborative initiatives, like the Dutch Blockchain Coalition and Belgium's Blockchain Lab, emphasise the importance of public-private partnerships in developing practical and industry-specific regulations. Germany and Italy's strategy-based approaches highlight the need for research, development, and pilot projects to foster blockchain adoption across various sectors.

There are several areas for improvement in the regulatory frameworks of EU member states. The EU could benefit from more uniform regulations to facilitate cross-border blockchain applications in the food supply chain. Countries with developing frameworks or undefined penalties need clearer regulations and enforcement mechanisms to ensure compliance and foster trust in blockchain systems. More targeted guidelines for specific sectors, such as the food supply chain, would help address the unique challenges and opportunities presented by blockchain technology.

Conclusion

The integration of blockchain technologies in the food supply chain across the EU is influenced by diverse regulatory frameworks, ranging from comprehensive and well-defined to non-existent. Countries leading in this space provide valuable insights into best practices, while others need to develop clearer and more uniform regulations. Moving forward, the EU should aim for harmonised regulations that support innovation and ensure compliance, thereby leveraging blockchain's full potential in enhancing transparency, traceability, and efficiency in the food supply chain.

As blockchain technology matures and its adoption in supply chains grows, we can anticipate the emergence of more targeted regulations specifically addressing its use in supply chains. The evolution of these regulatory frameworks will likely be characterised by increased collaboration between regulators and industry

stakeholders, aiming to develop practical and effective regulations that foster innovation while ensuring consumer protection and maintaining supply chain integrity.

In conclusion, the integration of blockchain technology in supply chains presents both unprecedented opportunities and unique regulatory challenges. As the technology continues to evolve, so too must the regulatory frameworks governing its use. The goal for EU policymakers should be to create a regulatory environment that harnesses blockchain's potential to enhance transparency, traceability, and efficiency in supply chains while addressing the associated risks and challenges. This balanced approach will be crucial in realising the full potential of blockchain technology in revolutionising supply chain management across the European Union.

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THE GLOBAL MARKET AS A PROJECTION OF THE INFORMATION ECONOMY

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Abstract. The information economy is a social phenomenon that is developing at a rapid pace and covering the entire global economy. The informatization and digitalization processes directed economic agents' attention to the innovation and digitalization of classical economic processes. At the same time, modern business organizations conduct most of their commercial relations in a digital environment. The paper aims to explore the relationship between the information economy and the global market as a projection of this economic model. It examines the nature and characteristics of the information economy, highlighting the importance of technology and digital infrastructure in shaping global trade. The paper also delves into the global market model and argues that it is intrinsically linked to advances in technology. Through an analysis of the digitally based market mechanism, the paper seeks to demonstrate the interconnectedness of the information economy and the global market, ultimately proving that the global market is fundamentally dependent on technological infrastructure. Finally, several prospects for the development of the global economy based on knowledge are systematized.

Keywords: digital economy; global economy; digitalization; digital transformation; informatization; e-trade

Introduction

The evolution of the global economy has been marked by transformative changes that have redefined how societies produce, exchange and consume goods and services. The changes also affected economic relations, which are already taking place in the digital dimension of reality. In this new reality, new practices and rules, along with the already established classical trade models, were imposed to shape trade relations in the global digital economy. Among these changes, the emergence of the information economy and the transition to a human-centric society highlight the growing importance of knowledge, data and technology in shaping the economic and industrial landscape. The information economy is a

modern economic system in which information and knowledge are the primary resources and drivers of growth and development. With the rise of technology and the Internet, the Information economy has become a vital component of the global economy, influencing production processes, consumer behaviour and economic policies. In the 21st century, we are no longer talking about separate market centres. We are all passive and active participants in the global market system - the whole system of market centres united in the worldwide digital environment. The technological infrastructure is the main driver behind the digital nature of the global market. The global market offers market participants new challenges, such as new assets, new rules and regulations that form the foundation of modern trade relations in the new century. The critical analysis of these new challenges will allow a better knowledge of the potential opportunities of contemporary markets and the extraction of innovative and sustainable commercial practices in modern commerce.

The article aims to explore the relationship between the information economy and the global market as a projection of this economic model. The following tasks are solved to achieve the goal: The nature and characteristics of the information economy are examined, emphasizing the importance of technology and digital infrastructure in shaping global trade. Second, the substantive characteristics of the global market are analysed, as well as its intrinsic relationship with technological advances. Finally, several challenges and prospects for developing the global economy based on knowledge are systematized.

The information economy – essence and characteristics

The information economy's development can be traced back to the dawn of the industrial revolution in the 18th and 19th centuries. The concept is associated with the ways of producing and disseminating information and knowledge during the various stages of society's development and the emerging socio-economic and technical relationships. Tracing the evolutionary path of the information economy from basic data processing to the formation of multi-complex systems performing simple cognitive-human tasks, it can be emphasized the transformative power of data and technology in an economic structure. In the 21st century, information has evolved from a mere byproduct of doing business to a significant driver of real-time decision-making and wealth accumulation in today's global economy.

Various definitions of essence and characteristics are found in the scientific literature concerning the information economy. The differences arise from the authors' understanding of the subject of this area. In 1962, Machlup first introduced the concept of measuring the production and dissemination of knowledge, coining the term “knowledge economy”. He later developed the theory of knowledge economy among other authors (Machlup 2014; Bermeo Giraldo, Patino Toro, Valencia Arias, Benjumea Arias, & Bran Piedrahita 2022; Kuleshov, Untura, &

Markova 2017; Liyanage & Netswera 2022). They added the commercialization and use of knowledge (both scientific and technological) and information for achieving sustainable economic growth and productivity through investment in human capital, technological resources and innovation. Other authors correlate the concept of the information economy with the so-called new economy (Dźwigoł 2019), electronic economy (Zysman & Weber 2001), network economy (Amosha, Pidorycheva & Zemliankin 2021), digital economy (Su, Dong, Su, & He 2023; Xia, Lv, Wang & Ding 2023), Industry 4.0 (Zizic, Mladineo, Gjeldum & Celent 2022; Nair, Kumar & Sreenath 2021; Oztemel & Gursev 2020, among others). According to them, economic activities arise from the connection of individuals, businesses, devices, data and operations through digital technologies. These connections include the online connections and transactions taking place in economic sectors and technologies such as Internet and mobile technologies, big data, information and communication technologies, cyber-physical systems, bionics, and artificial intelligence.

