

Development of leadership competences in bachelor's and master's students as a factor in the formation of intellectual capital of modern entrepreneurship in the context of digitalization *

Vasyl Martsenyuk^{1,†}, Liudmyla Golovkova^{2,†}, Halyna Nahorniak^{3,*†}, Oksana Garmatiuk^{3,†} and Yurii Dyshkant^{3,†}

¹ University of Bielsko-Biala, Willowa Str. 2, Bielsko-Biala 43-309, Poland

² Ukrainian State University of Science and Technology, Dnipro, Ukraine

³ Ternopil Ivan Puluj National Technical University, Ruska str., 56 46001 Ternopil, Ukraine

Abstract

The article is devoted to the problems of developing leadership competencies in bachelor's and master's students as a factor in the formation of intellectual capital of modern entrepreneurship in the context of the formation of a digital society. The study highlights the need to create effective mechanisms to ensure the formation, development and use of leadership competencies in undergraduate and graduate students in the context of digital transformations, as a basis for increasing the competitiveness of entrepreneurship in countries. This determines the need and relevance of further scientific research in the field of developing conceptual theoretical and methodological approaches and practical recommendations that allow you to effectively form and build intellectual capital in the context of complex digital transformations. In the context of the formation of the digital economy, the traditional understanding of the main factors of enterprise competitiveness that stimulate the growth of business value based on maximizing its own profits has been replaced by other theories in which institutions, knowledge, management of leadership competencies, trust systems, corporate culture, intellectual and human capital play a significant role. Changes that occur in the economy and are associated with the development and implementation of digital technologies significantly affect the already formed business models. New materials, augmented reality, additive technologies, unmanned vehicles, advanced robotics, cloud computing and data storage, biometric and implanted technologies, big data and machine learning, a huge range of financial technologies and much more - all these phenomena effectively use information technology. The research methods are historical and empirical methods, the method of scientific abstraction, methods of analysis and synthesis, the method of system analysis. Scientific novelty consists in the development of a comprehensive approach to the development of leadership competencies in bachelor's and master's students by introducing modern digital processes in the educational process of universities; implementation of educational programs related to the formation of basic and specialized entrepreneurial competencies, the development of entrepreneurial thinking and culture, which will accelerate the entry of countries into the developed digital environment; automation of business processes, new methods of attracting customers, reducing the time for decision-making, reducing costs. The fate of the educational organization as an institutional and infrastructural element of the entrepreneurial ecosystem, which enhances its own characteristics as an entrepreneurial structure, is determined. Transformation into an entrepreneurial structure allows it to set entrepreneurial goals to increase income and use the qualities inherent in such a structure (initiative, focus on market share, etc.) to optimize entrepreneurial education. The study also examines the components of the intellectual capital of small and medium-sized businesses, in which the main ones are human capital in combination with organizational and relationship capital in the context of digitalization, as opportunities to ensure the competitiveness of domestic enterprises.

Keywords

intellectual capital, intangible assets, knowledge economy, information technology, digital economy

*CITI'2025: 3rd International Workshop on Computer Information Technologies in Industry 4.0, June 11–12, 2025, Ternopil, Ukraine

^{1*} Corresponding author.

[†] These authors contributed equally.

✉ vmartsenyuk@ubb.edu.pl (V. Martsenyuk); g.liudmila22@gmail.com (L. Golovkova); galinka2005_08@ukr.net (H. Nahorniak); oksanagar72@ukr.net (O. Garmatiuk); yurdishka@gmail.com (Y. Dyshkant)

ORCID 0000-0001-5622-1038 (V. Martsenyuk); 0000-0001-5473-6644 (L. Golovkova); 0000-0002-5446-2417 (H. Nahorniak); 0000-0001-9792-600X (O. Garmatiuk); 0009-0009-8505-1336 (Y. Dyshkant)



© 2025 Copyright for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).

1. Introduction

The toughness of competition, the emergence of new companies, and the constant development of markets make it necessary to improve the personnel management system and increase its efficiency. Competitive advantages of corporations that implement knowledge management are due to the competitive advantages of human resources, as well as information technologies effectively integrated into business processes. The task of innovative development and scientific and technological progress set strategic goals for production - automation and robotization of technological lines, in which physical work will be necessary only in minimal quantities. That is, the implementation of strategic goals will be accompanied by a reduction in life in blue-collar jobs and an increase in life in mid-level specialists aimed at the managerial and information nature of the work. As is known, the level of competitiveness of the economy of a particular country is ensured by the level of effective use of national production resources, an increase in the productivity of their use and the provision on this basis of a high, constantly increasing standard of living of the population. The condition for the functioning of a modern post-industrial society and the main factor in the competitiveness of a modern economy is intellectual capital. One of the main trends in the modern economy, which is associated with the emergence and implementation of intellectual capital, is the strengthening of the role and importance of the state in the economy. Today, intellectual capital is the object of special attention from managers, investors, economic organizations and governments of a number of countries. Also, special attention is paid to how the intellectual capital of companies is taken into account in stock markets when making decisions about investing in securities of companies. In comparison with company managers and governments, investors have only recently begun to pay attention to the possibility of taking into account elusive assets when choosing investment objects in stock markets, although the need for this has been discussed for quite a long time. Thus, investment funds and banks take into account elusive assets in the process of financing companies. However, investment methods are extremely underdeveloped. Financing based on elusive assets can be successfully applied only if the tools for measuring intellectual capital are developed. Those who manage assets find the most useful data on the company's relationship capital, in particular, how companies manage their relationships with customers and suppliers, create customer loyalty and brand favor, reputation and image, trademarks, distribution channels, and conduct advertising campaigns [Holland J. (1996)]. Holland emphasizes that investors perceive intellectual capital as resources that allow them to create competitive advantages in the market, which is reflected in market performance indicators such as capitalization. Based on content analysis, the study by Lee and Guthrie [Lee L. L., Guthrie J. (2010)] shows that, despite the undoubted benefits of intellectual capital analysis for portfolio managers and analysts, its measurement is extremely underdeveloped. In addition, market participants most often do not perceive the factors they use in the decision-making process as intellectual capital. Thus, many studies emphasize that investment based on intangible assets and intellectual capital can be successfully used only if the instrumental apparatus is developed, as well as an increase in the awareness of market participants regarding intellectual capital.

Determination of the ways of macroeconomic growth of Ukraine and Poland, first of all, requires specification of theoretical and methodological bases of further changes. Ukraine cannot but take into account world tendencies of reorientation to a new way of development, connected with the most essential role of intellectual capital in development of any country and provision of its competitiveness in world economic processes. In modern conditions of formation of intellectual capital of any country is rather complicated. Many tasks remain unresolved, among which – formation of an atmosphere of general interest in work of intellectuals, transition of the educational system to a new level of work, which will provide realization of individual requests and desires, development of personality, increase of well-being of the people and quality of its life, development of national projects in the sphere of introduction of management technologies and social innovations, intensive development of promising domestic branches of science, provision of effective connections between science and economy. The main competitive advantages of active-

innovative-active corporations are based on development of habits, acquired experience, understanding of the market, information exchange systems. At the same time, the sources of competitive advantages of modern companies are not so much material as intangible resources, which include patents, habits and abilities of employees, unique competencies and the system of their training. In the context of the struggle for intangible assets, intellectual capital becomes a stable advantage of innovative corporations, the competitiveness of which depends on the creation of key competencies.

The study of the processes of formation of intellectual capital at the macro level is important for the development of economic policy in any country that claims to be significant in the world economic system. The transformation of intellectual potential into intellectual capital occurs in the process of reproduction of intellectual capital, which is an important and significant process in the conditions of the formation of a modern digital economy. In the system of reproduction of intellectual capital, the following are distinguished: the education system, the system of production and restoration of scientific and technical knowledge, the mechanism for the protection of intellectual products, the system of measures for the development of all communication technologies, state policy in the field of attracting technologies from abroad.

Ukraine and Poland belong to the states with high scientific potential. These are, first of all, world-recognized scientific schools, significant and unique achievements in many areas - the development of new materials, biotechnology, radio electronics, low-temperature physics, nuclear physics, electric welding, computer science, etc. The state is responsible for creating such conditions that can ensure the increase of this potential, first of all, its maximum return. It has a direct conductor of innovative development, a customer and organizer of developments and research in the most modern, most promising areas of scientific and technological progress.