The modern concept of the information economy is considered in the works of Porat (1977), Castells (1996), Sukhodolov, Popkova & Litvinova (2018); Anie, Budak, & Kajh (2016), Fırat, Karaçor & Özkan (2017), Vassilev (2015), Trushkina (2019) and others, unites the essences of the above concepts into one. The concept uses transformative technologies for production, processing, and data storage and, at the same time, transfers information, knowledge, and innovation. In summary, we can assume that the concept of the information economy includes an economic system in which dominant activities for the formation of the predominant part of the gross domestic product are intellectual and innovative ones, and digital technologies are used for the production, processing, storage and distribution of information and information products. In today's society, the extraction of new knowledge and innovation are becoming critical competitive advantages that create the highest value and digital technologies and data flow become the "connective tissue" of the global economy (McKinsey Global Institute 2019).

We can point out the main elements as well as basic characteristics of the information economy based on the previous literature that was reviewed. The elements are:

– Information – it has become a primary resource collected, processed and analysed to create value. Moreover, information becomes an engine for making informed decisions and optimising business processes.

– Knowledge and innovation – they are not just additional factors, but the very foundation for the development of the information economy. New technologies, methods and processes driven by knowledge and innovation improve the efficiency and productivity of economic entities, as well as help to solve socio-economic problems.

– Digitization and automation – these are not just processes, but transformative forces that are reshaping social industries and enabling all kinds of flows. New digital and logistics technologies, digital platforms, automated processes, data processing progress caused by artificial intelligence improvement, increased informatization and knowledge extraction are transformed into a catalyst for business process innovation. They also provide new opportunities for growth and development and decreased costs, including for cross-border transactions.

The information economy has the following characteristics: it is global, virtual and networked in nature, as it uses the World Wide Web and technologies that allow the exchange of information between different users in real time in different parts of the world without requiring physical presence. Standardized and new information are equal, and innovation and creativity are enhanced by adequate intellectual property protection. The information economy is also distinguished by a high degree of dynamism, which allows rapid adaptation to technological changes and the market and high efficiency.

Global market – global market model

In the 21st century, many processes impact trade relations, but two stand out with particular force. On the one hand, this is the process of globalization that allows for the achievement of universal accessibility. On the other hand, the information economy provokes the creation of new models for the realization of the classic commercial relations between the interested entities. In its essence, globalization is a comprehensive process that dates back to ancient times when there were commercial and cultural relations between people from distant geographical locations, which emerged as international trade relations throughout thousands of years of human history. In the 21st century, digitization covers all spheres of modern life, which provokes the emergence of the so-called information economy, within which information is established as a critical resource in economic life.

The analysis presented focuses on market innovations and transformations. How digitalization accelerates the process of globalization, which is the crucial factor provoking the emergence and establishment of the phenomenon of a global market, as shown in figure 1.

The globalization process has been unfolding over millennia of human history, passing through various stages and reaching ubiquitous connectivity based on the technological boom of the 21st century. The symbiosis between global connectivity and technological innovation forms the so-called information economy, which is the foundation of the global market system. Historically, globalization provides connectivity between individual entities in market relations, and digitalization optimizes connectivity processes by providing opportunities for the movement

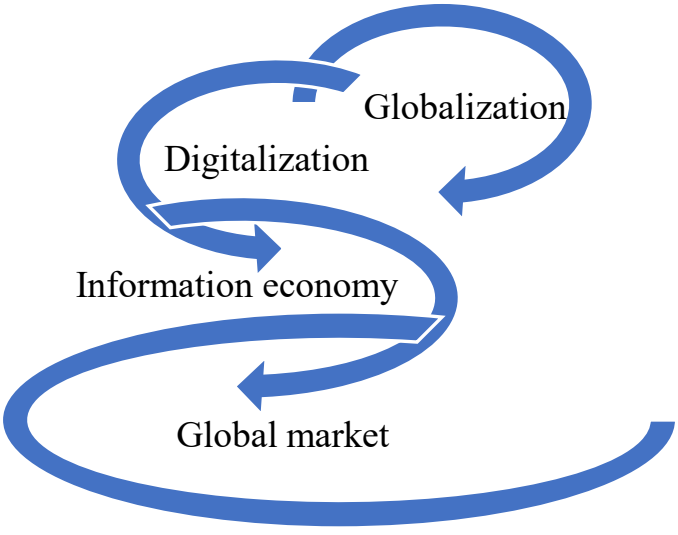

Figure 1. Connection and interaction between globalization, digitalization, information economy and global market

Source: Own representation

of people, goods, capital and innovation across national borders. The symbiosis between global connectivity and technological innovation has allowed modern economic relations to be realized through the prism of the information economy, which creates new market mechanisms to realize global commercial relations in the global market system.

The combination of ubiquitous global connectivity and the information economy catalyses a systemic collection of market centres that are digitally bound into the global market system. The world market (global) is the gathering centre of modern global trade relations that connect counterparties from different geographical locations at optimized transaction costs. The global market can be defined as a system that allows commercial, financial and labour exchange between countries without restrictions. Today, economies are so interconnected that anything that happens in one country can affect another, and no one is economically isolated (FiveAble library[1]). In its nature, the global market can be represented as an interconnected set of market environments that interact with each other and their surroundings. Features of the global market system can be summarized into several key directions – movement of assets across national and community (meaning the European Union) borders, movement of capitals, optimization of production and trade processes, rapid access to innovations, unlimited consumer potential, as shown in figure 2:

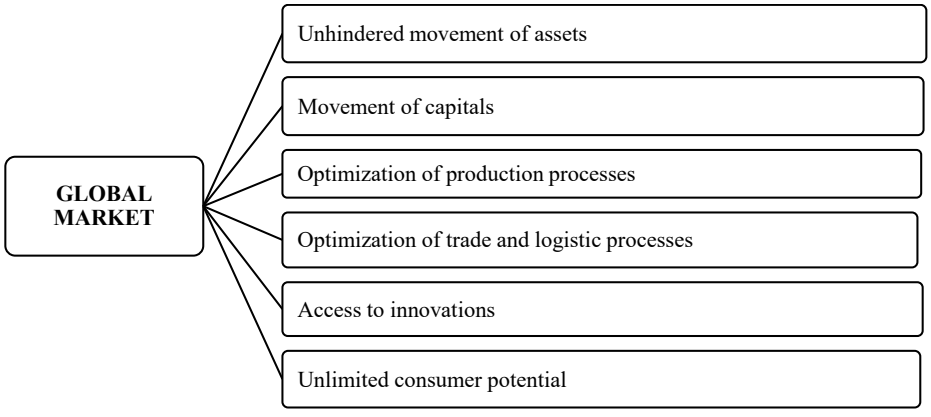

Figure 2. Key characteristics of the global market

Source: Own representation

– Unhindered movement of assets – the global market system facilitates the free movement of assets across national and community borders, largely due to the role of global regulations in depreciating barrier restrictions. These regulations streamline the asset movement process, mediating the global transfer of assets.

– Movement of capital – within the global market system, money flows freely across national and community borders, enabling modern businesses to invest globally in projects and companies around the world.

– Optimizing production processes – the information economy empowers modern companies to distribute production processes across different locations, leading to cost optimization and increased efficiency.

– Optimizing trade and logistics chains – global connectivity and technological innovation enable the optimization of trade and logistics costs for all participants.

– Access to innovation – within the information economy, access to innovation and modern technological solutions is relatively easy and cheaper, thanks to the optimization of transfer costs and unlimited accessibility.

– Unlimited consumer potential – the global market system, which unites most market centres, practically provides unlimited market potential because all markets are accessible to all consumers and suppliers, which guarantees optimal conditions of commercial negotiation.

– Globalized production chains – different stages of production for a single product can occur in different countries, optimizing efficiency and costs.

The global market as an information hub

Trade is a classic human activity that accompanies the evolutionary development of humanity. Like any other field, it also goes through various evolutionary stages

of development. The hypothesis that presents the global market as an information hub allows world trade relations to be considered through the lens of information as a strategic resource catalysing precisely in the international market system. This system features the following key features:

– Access to information resources – modern online platforms generate massive information arrays through which contemporary managers base their decisions and optimize the management process. These arrays form databases to analyse information on trends, consumer expectations and attitudes, corporate practices, market strategies, etc.

– Research on consumer habits - the global market system allows the generation of huge databases that provide reliable information about consumer demands and expectations in different regions.

– Innovation and competition – they are not just byproducts of the global market system but its driving forces. By concentrating worldwide supply and demand, the system accelerates competition between market entities, sparking global innovations that become powerful tools in the fight against international competition.

The systemic nature of the global market allows modern business/market entities to analyse generated market information using artificial intelligence and big data. In this way, they can bring out the leading trends in a specific sector and market, which optimizes the process of making strategic management decisions. The global market not only facilitates trade but also forms a new ecosystem where information and data play a vital role in the success of businesses. These dynamics create new opportunities and challenges that companies must take into account.

Prospects for the development of the global knowledge-based economy

Globalization, digitalization, and informatization allow the highlighting of primary challenges and perspectives (Amosha, Pidorycheva & Zemliankin 2021; NIC 2021) before the development of the modern world economy. Challenges facing the world economy are related to demography and human development, environment, economy and technology:

– Geopolitical instability – the conflicts between the major economic powers, the USA, China, Russia, and the EU, have serious consequences on the world economy, manifested through trade wars, sanctions and interruptions in global supply chains. It leads to an increase in uncertainty, a slowdown in economic growth, and pressure on migration processes.

– Climate change and sustainable development – the growing impact of climate change calls for a transition to more sustainable economic development models to mitigate the uncertainty of planetary resources. It includes reducing dependence on fossil fuels and innovating in the energy sector. However, the transformation is expensive and complex, especially for developing countries that often rely on traditional energy sources.

– Fragmentation of communities, states and the global system by national, cultural or political preferences. Despite the hyper-connected information environment, communities that differ in their values and culture can use digital repression for population control.

– Demographics and human development – relate to the observed trend of an ageing world population, with difficulties in maintaining and building on progress in education and health care.

– Technological changes and automation – the advent of new technologies such as artificial intelligence, automation, and robotics is reshaping the labour market. As Stoycheva and Vitliemov (2024) argue "the use of AI leads to changes in the requirements for occupying certain professions". While some jobs are becoming obsolete, new opportunities are emerging. However, this necessitates the retraining of the workforce, highlighting the importance of adaptability in the face of technological change and the potential for increased social inequality.

– Global Pandemic and Health Crises – the COVID-19 pandemic has shown how vulnerable the global economy can be to unexpected events. The economic consequences of the shutdown of entire sectors, disruptions in supply chains and the increase in government debt are challenges that will continue to be felt for a long time.

– Rising debt, financial crises, fragmented trading environment – the escalation of global public and private debt, particularly in the context of the mounting costs of dealing with the pandemic and its economic aftermath, is a cause for concern. This trend not only heightens the risk of new financial crises but also constrains the scope for future economic stimulus, underscoring the need for prudent financial management.

We can point out some prospects for the future of the world economy in the following areas:

– Diversifying economic connectivity, global partnerships, and collaborations by introducing some trade restrictions by governments on critical raw materials, use of digital e-commerce platforms, public-private partnerships and data sharing. All these tools will likely transform global value chains and the extent of international trade and stimulate economic growth.

– Digital transformation and technological innovation – cloud computing, digital e-commerce platforms, big data, financial technology (FinTech), and digital services are changing how business is done and expanding commerce. Platformization will allow small and medium-sized enterprises to compete with large corporations.

– Artificial Intelligence (AI) and Automation – AI is becoming a leading industry-transforming system, improving efficiency and creating new jobs. At the same time, they will require retraining of the workforce and adaptation to new realities. As Biolcheva and Sterev (2024) argue "the AI revolution is about to begin".

– Green economy and sustainable development – the transition to a green economy represents a challenge and an excellent opportunity for economic growth. Investments in green technologies, renewable energy sources and sustainable

practices can create new jobs and economic prosperity. Innovations that reduce the carbon footprint and protect the environment will be prioritized.

– Innovations in education – a convergence between scientific discoveries and the application of technologies, helping to personalize user needs, is expected. Digital platforms provide new opportunities for education and training and the diffusion of innovation.

– Security, privacy and ethics – new technologies require ever-increasing volumes of data to extract important insights and accumulate data. This underscores the importance of the ethical use of data, which is a responsibility shared by all stakeholders. Governments must create new regulations to regulate the use and control of data, and it's our collective responsibility to ensure ethical data practices.