In general, the digital economy can be defined as a set of social, economic and cultural relations that are implemented within the digital space, which involves the widespread use of information and communication technologies and big data. The National Program of Ukraine defines the digital economy as a set of markets and areas of the economy where competitive entities, platforms and technologies interact, where competencies are formed for the development of markets and areas; institutional environment (regulatory framework, information infrastructure, personnel, information security, etc.). The areas that are based on the use of achievements of fundamental science, information and knowledge come to the forefront. This process is primarily the result of the colossal development and priority in the economy of developed countries of such areas as biotechnology, software, genetics, biochemistry and various information subdivisions. Of particular interest is the growth in the number of information companies. In addition to the fact that, from an economic point of view, this growth is striking in its pace, it is also not supported by anything from the point of view of the industrial system. These companies do not own practically any fixed assets, but their achievements are very significant. The development of science should be considered as the top priority of social development. This includes advanced mathematical and computational modeling in biotechnology, which contributes to innovation and digital transformation in high-tech industries [Martsenyuk, V. (2024)]. Unfortunately, in Ukraine and Poland there is a crisis of science, because low wages of scientists, lack of funds for the purchase of modern equipment, resistance to the implementation of scientific research results and other phenomena become the reasons for significant losses of highly qualified human resources. The level of interest of enterprises in the use of innovations increases slowly due to shortcomings in the tax system of countries and difficulties associated with the risk of significant innovative measures, and in the scientific field insufficient attention is paid to the differential approach regarding the material incentives for scientists to create breakthrough "know-how". The formation and development of the digital economy, the growing role of information and knowledge in production processes make economic progress and social development directly dependent on the continuous intellectualization of life of the population. Such intellectualization is increasingly supported by models based on artificial intelligence and time-delay differential systems, which enhance decision-making and process automation in digital environments [Martsenyuk V. (2019)]. This process is

due to general economic trends, the growing role of information in the production process, changes in the ways of its transmission, the growth of financial assets and the complication of the ways of their transmission. Thus, there is an increase in the share of the intellectual component of production and the informatization of economic processes. Knowledge and information in modern society are the main strategic resources of economic activity. Another aspect of structural changes in the modern economy is the great role of science in the reproductive process of society. As for traditional industrial areas, the general development of production activities has directly affected them. The employment structure is also changing. In developed countries, the share of those directly involved in material production is less than 20%, and the share of those employed in agriculture does not exceed 10%. The reduction in the number of workers in the primary and secondary sectors of the economy is accompanied by a rapid increase in employment in the tertiary sector, that is, in the service sector. However, the service sector itself is not homogeneous, and therefore it is necessary to pay attention to changes in the employment structure within it. Here, the following domestic modern trends can be highlighted. In such sub-sectors of the tertiary sector as, for example, communications and transport, which do not require special individual investments from the employee, there was no growth in employment. Whereas in the service sector sub-sectors, associated with significant individualization of the product being produced and the use of special qualities of the worker, taking into account, first of all, special education and his intellectual potential, employment grew at a rapid pace.

The importance of knowledge in the development of modern society is objectively recognized as a key resource, which has outstripped the role of other factors of economic development: means of production and natural resources. This is confirmed by the results of research by international organizations (World Bank), according to which human resources are the main contribution to national wealth. Today, the main source of generating new knowledge in society remains the official education system. The role of the education sector as a set of entities that solve social problems is beginning to transform in the current conditions. The transformation and reform of the education sector, which are observed in all countries of the world, are due to both the initiative of government bodies and the objective needs of the current stage of socio-economic development. Implementing the strategy of catch-up modernization, Ukrainian and Polish companies do not introduce new developments, but mainly refine existing foreign technologies, for the adaptation of which they create special structural subdivisions that ensure the accumulation of relevant knowledge. Thus, in modern conditions, the technocratic approach, when production plans, percentages of completion and firm administration were important, is being replaced by a new system of work with personnel, which stimulates the employee to creative work, which is based on new approaches and organization of this work. In the post-crisis period, the structure of the Ukrainian and Polish economies will inevitably change. In the foreseeable future, we will face new areas of activity that will require additional labor resources, as well as the corresponding leadership competencies of employees. Main material. In the modern digital economy, the state has a great responsibility for the development and implementation of national socio-economic and scientific and technical policies, the formation and development of an institutional structure that covers not only legal, but also moral, ethical, moral relationships between people in modern society. A high level of socio-economic development of the country is the basis for the emergence, functioning and reproduction of intellectual capital. In a country with a low level of income and consumption, the possibilities for development (and implementation of intellectual capital) are quite limited. This pattern is due to the following points. It should be noted that individual elements of intellectual capital (information, knowledge, educational level, professional level, intellectual property) cannot individually ensure a high level of competitiveness of the economy of a particular country, and this is no accident, because intellectual capital at the level of the national economy is a complex system of interconnected elements, without each of which this system cannot exist properly. All this emphasizes the importance and significance of reproducing intellectual capital for business entities in the context of the modern digital economy.

2. Main research results

Business is the area where digitalization processes are most actively taking place. The use of information resources to increase the competitiveness of business structures occurs due to the optimization of business processes and their transfer to digital platforms. Digital platforms are hybrid structures focused on creating value by ensuring direct interaction and transactions between several groups of third-party users. The undoubted advantages of business digitalization are the automation of business processes, new methods of attracting customers, reducing the time for making decisions, and reducing costs. The difficulty that can be encountered during the transition to a digital economy is the lack of competent personnel who are competent in transforming a business, limited transformation timeframes, and conservatism. Possible points of business growth due to the use of digital technologies are the development of customer service and the use of communication channels (analytical tools, scoring, variability, adaptability, forecasting) to attract and maintain customers, forming a positive image; strengthening partnerships through the use of non-standard solutions in business; search for new directions of business development due to data enrichment and implementation of innovative technologies, modeling of consumer behavior and processes, building forecasts based on Big Data. These capabilities are enhanced by advanced analytical techniques such as predictive modeling and receiver operating characteristic (ROC) analysis, which improve the accuracy of forecasts and support data-driven decision-making in complex environments [Nykytyuk, S. (2023), Musiienko V. (2021), Musiienko V., Sverstiuk A. (2022), Chukur O. (2022)].

According to the research of the European Commission, in general, intensification of digitalization, widespread use of information technologies and intellectual capital can be observed in countries of the world. The evolution of EU member states in the field of digital competitiveness can be tracked by the International Digital Economy and Society Index (DESI), it is a consolidated index and includes five indices, which are characterized by more than 30 indicators. It includes the following indicators:

- Connectivity - measures the deployment of broadband infrastructure and its quality, access to fast and ultra-fast broadband services, is a prerequisite for competitiveness;
- Human Capital and Digital Skills - measures the habits necessary for the effective use of ICT;
- Use of Internet Services – takes into account various online activities, such as online content consumption, video calls, as well as online shopping and banking;
- Integration of Digital Technology – evaluates the activities of enterprises from the position of ICT implementation, that is, whether the enterprise uses electronic invoices, cloud services, or carries out electronic sales, etc.;
- Digital Public Services – evaluates the level of development of e-government and e-health services.

The readiness of small and medium-sized enterprises (SMEs) of Kyiv and Ukrainian regions for the digital business model is assessed by the Business Digitalization Index (BDI). This index is calculated on the basis of partial indices:

- channels for transmitting and storing information: this indicator shows whether the company uses various digital channels for transmitting and storing information (cloud technologies, corporate mail, instant messengers, automation systems, etc.);
- integration of digital technologies: the parameter measures the level of implementation of technologies in the robot - artificial intelligence, Internet languages, 3D-Printing, use of online documents, etc.;
- use of the Internet in sales: the indicator takes into account the range of activities that enterprises use in Internet channels (availability of a website, a page in social networks, use of promotion channels, etc.);
- information security: measures the readiness of entrepreneurs for potential digital threats;

- digital training: the indicator demonstrates the level of readiness of the company's management to train personnel in the field of digital technologies, as well as the experience of conducting similar courses and trainings.