Conclusion

The development of the information economy in the 20th and 21st centuries made economists and politicians begin to recognize the growing role of information and knowledge as critical drivers of economic growth, leading to a redefinition of socioeconomic relations. It changes the paradigm of society, leading to a transition from an industrial economy to an economy in which information is an essential source of value. Companies are beginning to see the value of collecting, analysing and selling data. The global, virtual and networked nature of the information economy enables the exchange of information between different actors. With the development of the World Wide Web, cloud technology, digital payments, social media and artificial intelligence, the global market has become increasingly connected and integrated. The rise of the Internet and new technologies has significantly further accelerated this trend, enabling the global exchange of information, facilitating international trade and communication, creating new business models based on data and offering new opportunities for consumers. The systemic aggregate of markets in the 21st century fully fulfils the role of an intelligent information hub, balancing the information flow and behaviour of the global market and non-market entities. Market innovations, transformations, and digitization accelerate globalization processes.

The digital character of the global market is primarily defined by its technological infrastructure. Understanding the role of this infrastructure is crucial for effective management and participation in the digital global economy. This digitally based global market is a potent tool for economic and social development, offering numerous benefits. However, it also presents new challenges in areas such as human development, education, economic processes, environment, technology, and security. To address these risks and maximize the benefits of the digital global economy, it is essential for all stakeholders to collaborate and make coordinated efforts. Therefore, understanding the nature and characteristics of this market mechanism is key to successfully navigating the global economy of the 21st century.

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ACADEMIC ENTREPRENEURSHIP: PRACTICAL RESULTS AND TRAINING

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Abstract. Economic theory once again addresses the role of the entrepreneur. The differences observe see rooted in on evolving changing role of universities and anticipated expected transition to Industry 5.0. Focusing on the role of the "entrepreneur" and the process of entrepreneurship with / within the university/ academia support we could find stages of understanding the common "academic entrepreneurship".

Thus, the focus of this paper is on successful "produced" entrepreneurship, specifically entrepreneurial businesses, mindsets, and behaviors at universities. In light of social and economic trends, the main hypothesis is that technological changes necessitate a new approach to academic entrepreneurship and entrepreneurial systems. However, universities are not fully adapted to these changes, particularly in developing countries such as Bulgaria.

Accordingly, the paper focuses on entrepreneurial skills and their training at universities. The primary aim of the paper is to explore how to adapt conventional economic training to foster an academic entrepreneurial mindset. Utilizing the methodology outlined in the European Entrepreneurial Framework, the author presents results from a study conducted before and after training in on developing an entrepreneurial mindset.

The paper is structured as follows: The first paragraph analyzes the evolving role of universities in fostering business-academic collaboration. The second paragraph presents essential entrepreneurial knowledge that is relevant in today's world. The third paragraph discusses the results of contemporary entrepreneurial education at UNWE-Sofia. Finally, several recommendations are provided for organizing virtual co-creation and co-working clubs for academic entrepreneurs.

Keywords: Academic entrepreneurship; entrepreneurship profile; entrepreneurial potential

JEL: I21, L26, M53

Introduction

With the evocative title "The Challenge – More Entrepreneurs in Europe," the action plan "ENTREPRENEURSHIP 2020" aims to revive the entrepreneurial

spirit in Europe. Its central goal is to conduct a comprehensive study and definition of entrepreneurship as a powerful catalyst for economic growth and job creation. This initiative seeks to open new markets, generate new businesses and jobs, and foster the development of new competencies, skills, and abilities.

From a scientific perspective, discussions on various entrepreneurship-related topics frequently take place, including business continuity, entrepreneurship education, the development of an entrepreneurial culture, and the promotion and expansion of entrepreneurial activities. It is crucial to expand the focus beyond the factors that foster the growth of entrepreneurship. This entails encouraging increased interaction and collaboration across different policy sectors, stimulating entrepreneurial activity, and exploring innovative approaches to assess entrepreneurial potential.

Yordanov (2020, p. 39) emphasizes the decline in the percentage of individuals opting for self-employment as a key issue, as noted by the European Commission. This conclusion is drawn from an analysis of sources of statistical data and comparing the outcomes with other nations (outside the EU) as, since 2004, the proportion of people who prefer self-employment to being employed by another employer has decreased in 23 of the 27 EU Member States according to the European Commission (2012). Five years ago, forty-five percent of Europeans said that working for themselves was their ideal option; now, that number is down to 37 percent. In contrast, this ratio is far greater in the USA and China, at 51 and 56 percent, respectively.

A new strategy, along with various initiatives to be implemented at both the EU and Member State levels, is part of the proposed plan to foster entrepreneurship in Europe. The primary objective is to prioritize small enterprises within national and European policies. The strategy targets specific demographics and focuses on three main areas: enhancing entrepreneurial education and training, promoting a business-friendly environment, and highlighting successful case studies. To support these goals, a team of researchers developed a toolbox, a portion of which is presented in this article, for assessing entrepreneurial potential.

1. Entrepreneurial qualities and entrepreneurial skills

Numerous competencies and abilities are essential for entrepreneurial activity, and various scholars have classified these skills in different ways. Entrepreneurial skills refer to the technical knowledge required to start and manage a business, while entrepreneurial competencies encompass the personal traits, attitudes, and behaviors that contribute to entrepreneurial success. The term “entrepreneurial competencies” describes a set of fundamental motives, attributes, and qualities that enable individuals to engage successfully in entrepreneurial endeavors. In contrast, the knowledge and practical skills that individuals must acquire and apply to thrive as entrepreneurs are known as entrepreneurial talents.

Some academics (Gartner 1988; Baron 2004; Timmons 1985) argue that when evaluating an individual's potential to become a successful entrepreneur, entrepreneurial competencies are more important than entrepreneurial skills. Generally, these scholars emphasize the importance of social, psychological, and cognitive abilities for entrepreneurial success, even asserting that these traits are more critical than technical skills.

Another group of academics, however, argue that success in entrepreneurship requires both competencies and skills. They suggest that developing both competencies and skills through experience can be an effective strategy for achieving business success. Accordingly, they assert that there is no significant difference in the positive relationship between these two types of skills and competencies and entrepreneurial objectives. According to Karen (2013), focusing solely on competencies may be limiting, and both skills and competencies are essential for entrepreneurship education and training.

The importance of entrepreneurial competencies and skills remains significant, but understanding what these competencies are is equally crucial. Various scholars have identified different lists of essential entrepreneurial talents. For instance, Dana and Musteen (2013) define key competencies as resilience, networking, innovation, risk-taking, and opportunity recognition. Venkatesh and Agarwal (2017) particularly emphasize the skills of female entrepreneurs, highlighting the importance of resourcefulness, networking, and self-efficacy. Sánchez and Rodríguez (2017) underscore the significance of strategic thinking, vision, and leadership for the performance of small businesses. Additionally, Ejigu and Alemu (2020) recognize core competencies such as problem-solving, adaptability, and marketing skills as critical growth factors for micro and small enterprises. Covin and Slevin (1989) attribute the success of small businesses to entrepreneurial competencies such as risk-taking and strategic thinking. Additionally, Baron (2004) highlights the cognitive and behavioral competencies essential for entrepreneurial success, including creativity, opportunity recognition, networking, persistence, adaptability, and the ability to learn from failure.

Regardless of the methods discussed above, most works also base their concept of entrepreneurship on Peter Drucker's writings (Drucker 1985). Drucker emphasizes that entrepreneurship involves more than merely starting a business; it also encompasses the creation of something new and the contribution to society. He identifies several entrepreneurial qualities that are essential for success, asserting that these skills can be developed and are vital for entrepreneurs. These competencies include the ability to recognize opportunities, take calculated risks, manage resources effectively, and innovate.

In 2016, as part of the New Skills for Europe program, the European Commission (EC) launched the **EntreComp** /Entrepreneurial Competence

Framework, in alignment with European policy. This framework serves as a valuable resource for empowering companies and individuals in Europe to enhance their entrepreneurial skills.

This framework identifies entrepreneurial abilities across three groups, with each one encompassing five distinct entrepreneurial talents:

– ***Ideas and Opportunities***, creativity and vision, and ensuring that thinking is ethical and sustainable.

– ***Resources***: financial and economic literacy; the ability to mobilize others; motivation and perseverance; self-awareness and self-efficacy; and the mobilization of resources.

– ***To Action***: exercising initiative, Volunteering, organizing and managing, handling risk, uncertainty, and ambiguity, collaborating with others, and gaining experience through hands-on learning.

2. Training towards the entrepreneurial skills

As the approach to entrepreneurship differ, the training of academics towards entrepreneurial skills could be different as well. Thus, according to Burns and Dewhurst (1989), Lambing and Kuehl (2003) and others, the following five concepts must be implemented in the academic entrepreneurial training:

– Because the training is time-focused, the entrepreneurial content that is given to the learners needs to provide results right away.

– The trainees must find the entrepreneurial information offered to be useful and relevant in real-world situations.

– The entrepreneurship training must be presented in an interesting way to the learners.

– The training atmosphere should be friendly in order to make all of the trainees feel at ease and prepared to participate fully.

– The trainees must have the chance to discuss their experiences, and the entrepreneurship training must be delivered in a courteous manner.

Additionally, the training content has to build up appropriate entrepreneurial mindset. Based on research of Hansen et al. (2022), Tam, Asamoah, and Chan (2021), Sterev et al. (2021) several topics are identified:

– Understanding business: covers topics related to business economics: enterprise and enterprise establishment; business processes and resources; products and production;

– Understanding themselves: entrepreneurship and risk taking; entrepreneurial risk management; motivation and leadership of people and entrepreneurs;

– Understanding innovation: innovation and added value; sharing and problem solving; intellectual property rights.

As a result, during the training phase, it is essential to consider important factors such as the audience's learning needs, abilities, and existing knowledge, along with

the objectives and expected outcomes. Before the training session, it is crucial to identify the students' expectations and the training objectives. The information and skills acquired must be relevant and effectively address the gaps in the academic audience's prior knowledge.

Defining academic entrepreneurial training goals sets the ultimate goal of learning. In addition, a different level of interaction between trainees and trainers is defined, with participants recognizing the benefits of learning from the outset and being able to focus on the results. Main recommendation is: be SMART:

– **S**pecific – The training goal should be specific according to the target audience;

– **M**easurable – The target of the training should be measurable;

– **A**ccepted by you and / or others – The training goal should be accepted by the people who will work on it;

– **R**ealistic – The training goal should be achievable;

– **T**ime-bound – The training target should have a time frame, i.e. with some deadline.

Following, the training curriculum aims to provide systematic information about the business and its establishment (entrepreneurship). The training's objective is to enhance students' understanding of the enterprise and entrepreneurship as an integrated system, complete with a specific structure, functions, and utilized resources, as well as how these resources are transformed into final goods and services with respective added value. The training, based on the SMART approach, offers insights into the various methods by which an organization transfers technology, know-how, resources, and expertise from the external environment into the organization.

Additionally, students examine the fundamental economic choices made throughout a business's and entrepreneurial life cycle. Evaluating the business's value and operational efficiency deepens students' understanding of the relationship between these outcomes.

3. Methodology and data analysis

It is challenging to ensure that each member of the trainees receives the appropriate level of entrepreneurial material during the training, as noted by Cooney (2012) and Moran and Cooney (2004). A tailored approach is essential for each academic entrepreneur. Therefore, in line with Kutzhanova et al. (2009), it is important to assess each student's entrepreneurial abilities to better customize their training to meet individual needs and to continuously monitor any changes in their entrepreneurial skills.

The entrepreneurial training outcomes are found in the next 3 steps according to Sterev (2023):

Round 1: A study on the entrepreneurial mindset, based on the methodology of Bacigalupo et al. (2016), was conducted among first-semester students at UNWE

during the first week of their economics training. All results are derived from the students' self-assessment of their knowledge and skills, reflecting their personal understanding of their own capabilities.

Round 2: The training program of "Business economics" is tailored to align with the personal business and entrepreneurial aspirations of the students. This program consists of 60 hours of instruction, including lectures, discussions, and role-playing activities that emphasize both theoretical and practical knowledge. It encompasses all three thematic areas and addresses 15 specific entrepreneurial skill sets.

Round 3: A study on entrepreneurial attitudes was conducted during the last week of the semester, utilizing the same questionnaire used in the Business Economics course.

Two primary hypothesis have been verified:

– *Hypothesis 1* posits that there is a significant difference in the average levels of entrepreneurial intention before and after receiving entrepreneurial training.

– *Hypothesis 2* suggests that certain entrepreneurial talents are more or less evident to students than others.