The SME digitalization index shows that today SMEs in Ukraine and Poland are not sufficiently aware of the benefits of implementing digital technologies and the possibility of improving work processes through digitalization of the company. In these conditions, an important indicator that characterizes the readiness of the organization for effective operation and its readiness to work in a modern environment is the organization of digital training for personnel. The digital habits (competencies) of individuals remain at a low level and require significant improvement. In various areas, a significant competitive advantage is the introduction of advanced information technologies at the enterprise. Enterprises that have installed information systems and also mastered the latest technologies, such as CRM or ERP, achieve competitive advantages over other enterprises that are lagging behind in mastering new information technologies. In these examples, the competitive advantage is the intellectual capital of the enterprise. It should be noted that knowledge plays a unique role in the creation and preservation of core competencies. Core competencies can be based on understanding customers and their advantages, knowledge of technology and specific ways of its application, knowledge of products, processes, etc. Understanding the business environment, other companies operating in the market and their concepts of achieving victory, different countries and their cultures also contribute to the formation of core competencies. There are numerous examples of ways of using knowledge to create and strengthen core competencies. Some successful organizations achieve the necessary competitive advantage through rapid learning how to improve their thinking and replenish the stock of knowledge necessary for the formation of sustainable and adaptive core competencies. Digitalization of the economy and society affects the business model of entrepreneurial activity. Such tools as digital marketing, CRM-Systems, marketplaces, cloud platforms, technologies for collecting and analyzing data, as well as their visualization, biometrics and others allow improving and simplifying the business processes of SMEs. But the use of new tools requires relevant knowledge, often SMEs do not even know how technologies can facilitate their work. The need for consulting, training and professional training of both entrepreneurs and employees of their enterprises is increasing; opportunities for new types of work in the future are opening up, the need for digital literacy and understanding of the features of the future P2P economy based on equal and mutually beneficial cooperation of users, exchange of creative products, information, attention, labor efforts, lending, support, etc. is growing. Its main principles are free choice of partners and equal cooperation with them. Ukraine, having a powerful intellectual potential and the ability to transform it into capital, cannot stand aside from the global processes of intellectualization of social production. A mandatory basic condition for the further development of the national economy is the formation of an effective digital infrastructure of a modern post-industrial society in our country, which will create the prerequisites for its transition to knowledge-intensive and highly productive types of production and development and the reproduction of intellectual capital as the main factor in the competitiveness of the modern economy of Ukraine.

In many areas, the most significant core competence of companies is their ability to innovate. This applies not only to knowledge-intensive areas, but also to those that are not usually considered in a number of areas built entirely on innovation and new technical solutions. In particular, innovative processes are characteristic even of such a traditional area as food. Competitive advantages of this kind are found not only in the sphere of technology production, they often move to the stage of marketing, service, R&D, management and financial innovations. Thus, pharmaceutical companies today have focused their competitive advantages in the sphere of brand management, in sales and R&D. The main elements of the price and expenses of these companies are R&D, patent protection, rapid and productive testing of new forms, and a developed distribution system. Often, large pharmaceutical companies do not have their own production facilities, since this is not their core competence. The core competence of a company and its possible composition are shown in Fig. 1.

There is an urgent need to improve the process of financing scientific and scientific-technical works, including through government orders in the implementation of priority areas of scientific research, which practically affects the formation of the intellectual capital of Ukraine. In addition to financing scientific developments for budgetary funds, a significant part of scientific and technical work is carried out by enterprises and organizations themselves.

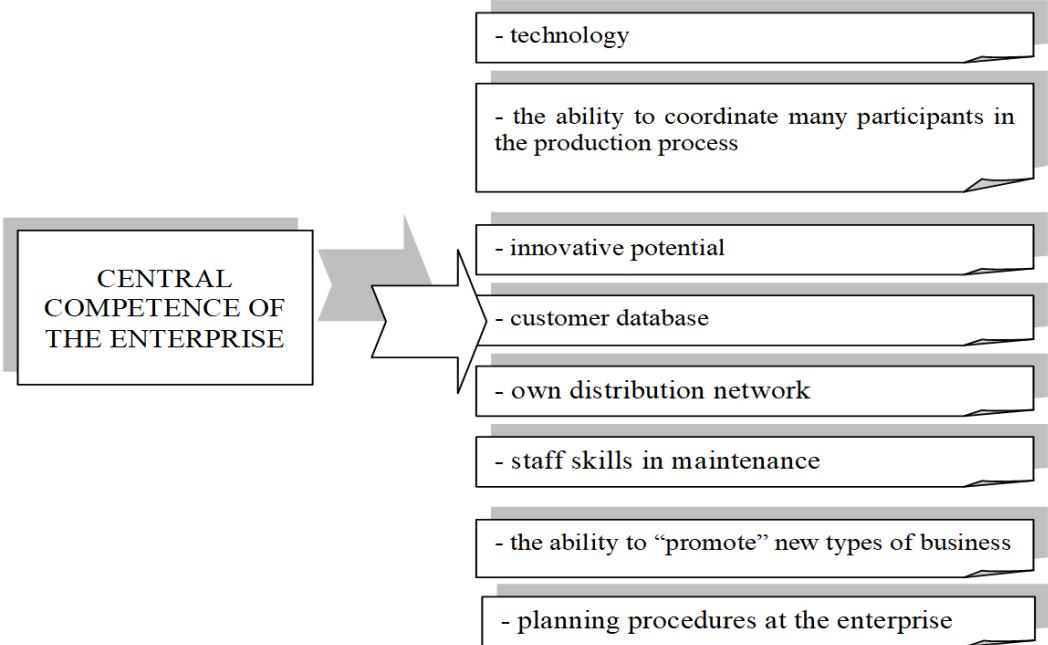


Figure 1: The central competence of the enterprise and its probable composition (interpretation of the authors).

Proving the need to integrate the main types of intellectual capital, we emphasize once again that in the modern understanding of competition and competitiveness, many researchers come to the conclusion that the advantages in the material aspects of production are no longer as significant as they were 20-30 years ago. Priority is given to advantages in the intangible aspects of production (skills, experience, knowledge and abilities, innovation, information systems, databases, understanding the market, sales). Strategically, it is also necessary to improve a number of selected areas of activity that rely on one of the organization’s core competencies, protect them with barriers to the emergence of new competitors, and, in addition, build partnerships with suppliers of external services and components.

In the era of globalization and the “new economy,” the role of tangible assets is fading into the background, since they are not always able to improve financial results, while interest in non-financial assets is growing, which is observed both for large international companies and for small, closed-type firms. The explanation is that small firms, compared to larger companies, provide services more often, and therefore depend more on non-financial assets. Successful companies are focused on creating and developing knowledge, competencies, skills and habits, that is, on developing intellectual capital, which changes the process of value creation itself. As a result of companies’ growing awareness of the importance of investing in intellectual capital in terms of value creation, expenditure on intellectual capital is increasing every year, in some countries exceeding the amount of investment in physical and financial capital. Some researchers, such as Stewart (1997), associate similar changes in the structure of investments with the transition to a knowledge-based economy. Others, such as Edvinsson (1997), Sveiby (1997) and Lynn (1998), clarify that the growing importance of intellectual capital is inextricably linked to its impact on value creation within the “new economy”.

Many researchers view the components of the intellectual capital structure as equal elements. Table 1 provides a summary of the main proposed classifications of intellectual capital.

Thus, almost all studies devoted to intellectual capital highlight such components as human capital, structural and relational capital. It is this structure that should be used, since a stronger decomposition should be chosen taking into account the specifics of the organization. The above-listed types of capital are available to each organization, and, therefore, allow for inter-industry and inter-country analysis.

Table 1

Approaches to Determining the Structure of Intellectual Capital (Authors' Interpretation)

Author and Year	Elements of the Structure of Intellectual Capital
Saint-Onge. H. (1996), Roos G., Roos J. (1997) (1998)	- human capital; - structural capital; - relationship capital.
Stewart T. A. (1997)	- human capital; - structural capital.
Sveiby K. E. (1998), Mouritsen J. (2003), Youndt M. A., Snell S. A. (2004), Komnenic B., Pokrajcic D. (2012), Maditinos D., Chatzoudes D., Tsairidis C., Theriou G. (2011)	- human capital; - organizational capital (procedures, management and administrative systems; - customer capital (customer loyalty, brand of goods and corporate image).
Haanes, Lowendahl (1997)	- competencies; - relationship resources.
Kimura H., Basso L. F., Nogueira, S. G. (2010)	- individual competencies; - collective competences; - individual relationship resources; - collective resources of relations.
Sveiby K. E. (1998)	- employee competencies (analog of human capital).
O'donnell D., O'regan P., Coates B. (2000).	- internal structure (analog of structural capital); - external structure (analog of relationship capital).
Leana C. R., Van Buren H. J. (1999)	- human capital; - innovation capital; - process capital; - capital relations.
Dumay J. C. (2009)	- people (analog of human capital); - market (analog of relational capital); - system (analog of structural capital).
Leliaert P. J. C., Candries W., Tilmans R. (2003)	- human capital; - customer capital; - structural capital; - strategic alliance capital.
Cuganesan S. (2005)	- human capital; - organizational capital; - relational capital (the company's relations with all external stakeholders).
Cohen S., Kaimenakis N. (2007)	- hard capital (the value of which the company can determine, for example, patents, expenses on RDW, etc.); - functional capital (which includes organizational processes); - soft capital (the value of which cannot be determined).