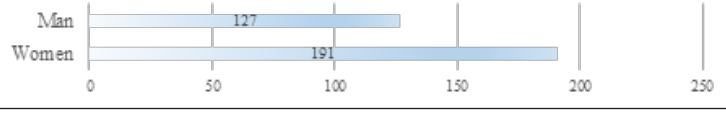
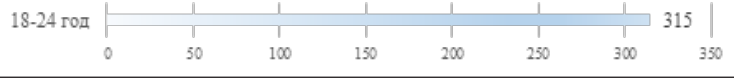
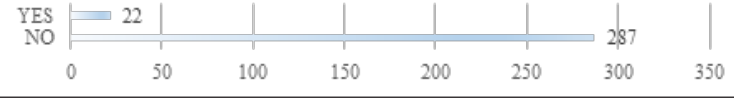
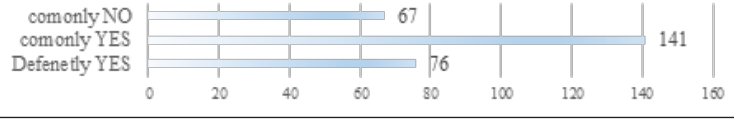
The results could be summarized as follows.

– the trainees fulfill one and the same questionnaire based on the EntreComp methodology (Bacigalupo et al. 2016) before and after the training.

– 238 students taken part of the business economics academic training program (60 academic hours during 2023/2023 academic year at UNWE-Sofia), 81 of them successfully graduated fulfill the after training test.

– The main demographic characteristics are given on Table 1.

Table 1. Characteristics of students group

1. Gender	
2. Age	
3. Business role	
4. Intention to start business	

The data indicates that there is no complete gender parity within the group, which consists of first-year students aged 18 to 24. In terms of business experience, 93% of the students lack any, while 7% have prior business experience. Notably, none of the students were managing a business at the time of the study. Regarding their intentions to start a business, 25% of respondents indicated that they plan to do so within the next four years. However, an entrepreneurial career is a viable option for an additional 46% of the students.

According the Round 1 research we built the entrepreneurial profile by the 15th entrepreneurial skills (Figure 1).

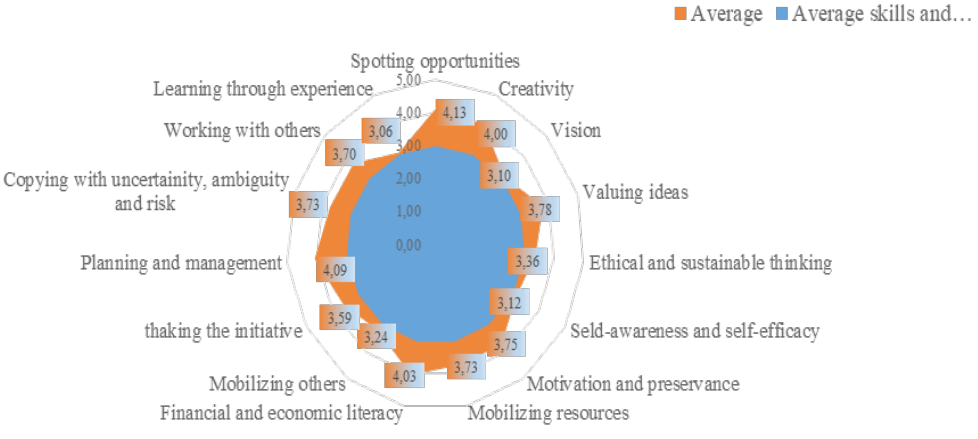


Figure 1. Entrepreneurial skills

According to the figures (Figure 1) we could found 3 groups of entrepreneurial skills:

– Important skills:

– Spotting opportunity; planning and management; financial and economic literacy; and Creativity;

– Valuing ideas; motivation and perseverance; mobilizing resources; copying with uncertainty; working with others.

– Unimportant skills:

– Visions; self-awareness; mobilizing others; and learning through experience.

Comparing the results with previous research on entrepreneurial competencies in business (Sterev et al. 2021; Sterev 2023), we found a very similar profile of students that differs from the actual entrepreneurial profile. Thus, we can confirm *Hypothesis 2*.

According the Round 2 research we built the entrepreneurial profile by the 15th entrepreneurial skills before and after the Business economics study (Figure 2)

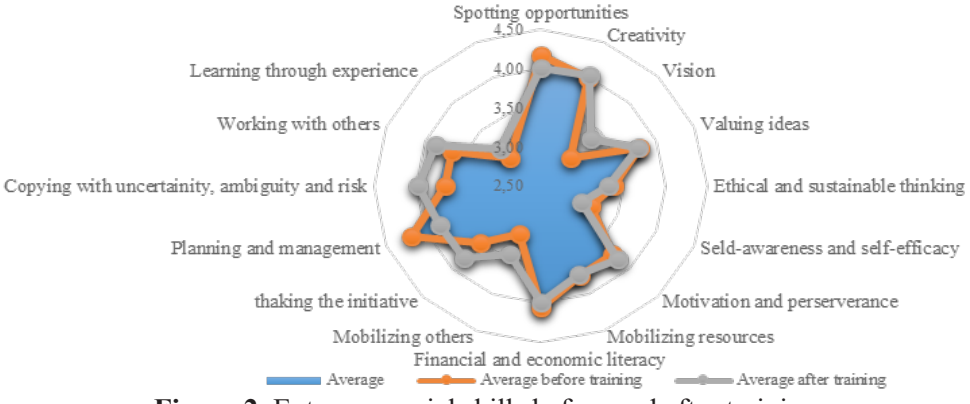


Figure 2. Entrepreneurial skills before and after training

The figures show that the students have bettering their entrepreneurial skills in five very important for entrepreneurial success fields:

– visions; learning through experience; copying with uncertainty; valuing ideas; working with others; and taking the initiative.

On the other hand, they reduce their importance of entrepreneurial skills in three areas:

– planning and management; spotting opportunities; and self-awareness.

So we **CONFIRM** *Hypothesis 1.*

In conclusion, the study of business economics illustrates that it transforms the "entrepreneurial game" by fostering traits in trainees that make them more driven, innovative, and proactive. These qualities are beneficial for reducing risk and enhancing the number of successful academic entrepreneurial stories.

Conclusions

We agree with Huffman and Quigley (2002), who found that universities play a crucial role in both nurturing entrepreneurial potentials in the region and attracting human capital to the area. This is a result of a highly concentrated human capital base that enhances the relationship between local businesses and educational institutions. A significant challenge in traditional training is achieving a balance between personalized coaching and group support in academic entrepreneurial programs.