In a number of studies, intellectual capital is positioned as a full-fledged part of the company's resource portfolio along with traditional financial and physical resources. The analysis of the literature revealed the following properties of intellectual capital, which complicate its identification, assessment, and, therefore, management of this type of resource:

- Intangibility. The intangible nature of intellectual capital determines the complexity of its identification and measurement [Bontis N., Dragonetti N.C., Jacobsen K. and Roos G. (1999)].

However, despite this, some of the elusive assets are still controlled by the company [Tseng C. Y., Goo Y. J. J. (2005)].

- Inseparability from the carrier in the case of human capital [Abhayawansa S., Abeysekera I. (2009)].

- Partial non-exclusivity and non-rivalry (which are properties of a public good). These properties make it difficult to control and manage intellectual resources, as well as to measure the results of their use [Tseng C. Y., Goo Y. J. J. (2005)].

- Reproduction ability. Intellectual assets do not lose their value when distributed into parts and increase it when distributed and exchanged [Allee V. (2000)].

- Subjectivity. The value of the same component of intellectual capital can vary depending on the context of its use [Chan K. H. (2009)].

- Time lag effect. Investments in intellectual capital require a significant hour to receive a return. Due to the need to introduce a similar type of expenses into the corporate culture of the company, there is a certain inertia that does not allow for immediate benefits [Changa S. C., Chen S. S., Lai J. H. (2008)]. According to empirical studies, investments in intellectual capital on average bring profit only after 5-9 years [Lev B., Sougiannis T. (1996)].

- Idempotency of addition. Re-acquisition of components of intellectual capital already existing in the company does not increase the amount of elusive assets that belong to it [Brennan N. (2001)]. For example, if a company re-purchases a patent that belongs to it, the amount of its intellectual capital will not change.

- Non-zero sum effect. Investments in intellectual capital are not equal to the value it creates, unlike investments in tangible assets, which increase both parts of the balance sheet [Roos G., Roos J. (1997)].

- Multiplicity. According to some researchers, unlike additive tangible assets, elusive ones obey the multiplication rule, according to which the value of intellectual capital is defined as the product of human, structural and relational capital [O'donnell D., O'regan P., Coates B. (2000)]. - Increasing returns to scale. Due to the elusive nature of intellectual assets, investment in them pays off many times over, whereas with an increase in material factors of production, their marginal productivity decreases [Arthur (1996); Bontis (2000); Daum (2001)]. A number of researchers associate the ability of intellectual capital to create value with this property [Lev (2001); Hand and Lev (2003)]. However, empirical studies do not find confirmation of this property [Canibano L., Garcia-Ayuso M., Sanchez P. (2000); Huang C., Wang M. (2008); Chen M. C., Cheng S. J., Hwang Y. (2005); Diez J. M., Ochoa M. L., Prieto M. B., Santidrian A. (2010)]. In addition, some of them reveal the presence of negative returns on elusive assets [Abdolmohammadi M. J. (2005)]. - Network effects. Such effects are a characteristic feature of the new economy and arise due to the ability of existing customers to attract new ones, even when the company makes no effort to do so [Hand J., Lev B. (2003)].

Thus, the properties of intellectual capital theoretically determine its ability to create and destroy value. However, the complexity of control and measurement of elusive assets that follow from their intangible nature make this fact non-obvious and require empirical verification. There is a relationship between the nature and intensity of management actions aimed at the process of creative activity of specialists from different functional subdivisions, as well as the results of intellectual work, which form the basis of intellectual capital. That is why it is necessary to consider not the dependence of investments in knowledge and information as a result of the functioning of enterprises, but the dependence of targeted investments in the intellectual activity of workers, clearly drawing a line between the potential of workers and their creative activity. There is also a need to improve state mechanisms regarding the regulation of innovative processes in Ukraine, which would contribute to the acceleration of the transformation of intellectual potential into an effective element of intellectual capital, which is capable of realizing productivity and competitiveness in the domestic and European labor markets. In the context of solving this problem, special attention should be paid to improving state mechanisms for the social protection of intellectual property as an innovative creative product. In modern conditions, intellectual capital

and intellectual work are the main factors of production, efficiency and development, the source of well-being of nations in the economies of most countries of the world. Strategic directions of development of countries are based on the formation of an innovative development model, in which the value of the intellectual component of the innovative potential increases. The effectiveness and efficiency of the implementation of innovative projects significantly depend on political, financial, economic and intellectual factors.

The transition to an information society in Ukraine and Poland involves the transfer of information, knowledge and habits to the basis of the country's economic development. The need to overcome the crisis and reach a new level of development necessitate the realization that unused reserves and optimal directions for the effective development of Ukraine and Poland are within the recognition of the theory of intellectual capital and the implementation of its basic provisions in practical economic activity. The formation of a civilized market for intellectual property can significantly increase the profits of Ukrainian and Polish enterprises and provide new sources of replenishment of the state budget. In the modern economy, the main role belongs to the value created by knowledge, and intellectual capital is turning into a commodity. The process of forming the competitiveness of intellectual capital consists of four main stages, different in functional characteristics: the first is the formation of intellectual potential, which includes demographic reproduction - ensuring an extensive base for the competitiveness of intellectual capital; the second is the formation of intellectual potential in terms of increasing qualitative characteristics in the course of acquiring knowledge, skills and experience - ensuring an intensive base for the competitiveness of intellectual capital; the third is the conversion of intellectual potential into intellectual capital - capitalization of intellectual potential; the fourth is increasing the efficiency of using intellectual capital.

The globalization processes that are taking place in the world today create preconditions for the withdrawal of work and education, open up new opportunities and prospects for people for interconnection and cooperation, which significantly contributes to the creation of different communities and the expansion of network interaction between members of these communities. Scientific and educational communications of this type are aimed at exchanging experience and best practices, searching for new ideas and their solutions, and quickly responding to changes. Such graduates will have the necessary professional competencies to a greater extent and will be able to become full members of the business community. Professional communities become that information space in which employers can express their requirements for understanding training, and teachers can take them into account in their courses. Thus, employers become participants in the educational process and have a direct impact on the formation of the necessary competencies in the students. This is manifested in the fact that universities involve representatives of employers (business communities and government organizations) in the development of programs, conducting classes and final certification, without which it is impossible to implement high-quality training in practice-oriented programs. But the same programs of additional education are practice-oriented, which must necessarily have certain specialized, professional modules, the development of which is carried out with the participation of representatives of business, various government agencies. The integration of education and business, implemented by professional communities, allows us to respond proactively to changes that occur in society and to train the required personnel. The mark of modern entrepreneurship is the transformation of a company into an organization that learns, has an effective system of continuous individualized training and professional development of employees in terms of results and resources used, its own base of intellectual property and knowledge, which regards the desire of employees for independent professional development as a basic value. The labor behavior of an employee in such an organization is focused on personal initiative, independence and responsibility, which require constant renewal of knowledge and development of employees' abilities, which together form leadership competencies. Thus, a systematic approach to the formation of conceptual elements of a new paradigm of work with personnel includes the volume and structure of personnel leadership

competence, management of the competence life cycle, total expenses on employees, the level and dynamics of its performance.

The TransLeader project (2023-2-PL01-KA220-HED-000179445) provides an innovative curriculum structure that prepares IT business leaders to excel in industries shaped by AI and IoT technologies. By integrating technical expertise with leadership and organizational management skills, the curriculum ensures that students are well-equipped to take on leadership roles in a global IT market. The project's commitment to aligning Ukrainian and EU educational standards fosters greater mobility and competitiveness for IT professionals in both regions. This paper, prepared as part of activity A3.7, shares the key outcomes of the TransLeader project and contributes to the broader discussion on how to prepare the next generation of IT business leaders in a rapidly evolving digital landscape. The TransLeader project, in developing a comprehensive curriculum for IT business leaders, integrates a range of technical skills, leadership competencies, and professional dispositions necessary for guiding businesses in today's technology-driven economy. The blend of AI and IoT expertise with leadership development ensures that future IT business leaders are well-prepared to take on the challenges of modern industry, particularly in aligning Ukrainian IT education with EU standards. This holistic approach to training creates IT leaders who are not only technically adept but also ethically responsible and capable of driving innovation across borders. This project co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or Fundacja Rozwoju Systemu Edukacji. Neither the European Union nor the granting authority can be held responsible for them.