Following Kirova and Yordanova (2024) and Vutsova at al. (2023) acquisition of Industry 5.0 entrepreneurial skills. the business training at the universities must be related to However, advancements in digital technology enable us to provide tailored training that integrates group collaboration within entrepreneurial business networks while addressing individual needs.

The argument for the entrepreneurial qualities of creativity, leadership, and innovation is supported by management experts, globalization literature, and the

application of private sector management practices to the often resistant public sector (Adcroft, Willis, & Dhaliwal, 2004). However, as long as the conflict between promotion and recognition of entrepreneurial training and entrepreneurial skills continues, doubts regarding the academic entrepreneurial supply fueling an unrealistic and insatiable demand in both the public and private sectors will remain.

On that basics, the results of the Business economics show that the study has provided a comprehensive understanding of the entrepreneurial company as a vital structural and economic component of the national economy. Therefore, entrepreneurial training's success enhances students' comprehension of the enterprise as a main entrepreneurial system, characterized by a specific structure, functions, and resources. So, the Business economics study, based on the next (Table 2) elements, offers insights into the various technology development, know-how acquisition, effective resource management, and leadership and motivation of the entrepreneur.

Table 2. Characteristics of Business economics study

Entrepreneurial skills	Entrepreneurial knowledge	Training socialization
– **Spotting opportunity** and **mobilizing resources:** To generate and select ideas for starting a new business using all available sources of information and methods (mostly brainstorming and expert evaluations) **– Valuing ideas** and **creativity:** To apply market analysis techniques to evaluate a business idea **– Planning and management**: To define appropriate business model **– Working with others** and **mobilizing others**: To build a winning team **– Financial and economic literacy:** To set price policies and analyse the financial results; and to analyse state of art and to select decisions in the field of marketing, production, management and especially in performing financial calculations (financing of business, discounting of cash flows, analysis of risk and results)	**–** To comprehend the nature of business economics and the process of its establishment. **–** To evaluate the technological innovation needs **–** To identify the primary initiatives and resources that promote technology transfer and innovation for business success. **–** To comprehend corporate management approaches and strategies for entrepreneurial success. **–** Recognize the key elements of production process and copying with human resource management. **–** To describe market forces. Possess a thorough understanding of pricing policies, budgetary regulations, income forecasting, financial resource leveraging, and planning. **– T**o project the costs associated with launching a new company, from choosing the best concept.	**–** Working with **tutors** to design an effective financial framework that integrates public grants, venture capital, and risk capital. **–** Working within **training teams** to establish practical methods and tools for human resource management. **– Individual working** and group discussion to increase **self-awareness** and **learning through experience** for strategic business decisions, business networking, and marketing development.

In conclusion, developing entrepreneurial skills is not solely dependent on entrepreneurial courses or business economics studies (Minchev,Hristova, Stoyanov, 2023). It is a long-term, lifelong process that identifies the key areas of entrepreneurial skills and knowledge. However, academic entrepreneurial success relies not only on individual and group training but also on effective networking among the trainees.

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ЗА АВТОРИТЕ

Настоящите Указания са разработени в съответствие с желанието на списанието да представя в максимална степен публикуваните текстове в международни наукометрични бази. Указанията са подготвени в съответствие със стандарт БДС *INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO). ISO 690: 2021(E), Information and documentation — Guidelines for bibliographic references and citations to information resources*

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Списание *Стратегии на образователната и научната политика (Strategies for Policy in Science and Education-Strategii na Obrazovatelnata i Nauchnata Politika)* разглежда само ръкописи, които са насочени единствено към него.

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Задължително се посочват име на автор, година на издаване, заглавие на статия, име на списание (наклонен шрифт), годишен том (удебелен шрифт), номер на брой (в скоби), страници (по номера, разделени с дълго тире), а така също ISSN, ако списанието има такъв.

ZLATEVA, A., 2019. Reflecting the Level of Social Adaptation in the Drawings of Children Aged 6 – 7. *Pedagogika-Pedagogy*, vol. 91, no. 5, pp. 687-695. ISSN 1314-8540.

Такъв източник се цитира в основния текст като (Zlateva 2019). Ако има нужда да се посочи и конкретна страница (напр. стр. 689), тя се посочва по следния начин: (Zlateva 2019, p. 689).

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Ако източникът е на български език, но е представен във вторичен литературен източник, например в Web of Science, източникът трябва да се появи в списъка на литературата по следния начин:

STOYANOV, V., 2021. Live through of the students in the conditions of pandemic of Covid-19. *Strategies for Policy in Science and Education-Strategii na Obrazovatelnata i Nauchnata Politika*, vol. 29, no. 2, pp. 154 – 171 [In Bulgarian]. DOI: 10.53656/str2021-2-3-pan.

Когато авторите на дадена статия са повече от трима, допустимо е в списъка с източниците авторският състав да бъде описан в съкратен вариант с използване на съкр. et al., както следва:

NICHOLS, P.; TWING, J.; MUELLER, C.D. & O'MALLEY, K., 2010. Standard-setting methods as measurement processes. *Educational Measurement: Issues & Practice*, vol. 29, no. 1, pp. 14-24. ISSN 1714-5541.

или като:

NICHOLS, P., et al., 2010. Standard-setting methods as measurement processes. *Educational Measurement: Issues & Practice*, vol. 29, no. 1, pp. 14-24. ISSN 1714-5541.

Такъв източник се посочва в основния текст като (Nichols, Twing, Mueller & O'Malley 2010) или като (Nichols et al. 2010) – в зависимост от начина на записване в списъка с цитирана литература.

Книги

При книгите, за разлика от статиите на списанията, с наклонен шрифт се пише заглавието на книгата. Авторът на ръкописа посочва също името на града, на издателя на книгата и ISBN, ако книгата има такъв.

ATKIN, J.M.; BLACK, P. & COFFEY, J., 2001. *Classroom assessment and the national science education standards*. Washington: National Academies Press. ISBN 978-0-17-966137-9.

Книгите, които в оригинал са публикувани на кирилица, се представят по следния начин:

ЛИТЕРАТУРА

КАНТ, И., 1992. *Критика на чистия разум*. София: БАН. ISBN 978-0-11-966139-2.

REFERENCES

KANT, I., 1992. *Kritika na chistiya razum*. Sofia: BAN [in Bulgarian]. ISBN 978-0-11-966139-2.

Такъв източник се цитира в основния текст като (Kant 1992).