The degree of documentation of the personnel management system of one organization may differ from another depending on:

- the size of the organization and type of activity;
- the complexity and interaction of processes;
- leadership competencies of employees.

The results of intellectual activity in themselves have no economic value without their proper use. Such use is possible either in one's own economic activity, or in the transfer of the right to use to third parties, as well as in a mixed form. As many experts note, the greatest interest is precisely the process of market implementation of intellectual capital, which leads to the formation of a market for innovative products and ensuring the income of enterprises from interaction with it. The relationship between the components of intellectual capital is presented in Fig. 2.

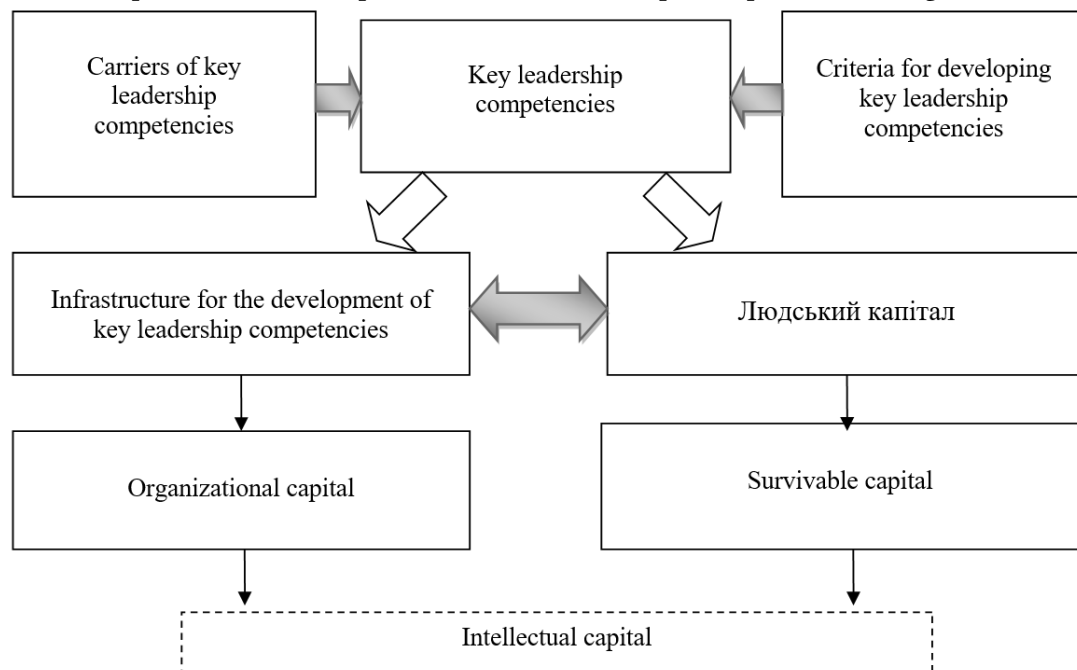


Figure 2: Relationship between the components of intellectual capital (interpretation of the authors).

As can be seen from Figure 2, the bearer of leadership competencies are the employees of the enterprise, who have the constituent elements of the formation of human capital. Organizational capital acts as the infrastructure for the development of leadership competencies, and consumer capital is the final benchmark and goal of producing key leadership competencies.

In Ukraine, there is a reduction in the demographic base for the reproduction of human capital due to the constant excess of mortality rates over birth rates and emigration over immigration. The reduction in the demographic base is accompanied by its redistribution within the national economy in favor of urban settlements and migration losses in rural areas.

It should be emphasized that in the majority of Ukrainian and Polish companies, activities are focused on one type of intellectual capital. A number of organizations emphasize human capital, education, training, motivation systems and career advancement. Others give priority to marketing, distribution, and market share acquisition. The core of the activities of others is the formation of corporate management systems that rely on the use of advanced information technologies. Only some comprehensively focus on all components of intellectual capital. But these companies achieve success.

Thus, the integration of all types of intellectual capital of a production and commercial company is a key factor in the development of its competitive advantages. This is explained by the fact that the share of intellectual services and other intangible components in the cost structure of goods increases. In addition, in the structure of assets of a production and commercial organization, the intangible component has recently taken its place. A sufficient factor in ensuring the growth of the intellectual coefficient of added value of the company due to the growth of human capital is the fulfillment of the condition: an increase in the contribution of intellectual capital must exceed the growth of physical (employed) capital.

It is the integration and interaction of different types of intellectual capital that lead to accelerated development and growth of competitive advantages of the company. Let us consider the main possible types of such interaction. The mutual influence of human capital and relationship capital involves cooperation with consumers, which allows you to replenish the stock of knowledge, habits and skills of the company's employees. This process can be carried out in different ways, for example, through direct interaction with customers. In this regard, various organizations need to increase the number of employees who directly interact with customers. Whether there are any feedback opportunities, conducting sociological research or direct marketing, it is also necessary to implement in order to improve the qualifications of employees, as well as their readiness to satisfy new customer requests.

For the most optimal assessment of human capital, it is proposed to divide personnel into different categories, that is, to classify members of the workforce first into leaders and followers, and then by professional, leadership and other qualities.

The formation of a management system for the development of human and intellectual capital implies the presence of a criterion for the effectiveness of its functioning. Based on the results of the studies, the growth rate of the intellectual coefficient of added value (VAIC) due to the efficiency of using the intellectual capital (HCE) of the company was chosen as an indicator of the effectiveness of functioning. Within the true study of the growth of the intellectual coefficient of added value (VAIC) of the enterprise, as a criterion for the functioning of the human and intellectual capital management system, it is proposed to evaluate the increase in the contribution of human capital to the growth of the value of the enterprise. This is determined by the fact that in the conditions of the development of an innovative economy, it is intellectual property and intangible assets that are becoming one of the most important components of the enterprise's assets and are the main source of the formation of sustainable competitive advantages. The knowledge management system, as an important component of human resource management, can be created on the basis of the development of intellectual capital, corporate culture and the current

system of motivation of employees who demonstrate innovative abilities, reflect on the event, use intuition, decide on risk, become intellectually involved in the organization and change the model of economic behavior. In the modern conditions of changes in the business environment and digitalization of society, SMEs are becoming one of the drivers and catalysts of economic development and, at the same time, an indicator of the level of innovative processes in the economy, that is, it is a flexible form of management that can dynamically respond to changes that occur in the market, and is also capable of actively forming new points of financial and economic growth, using digital technologies, which affects the increase in economic efficiency. Small and medium-sized enterprises provide the necessary mobility in the market conditions, contribute to the achievement of social and political stability, social adaptation of citizens, create deep specialization and extensive cooperation of production, are able to reduce the consequences of various structural changes, can adapt faster to the changing needs of the market, make a great contribution to regional development, quickly implement and use technical, organizational and other innovations. Despite the comprehensive support of SMEs by the state, there is still potential for support tools that need to be developed and used to improve the efficiency of SMEs, including creating new support approaches. It is necessary to optimize the set of support measures taking into account the specifics of SMEs and their advantages (primarily, the ability to quickly respond to changes in the business environment), strengthen competence-based and differentiated approaches aimed at meeting specific consumer groups, using the potential of educational organizations as centers for the formation of entrepreneurial competencies, a base of teachers and places of practice, and use the potential of the digital economy. One of the most effective ways to prevent negative and crisis situations in small business, according to various experts, is preparation for entrepreneurship through the formation of competencies. The identified problems and directions of SME development do not allow us to consider the existing approaches to the formation of competencies in SME entities sufficient. When forming them, it is also necessary to take into account the conditions of the modern economy, including special factors of digitalization.

Let us define the differences between the definitions of the categories “competence” and “competency”: “competence” refers to the individual and reflects the individual’s compliance with the requirements of the professional sphere, “competency” is an area of issues that a specialist with a certain set of competencies is able to solve. It should be noted that a fairly large number of modern studies are devoted to the issue of forming entrepreneurial structures and entrepreneurial competencies. Content analysis of scientific papers devoted to the problems of forming entrepreneurial competencies has shown that the formation of competencies, including entrepreneurial ones, in Ukrainian and Polish practices is considered, primarily, within the framework of research in pedagogical sciences. The economic basis of the competence-based approach was laid in their works, primarily, by foreign researchers. As a rule, in the structure of entrepreneurial competencies, personal business qualities, habits and a model of behavior are distinguished, the possession of which helps to successfully solve certain business problems and achieve high results. Within the framework of another approach to the list of general entrepreneurial competencies include such personal qualities as stability under pressure; high personal responsibility; ability to sell; ability to negotiate; ability to establish connections; readiness to take risks; ability to act in conditions of uncertainty.

For the successful implementation of SME business plans, in addition to the formation of entrepreneurial competencies, it is also necessary to form economic thinking and lay the foundation for an entrepreneurial culture. It should be noted that the economic thinking of entrepreneurs is a broad concept, it is their knowledge, mastering of economic reality, the peculiarities of interaction in society, the production of economic activity in the conditions of market relations, competition, state regulation.

The basic (key) competencies of an entrepreneur are based on the requirements of educational standards. When forming a set of competencies, it is necessary to take into account that today there are no separate professional standards and state educational standards (SES) for entrepreneurship. When forming entrepreneurial competencies, the DOS of other professions are

taken into account, or entrepreneurial competencies are included in blocks in other DOS. Today, such a block of inclusions in the DOS from management (bachelor's level), within which the following entrepreneurial competencies are formed:

1. general professional competencies of a graduate:
 - the ability to identify and evaluate new market opportunities, develop business plans for the creation and development of new areas of activity and organizations;
2. professional competencies of a graduate:
 - the ability to assess the economic and social conditions for implementing entrepreneurial activity, identify new market opportunities and form new business models;
 - possession of the habits of business planning, creation and development of new organizations (areas of activity, products);
 - possession of the habits of coordinating entrepreneurial activity in order to ensure the consistency of the implementation of the business plan by all participants;
 - possession of the habits of preparing organizational and administrative documents necessary for the creation of new entrepreneurial structures.

It should be noted that entrepreneurship competencies are included only in the DOS from management (bachelor's degree level), and the entrepreneurial block does not distinguish from the DOS (master's degree level). Within the development of domestic scientific schools, it is possible to highlight works in which professional competencies are presented not only as a set of knowledge, skills and habits of individuals, but also entrepreneurial talents of managers and owners. At the same time, accumulated entrepreneurial talents are realized in the intellectual capital of entrepreneurial structures.

It is necessary to distinguish two groups of entrepreneurial competencies, depending on the level of their implementation and impact on the competitiveness of an organization or an individual:

- personnel competencies necessary for an entrepreneurial structure to implement the strategy and achieve the main goals of the activity: economic, scientific and technical, industrial and commercial and social (corporate, general level). Corporate development of competencies is determined by the coherence and universality of private socio-economic interests of all subjects of labor activity, the readiness of the organization to undertake the obligation to create the necessary minds to support competitive advantages in the market in the interests of achieving goals and implementing the mission;
- professional characteristics of a specific individual (autonomous, private level). Autonomous development of competencies is the satisfaction of private interests of individual employees in the formation and enhancement of their competitive advantages in the labor market by increasing knowledge, skills, habits, and powers.

Also, among entrepreneurial competencies, a number of researchers distinguish information, communication and project competencies, which are expressed in the following characteristics:

- readiness for effective communication;
- readiness to use information resources;
- readiness and ability to apply design methods in practical life;
- ability to independently identify a problem, find ways and means to solve it;
- readiness for self-organization of one's activities;
- resilience - the ability to exercise control over oneself in an extraordinary, extreme situation and effectively manage this situation.

From the point of view of the functions performed in the professional competencies of a specific individual, 3 levels of competencies are distinguished:

- critical, that is, absolutely important;
- non-exclusive competencies necessary for the performance of advanced functions;
- application competencies necessary for career advancement (for employees) and the implementation of entrepreneurial initiatives (for entrepreneurs).

Requirements for the structure of entrepreneurial competencies and the general perception of entrepreneurship in society are not constant and change over time. For example, the perception of entrepreneurship depends on the presence of favorable minds for starting a business, the general level of entrepreneurial knowledge and habits, as well as the level of the so-called "fear of failure".

Over the past 5 years, the priorities of entrepreneurial habits have changed, while the habit of solving complex problems remains in first place in importance, which, of course, indicates that entrepreneurs need support from the state, because they encounter a fairly large number of problems that require solutions.

Comprehensive development of competencies will allow, through influencing the triad of values (the value of work, worries and relationships), to obtain a synergistic effect from the implementation of human potential. We believe that four approaches (schools) should be distinguished to the complex of necessary professional competencies:

1. Functional approach (English school). Based on determining the role of a specific position in the enterprise, functional, personal, cognitive, ethical competencies are considered as the main competencies.

2. The multidimensional approach (French school) examines the current ecosystem of entrepreneurship and how it is developed taking into account the development of individual competencies:

3. The behavioral approach (American school). The focus of the study is on personality traits formed on the basis of interpersonal, informational, systemic and technological competencies.

4. The holistic approach (German school). Knowledge, experience and behavioral characteristics are transformed into subject or social competencies, competencies of actions in each specific area of activity.

Along with the American, English, German and French schools of competence formation, we can distinguish the Ukrainian and Polish schools, which are being formed, the basis of which (according to some authors) is an intellectual approach and the main focus of study is the ability to master new learning technologies and self-study. Thus, the set of entrepreneurial competencies can be considered both as an independent model of professional activity and as a system of professional and personal qualities tied to different industry professional competencies and professions.

The approaches analyzed earlier use different criteria for identifying or classifying professional entrepreneurial competencies. At the same time, if we consider the types of competencies from the point of view of their formation, then we need to highlight the following types, which further determine the approach to the processes of their development:

- innate, which the future entrepreneur receives at birth and in the process of upbringing in society;
- acquired, obtained in the course of professional development through education and practice at different levels (during training in children's baskets and schools, universities, that is, in all types of educational organizations).

Individual competencies are formed mainly on the basis of innate abilities, acquired knowledge and habits largely form the basis for the existence and functioning of a business, determine its development and success. Acquired competencies include knowledge competencies, skills and habits, the so-called subject-specific-subject-specific-subject component of entrepreneurial competencies. This is specialized knowledge in the field of economics, finance, law, management, psychology, including business creation (startups), project management, business valuation, business investment analysis, crisis management, etc. To ensure the educational process for the formation of entrepreneurial competencies, as a rule, a number of methodological approaches are used:

- system-action, which involves the study of objects as systems, the study of external and internal properties and qualities;

- individual-action, which assumes that in the process of forming entrepreneurial competencies, the principles of individualization and education are used, as well as forms and methods of work for students who study that stimulate personal, intellectual activity, readiness to think creatively, generate ideas, turning them into new technologies, independently achieve goals, find non-

standard solutions, show initiative, be ready to take responsibility, skillfully respond to different life situations;

- competence, which assumes an integrated combination of knowledge, skills and habits, abilities and personal qualities, the unity of theoretical knowledge and practical activity;
- integrative considers education as a process of interdisciplinary, intra-disciplinary, interpersonal and intra-personal integration;
- axiological, which consists in identifying and substantiating the values necessary for life in modern society, as well as ways of their purposeful formation.

Analysis of foreign experience in preparing for entrepreneurship allows us to conclude that training is carried out at different levels of a person's professional development, from school to training centers based on companies. A very important point is the cumulative effect in the formation of entrepreneurial competencies at different levels of their acquisition, which positively affects the formation of an effective set of competencies and experience. Training for entrepreneurs (potential and current) is based on a basic set of disciplines: fundamentals of entrepreneurship, finance, marketing, strategic management, company growth management. Large universities around the world include these disciplines in the educational process aimed at forming entrepreneurial competencies and entrepreneurial thinking.

When training specialists in entrepreneurship, it is necessary to take a comprehensive approach to the issue of developing entrepreneurial competencies, at the same time using a differentiated approach: depending on different goals and target audiences, industry characteristics, the requirements of the state and the business community, economic conditions and the type of digitalization should be taken into account. It is advisable to train an entrepreneur in a single educational process by integrating basic professional and additional education. Basic entrepreneurial competencies are mainly formed when receiving basic education, and specialized ones - on the basis of additional education. Such a comprehensive approach to the formation of entrepreneurial competencies can only be formed with the participation of professional educational organizations that have the ability to segment the target entrepreneurial audience, a base of different programs and practice bases, and highly qualified personnel. Educational organizations began not only to teach entrepreneurship, but also became entrepreneurial structures. The educational organization as an entrepreneurial or enterprise-oriented structure is characterized by the following features:

1. Initiative. Along with the main educational programs, additional educational programs and projects are implemented, aimed at developing competencies and solving problems relevant to a given stage of development.
2. Risk. The educational organization evaluates and resolves risks associated with changes in the market situation, legislative framework, socio-demographic situation, etc.
3. Innovativeness. The educational organization develops and uses new educational technologies, improves internal and external business processes taking into account the set development priorities.
4. Customer focus. The educational organization develops and implements educational programs that take into account the reasonable requirements of the business community (as employers), individuals (as employees), entrepreneurs (as initiators of business projects).
5. Efficiency. The educational organization uses its existing capabilities and resources to achieve its goals.
6. Business reputation. Characterizes the level of responsibility of the educational organization to society and the quality of the educational products provided.