Когато авторът е неизвестен, то описанието се извършва по следния начин:

ANONYMOUS, 2021. *Kritika na porochnata praktika*. Plovdiv: PAN [in Bulgarian]. ISBN 978-7-13-366333-3.

Книги/сборници с редактор

Както е посочено в примера по-долу, само заглавието на цитираната книга/сборник се дава с наклонен шрифт, след което се посочват цитираните страници.

CARMAN, T., 2005. On the Inescapability of Phenomenology. In: D.W. SMITH & A. L. THOMASSON (Eds.). *Phenomenology and Philosophy of Mind*, pp. 67-89. Oxford: Clarendon Press. ISBN 978-0-19-966135-0. Available from: EBSCOhost. [paywall].

ДОНЕВ, Г., 2004. Феноменологична десубстанциализация на мисленето. В: КАНАВРОВ, В. & ДОНЕВ, Г. (ред). *Кант и диалогът на традициите*, с. 51-60. Благоевград: Неофит Рилски. ISBN 978-0-19-966175-2.

В рубриката „Използвана литература" (references) може да се посочват документи със статус на ръкопис. Например дисертацията се описва по следния начин:

ДОДОВ, Иван. *Автоматизация на процесите на настройка на станциите при ремонт*. Дисертация. Кардам: Виртуален институт, 2016. Available from:

https://www.kardam.com/daily-news/2016/12/11/ 1576104511. [Viewed 2019-3-11].

Коректури

(12) Преди отпечатване на одобрените ръкописи авторите получават коректури на своите статии, които трябва да върнат в редакцията в срок от една седмица. На този етап от подготовката на ръкописа не се допускат значими промени в текста.

Отпечатъци

(13) Публикуването се обявява на авторите с писмо, което съдържа .**pdf** файл на статията. Правата върху публикувания текст са собственост на списанието. Полученият .pdf файл не следва да се разпространява свободно, включително и чрез академични и социални мрежи за споделяне на резултати от научни изследвания (напр. ResearchGate.net и Academia.edu).

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(3) It is not recommended to specifically format the text itself with regard to tabs, bullets and other similar symbols. Tabs should be used for table layout only.

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(5) The abstract should indicate the research goal and methodology, and to outline the research novelty and results. The abstract should correspond to the title, keywords and main text of the study. Recommended abstract volume – 150 words.

(6) Figures (Illustrations) and their captions should be presented simultaneously with the text and also separately in a new file. If the volume of a figure is not suitable for inserting, its position should be indicated in the text clearly - Fig. 1, Fig. 2, etc.

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(8) Acknowledgments, cited archival sources and notes at the end of the text are written only in the language of the main text of the manuscript.

(9) The references should be cited in Roman script. If there are sources in Cyrillic script, they (authors, titles and sources) should be presented in Roman script – with translation or by transliteration. In such case, the original language is pointed at the end of reference in square brackets.

(10) The list of references should include sources that can be checked easily by the referees and by the readers as well. The marginal sources without broad visibility should not be included in the list of references. Nevertheless, if such sources are necessary to be cited, they should appear in the list of notes, together with additional explanations or marginal sources for which it is considered that their presence in the main text would burden it unnecessarily. The position of notes within the text should be marked by Arabic numerals as superscripts.

(11) The cited literature should be presented in the list of references in accordance with ISO 690-2021 (Harvard System).

Some examples:

Journal article:

The reference includes: author's name, year of publication, article's title, journal's name (in Italics), volume (in Bold), issue (in brackets), pages, journal ISSN (if any).

ZLATEVA, A., 2019. Reflecting the Level of Social Adaptation in the Drawings of Children Aged 6 – 7. *Pedagogika-Pedagogy*, vol. 91, no. 5, pp. 687-695. ISSN 1314-8540.

Such a source is cited in the text as: (Zlateva 2019). If it is necessary to indicate a specific page (e.g. p. 689), it is indicated as follows: (Zlateva 2019, p. 689).

Online periodicals article:

The article source (accessible web address or DOI) should be placed at the end of the cited source.

LASQUETY-REYES, J. A., 2019. Towards Computer Simulations of Virtue Ethics. *Open Philosophy* [online], vol. 2, no. 1, pp. 399-413. [viewed 15 April 2021]. DOI 10.1515/opphil-2019-0029.

Have in mind, that:

When the article is published in a journal, the journal's name is written in italics.

The journal Strategies for Policy in Science and Education is cited in English as *Strategies for Policy in Science and Education-Strategii na Obrazovatelnata Nauchnata Politika*;

When citing, it is necessary to indicate the annual volume and the issue of the journal.

PETRUNOV, G., 2019. Development of Anticorruption Education in Bulgarian Universities. *Strategies for Policy in Science and Education-Strategii na Obrazovatelnata i Nauchnata Politika*, vol. 27, no. 6, pp. 567 – 578. ISSN 1314–8575 (Online) [In Bulgarian].

When there are more than three authors, the usage of the abbreviation et al. is also acceptable, as follows:

NICHOLS, P.; TWING, J.; MUELLER, C.D. & O'MALLEY, K., 2010. Standard-setting methods as measurement processes. *Educational Measurement: Issues & Practice*, vol. 29, no. 1, pp. 14–24. ISSN 1714-5541.

or as:

NICHOLS, P., et al., 2010. Standard-setting methods as measurement processes. *Educational Measurement: Issues & Practice*, vol. 29, no. 1, pp. 14–24. ISSN 1714-5541.

Such source is cited in the text as: (Nichols, Twing, Mueller & O'Malley 2010), or as (Nichols et al. 2010) – depending on the way it is stated in the reference list.

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In books, the title of the book is written in italics. The author of the manuscript also mentions the city and the publisher of the book.

ATKIN, J.M.; BLACK, P. & COFFEY, J., 2001. *Classroom assessment and the national science education standards*. Washington: National Academies Press. ISBN 978-0-17-966137-9.

Edited Books

As shown in the example below, only the title of the cited book / collection is given in italics, after which are indicated the quoted pages.

CARMAN, T., 2005. On the Inescapability of Phenomenology. In: D.W. SMITH & A. L. THOMASSON (Eds.). *Phenomenology and Philosophy of Mind*, pp. 67–89. Oxford: Clarendon Press. ISBN 978-0-19-966135-0.

For all other cases not described in the guidelines, authors are required to consult the ISO 690-2021 and follow its instructions in citations.

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