It is on the basis of universities that comprehensive training of specialists can be carried out according to the number of SME entities, because, in addition to high-quality personnel and material and technical support, universities, the most implementing entrepreneurial activities, are an integral part of the entrepreneurship ecosystem. Universities can provide the economy with qualified personnel, competent in matters of creating and running a business, and in order to

maximize their potential, the necessary scientific research in the field of forming differentiated needs in entrepreneurship training.

Conclusions

Small and medium entrepreneurship is a driver of the development of the social economy, activation of the labor market and improvement of the welfare of society, at the same time, it is an indicator of the level of innovative processes in the economy, that is, a flexible form of management that can dynamically respond to changes that occur in the market, also capable of actively forming new points of financial and economic growth, therefore, a positive concept of entrepreneurship was chosen as the basis for the study. The problem of maintaining economic viability and finding low-cost tools for managing development is one of the main problems of SMEs, especially in the era of crises and digitalization. The identified advantages and specifics of SMEs made it possible to improve and adapt the characteristics of the entrepreneurship ecosystem to SMEs, supplementing it with a detailed description of the characteristics relative to SMEs, as well as blocks of digitalization of the business environment and entrepreneurial education as elements that reveal a significant impact on the change in business processes of SMEs. The identified areas of influence of digitalization of the economy on the SME ecosystem, within which it is determined that for SMEs the introduction of modern digital technologies is not only a factor, but also a tool for development. The proven need to acquire certain digital competencies for SMEs. In turn, digital technologies create conditions for the development of entrepreneurial education through self-employed workers and training, opportunities for inclusive education, remove territorial and material barriers to access to quality educational services and the digital job market, set new tasks for creating a flexible digital educational environment that allows integrating the capabilities of different entities to support the SME ecosystem.

Based on a review of the research results of a number of domestic and foreign scientists, the authors came to the conclusion that at the present stage of development of scientific thought, two approaches to entrepreneurial education have been formed:

1. Entrepreneurial education lies in the field of interests of business, future entrepreneurs and business consultants. The role of educational organizations, especially universities, is that the stench is an institutional infrastructure for the development of entrepreneurship and, based on the proposal of business education programs, provides specialists with the knowledge and habits necessary for opening and running a business.

2. Entrepreneurial education is the basis for the formation and development of a wide range of qualities that represent the personality of an entrepreneur. Therefore, entrepreneurship training is a process that begins at the initial level of education, integrated with basic educational programs, with the aim of forming entrepreneurial thinking from the early period of an individual's development.

The authors of the study believe that a third, combined approach to the development of entrepreneurial thinking and the formation of entrepreneurial competencies is appropriate. This is the implementation of a multi-level and different system of entrepreneurship training on the basis of educational organizations as an institutional infrastructure for the development of entrepreneurship. That is, educational organizations do not simply implement business education programs on an initiative basis, but are integrated into the system of support and development of entrepreneurship, ensure the formation of precisely the entrepreneurial competencies that are most in demand by SMEs.

It is impossible to implement such support without the scientific platform of universities, which are capable of forming professional (basic and specialized) competencies at the system level, ensuring their development and transformation into entrepreneurial abilities through the implementation of business education programs for the general population (in contrast, for example, to corporate universities, which form special competencies and, as a rule, only among their employees). Within the framework of the conducted study, the educational lever is of

particular interest as a tool for ensuring economic growth and improving the quality characteristics of economic processes through the implementation of educational programs related to the formation of basic and specialized entrepreneurial competencies, the development of entrepreneurial thinking and culture. It has been determined that the main role in the processes of forming entrepreneurial competencies, thinking and culture within the SME ecosystem is assigned to educational organizations. The fate of an educational organization as an institutional and infrastructural element of an entrepreneurial ecosystem is enhanced by its own characteristics as an entrepreneurial structure. Transformation into an entrepreneurial type structure allows it to set entrepreneurial goals to increase income and use the qualities inherent in such a structure (initiative, focus on market needs, etc.) to optimize entrepreneurial education. Such an organization is constantly searching for innovative forms of educational and scientific activities, searching for effective mechanisms of interaction with government bodies and the business community to achieve the goals of increasing competitiveness.

Declaration on Generative AI

The authors have not employed any Generative AI tools.

References

- [1] Abdolmohammadi M. J. (2005). Intellectual capital disclosure and market capitalization // Journal of Intellectual Capital, 2005 Vol. 6. Iss: 3. P. 397-416.
- [2] Abhayawansa S., Abeysekera I. (2009) Intellectual capital disclosure from sell-side analyst perspective // Journal of Intellectual Capital, 2009. Vol. 10. No. 2. P. 294-306
- [3] Allee V. (2000). The value evolution: Addressing larger implications of an intellectual capital and intangibles perspective // Journal of Intellectual Capital, 2000. Vol. 1. Iss: 1. P. 17-32.
- [4] Brennan N. (1999). Reporting and managing intellectual capital: evidence from Ireland // Paper presented at the International Symposium Measuring and Reporting Intellectual Capital: Experiences, Issues, and Prospects, OECD, Amsterdam, 1999.
- [5] Brennan N. (2001). Reporting intellectual capital in annual reports: evidence from Ireland // Accounting, Auditing & Accountability Journal, 2001. Vol. 14. Iss: 4. P. 423-436.
- [6] Brennan N., Connell B. (2000). Intellectual capital: current issues and policy implications // Journal of Intellectual Capital, 2000. Vol. 1. No 3. P. 206-240.
- [7] Bontis N. (2000). Assessing Knowledge Assets: A review of the models used to measure intellectual capital // In J. McKeen (Ed.), Knowledge-Based Enterprises, Kingston, Canada: Queen's Management Research Centre for KBE, republished from International Journal of Management Reviews, 2000. P. 1-24.
- [8] Bontis N. (2001). Assessing Knowledge Assets: A review of the models used to measure intellectual capital // International Journal of Management Reviews, 2001. Vol. 3. No 1. P. 41-60.
- [9] Bontis N., Dragonetti N. C., Jacobsen K. and Roos G. (1999). The Knowledge. Toolbox: A Review of the Tools Available to Measure and manage Intangible Resources // European Management Journal, August, 1999.
- [10] Bontis N. (2003). Intellectual Capital Disclosure in Canadian Corporations // Journal of Human Resource Costing and Accounting, 2003. Vol. 7. No 1 (2). P. 9-20.
- [11] Bontis N, Keow W.C.C., Richardson S. (2000) Intellectual capital and business performance in Malaysian industries // Journal of intellectual Capital, 2000. Vol. 1. No 1. P. 85-100.
- [12] Bontis N., Fitzenz J. (2002). Intellectual Capital ROI: A causal map of human capital antecedents and consequents // Journal of Intellectual Capital, 2002. Vol. 3. No 3. P.223-247.
- [13] Canibano L., Garcia-Ayuso M., Sanchez P. (2000). Accounting for Intangibles: A Literature Review // Journal of Accounting Literature, 2000. Vol. 19. P. 102-130.

- [14] Chan K. H. (2009). Impact of intellectual capital on organisational performance. An empirical study of companies in the Hang Seng Index (Part 1) // The Learning Organisation, 2009. Vol. 16. Г. 4-21.
- [15] Changa S. C., Chen S. S., Lai J. H. (2008). The effect of alliance experience and intellectual capital on the value creation of international strategic alliances // Omega, 2008. Vol. 36. Г. 298-316.
- [16] Chen J., Zhu Z., Xie H. Y. (2004). Measuring intellectual capital: a new model and empirical study // Journal of Intellectual Capital, 2004. Vol. 5. No 1. Г. 195-212.
- [17] Chen M. C., Cheng S. J., Hwang Y. (2005). An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance // Journal of Intellectual Capital, 2005. Vol. 5. No. 2. Г. 142-159.
- [18] Cheng K.Y. (2004) Intellectual Capital and Firm Performance of 1C Design Companies in Taiwan // Master's Thesis. National Cheng Kung University. Institute of Business Administration. January 2004.
- [19] Cohen S., Kaimenakis N. (2007). Intellectual Capital and Corporate Performance in Knowledge Intensive Smes // The Learning Organization, 2007. Vol.14. No 3. Г. 241-262.
- [20] Chukur O., Pasyechko N., Bob A., Sverstiuk A. (2022). Prediction of climacteric syndrome development in perimenopausal women with hypothyroidism. Menopause Rev; 21(4), 1-6.
- [21] Cuganesan S. (2005). Intellectual capital in action and value creation // Journal of Intellectual Capital, 2005. Vol. 6 (3). Г. 357-373.
- [22] Diez J. M., Ochoa M. L., Prieto M.B., Santidrian A. (2010). Intellectual capital and value creation in Spanish firms // Journal of Intellectual Capital, 2010. Vol. 11. No 3. Г. 348-367.
- [23] Dumay J. C. (2009). Intellectual capital measurement: a critical approach // Journal of Intellectual Capital, 2009. Vol. 10. No 2. Г. 190-210.
- [24] Hand J., Lev B. (2003). Intangible Assets: Values, Measures and Risks // Oxford University Press, Oxford, U.K., 2003.
- [25] Holland J. (1996). Fund management, intellectual capital, intangibles and private disclosure // Managerial Finance, 1996. Vol. 32. No. 4. Г. 277-316.
- [26] Huang C. F., Hsueh S. L. (2007). A Study on the Relationship between Intellectual Capital and Business Performance in the Engineering Consulting Industry: A Path Analysis // Journal of Civil Engineering and Management, 2007. Vol. 8. No 4. Г. 265-271.
- [27] Huang C. J., Liu C. J. (2005). Exploration for the relationship between innovation, IT and performance // Journal of Intellectual Capital, 2005. Vol. 6. No 2. P. 237-252.
- [28] Huang C., Wang M. (2008). The Effects of Economic Value Added and Intellectual Capital on the Market Value of Firms: An Empirical Study // International Journal of Management, 2008. Vol. 25. No 4. P. 722-731.
- [29] Kimura H., Basso L. F., Nogueira, S. G. (2010). The impact of intellectual capital on value added of Brazilian companies traded at the Bmf-bovespa// Journal of International Finance & Economics, 2010.
- [30] Komnenic B., Pokrajcic D. (2012). Intellectual capital and corporate performance of Mncs in Serbia // Journal of Intellectual Capital, 2012. Vol. 13. Iss: 1. Г. 106-119.
- [31] Leana C. R., Van Buren H. J. (1999). Organizational social capital and employment practices // Academy of Management Review, 1999. Vol. 24. No 3. Г. 538-555.
- [32] Lee L. L., Guthrie J. (2010). Visualising and measuring intellectual capital in capital markets: a research method // Journal of Intellectual Capital, 2010. Vol. 11. No 1. Г. 4-22.
- [33] Leliaert P. J. C., Candries W., Tilmans R. (2003). Identifying and managing 1 C: a new classification // Journal of Intellectual Capital, 2003. Vol. 4. No 2. Г. 202-214.
- [34] Lev B., Zarowin P. (1999). The Boundaries of Financial Reporting and How to Extend Them // Journal of Accounting Research, 1999. Vol. 37. No 2. P. 353-385.
- [35] Lev B. (1999) R&D and Capital Markets // Journal of Applied Corporate Finance, 1999. P 21-35.
- [36] Lev B., Sougiannis T. (1996) The capitalization, amortization, and value-relevance of R&D // Journal of Accounting and Economics, 1996. Vol. 21. P. 107-137.

- [37] Lev B., Sougiannis T. (1999). Penetrating the Book-to-Market Black Box: The R&D Effect // *Journal of Business Finance & Accounting*, 1999. Vol. 26 (3) & (4). P. 419-449.
- [38] Martsenyuk, V., Soldatkin, O., Klos-Witkowska, A., Sverstiuk, A., & Berketa, K. (2024). Operational stability study of lactate biosensors: modeling, parameter identification, and stability analysis. In *Frontiers in Bioengineering and Biotechnology* (Vol. 12). Frontiers Media SA. <https://doi.org/10.3389/fbioe.2024.1385459>
- [39] Martsenyuk V., Sverstiuk A. (2019). An exponential evaluation for recurrent neural network with discrete delays. (2019) *System Research and Information Technologies*, Vol. 2, 83 – 93. <https://doi.org/10.20535/SRIT.2308-8893.2019.2.07>
- [40] Maditinos D., Chatzoudes D., Tsairidis C., Theriou G. (2011). The impact of intellectual capital on firms' market value and financial performance // *Journal of Intellectual Capital*, 2011. Vol. 12. Iss: 1. P. 132 -151.
- [41] Mouritsen J. (2003). Intellectual capital and the capital market: The circulability of intellectual capital // *Accounting, Auditing and Accountability Journal*, 2003. Vol. 16. P. 18-30.
- [42] Musiienko V., Marushchak M., Sverstiuk A., Filipyuk A., Krynytska I. (2021). Prediction Factors For The Risk Of Hypothyroidism Development In Type 2 Diabetic Patients. *PharmacologyOnLine*, Volume 3, 585-594.
- [43] Nykytyuk, S., Sverstiuk, A., Klymnyuk, S., Pyvovarchuk, D., & Palaniza, Y. (2023). Approach to prediction and receiver operating characteristic analysis of a regression model for assessing the severity of the course Lyme borreliosis in children. *Rheumatology*, 61(5), 345–352. <https://doi.org/10.5114/reum/173115>
- [44] Musiienko V., Sverstiuk A., Lepyavko A., Danchak, S., Lisnianska, N. (2022). Prediction factors for the risk of diffuse non-toxic goiter development in type 2 diabetic patients. *Polski merkuriusz lekarski: organ Polskiego Towarzystwa Lekarskiego* [this link is disabled](#), 50(296), 94–98.
- [45] O'donnell D., O'regan P., Coates B. (2000). Intellectual capital: a Habermasian introduction // *Journal of Intellectual Capital*, 2000. Vol. 1. Iss: 2. P. 187-200.
- [46] Roos G., Roos J. (1997). Measuring Your Company's Intellectual Performance // *Journal of Long Range Planning*, 1997. Vol. 30. No. 3.
- [47] Saint-Onge. H. (1996). Tacit knowledge: the key to strategic alignment of intellectual capital // *Strategy and Leadership*, 1996. Vol.24. No. 2. P. 10-14.
- [48] Stewart T. A. (1991). Brainpower // *Fortune*, 1991. Vol. 123. No 11. P. 44-51.
- [49] Stewart T. A. (2002). The case against knowledge management // *Business 2.0.*, 2002. Vol. 3. No. 2. P. 37-50.
- [50] Sveiby K. E. (1998). Intellectual Capital: Thinking Ahead // *Australian CPA*, 1998. Vol. 68 (5). P. 18-22.
- [51] Sveiby K.E. (2001). A knowledge-based theory of the firm to guide in strategy formulation // *Journal of Intellectual Capital*, 2001. Vol.2. Iss: 4. P. 344-358.
- [52] Tseng C. Y., Goo Y. J. J. (2005). Intellectual capital and corporate value in an emerging economy: empirical study of Taiwanese manufacturers // *R&D Management*, 2005. Vol. 35. No 2. P. 187-201.
- [53] Youndt M. A., Snell S. A. (2004). Human Resource Configurations, Intellectual Capital, and Organizational Performance // *Journal of Managerial Issues*, 2004. Vol. 16, No. 3. P. 337-360.
- [54] V. Aulin, O. Lyashuk, O. Pavlenko, D. Velykodnyi, A. Hryniv, S. Lysenko, et al. (2019). Realization of the Logistic Approach in the International Cargo Delivery System, *COMMUNICATIONS*, vol. 21, no. 2, pp. 3-12.
- [55] Petraška, A.; Čižiuniene, K.; Jarašuniene, A.; Maruschak, P.; Prentkovskis, O. (2017). Algorithm for the assessment of heavyweight and oversize cargo transportation routes. *J. Bus. Econ. Manag.* 18, pp. 1098–1114
- [56] I. Tymchuk, M. Malovanyy, O. Shkvirko, N. Chornomaz, O. Popovych, R. Grechanik, D. Symak. (2021). Review of the global experience in reclamation of disturbed lands. *Inżynieria Ekologiczna*. 22(1), pp. 24–30. DOI: 10.12912/27197050/132097