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Intellectual Capital of Organisations in Kazakhstan: Need for Formation and Vectors of Development

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Abstract

In this study, it is acknowledged that, in the current phase of economic development, the transition from an industry-based economy to a knowledge-based economy is characterised by a shift in production factors. In consideration of this, the need to organise and develop intellectual capital in organisations in the country is considered. In the prevailing economic circumstances, intellectual capital is acknowledged as a pivotal asset and the principal source of wealth for any organisation, eclipsing natural resources, technology and even financial capital in terms of significance. The effective utilisation of intellectual capital empowers organisations to attain a competitive advantage and generate augmented profit through unique advantages. The capacity to oversee an organisation's intellectual capital is evolving into a targeted process, ensuring its sustainable development in a highly competitive environment. The paper examines the nature of intellectual capital, its structure, and its imperative necessity for the formation and development of organisations in the modern economy. The three main components of intellectual capital – human capital, structural capital and customer capital – are regarded as the primary mechanisms influencing an organisation's performance. The following section will describe the methods for evaluating each of these components and their impact on economic indicators. A thorough analysis of the constituent elements of intellectual capital is conducted, leading to the identification of their fundamental characteristics and properties. The study further establishes the foundations for their impact on organisational indicators, thereby determining the necessity for their formation and development. The paper provides a comprehensive analysis of the role, structure and significance of intellectual capital in the current economic context of the Republic of Kazakhstan, as well as the development of strategies for

its enhancement. The present study draws upon the findings of international research of a quantitative and qualitative nature in order to provide a comprehensive overview of the impact of intellectual capital and its individual components on the effectiveness of organisations.

Keywords: *Organisation Economics, Structural Capital, Consumer Capital, Competitiveness, Knowledge Economy, Intellectual Capital Development.*

Introduction

The concept of intellectual capital is closely related to the activities of the organization and its technological potential and can contribute to increasing the dynamics of the organization's development. Before defining intellectual capital, it is necessary to explain the concept of «intellectual». Intelligence is a set of characteristics attributed to an individual according to his various abilities, knowledge and skills [1]. In the post-industrial economy, intellectual capital is becoming the main value-forming factor in organizations. Intangible assets in organizations lead to organizational changes and bring economic benefits in the future. The rapidly developing competition in the modern economy, the dynamic business environment, the rapid development of digitalization and the rapid awareness of consumers are also leading to many changes in organizations. Their survival largely depends directly on their susceptibility and abilities to these listed changes [2]. Therefore, the income of organizations in a highly competitive environment is based not only on tangible assets, but also on intangible assets [3].

In defining the concept of «intellectual capital», authors most often put forward knowledge (as well as information, skills, competencies, abilities, experience, communication) as its main component, that which is created or carried by humans. However, on the other hand, the definitions provided show a tendency to interpret and reduce intellectual capital to the function of ensuring the growth of a company's value and creating competitive advantages through intangible assets [4].

In the context of rapid digitalisation of the economy and intensifying global competition, modern organisations face the need to constantly renew and improve their resources. One of the key assets that ensure sustainable development and competitiveness is intellectual capital. Companies that effectively manage knowledge, innovation, and relationships can not only create added value but also establish a sustainable competitive advantage.

Research Methods

This paper examines the nature and structure of intellectual capital within the economic system, as well as the methods used to identify and assess it. Particular attention is paid to the role of intellectual capital in creating competitive advantages for the national economy, and to its impact on economic growth. A systematic analysis of existing theoretical concepts enables the identification of the main trends in the study of this category

and the definition of prospective scientific directions for its further development. The research process employed a variety of general scientific methods, including empirical methods, algorithms for calculating and analysing statistical data, time series analysis, inductive and deductive methods, the systematisation of factual materials, and graphical interpretation tools. The study provides a comprehensive analysis of the economic nature of intellectual capital, its structural components and the methodological basis for identifying and valuing it. During the research process, comparative analysis and economic-statistical methods were employed, as well as tools for expert assessment. The results obtained provide a basis for the scientific systematisation of the place and importance of intellectual capital in the economy and for determining the influence of digital technologies on its development. They also provide the basis for developing practical recommendations aimed at the effective use and enhancement of intellectual capital.

Research Findings

In the prevailing economic climate, the significance of intellectual capital in determining the development and competitiveness of organisations has become paramount. Contemporary researchers regard intellectual capital as a leading economic resource with distinctive characteristics, such as the ability to be used multiple times and the accumulation of individual elements, namely knowledge and skills. The consideration of these characteristics in the management of organisational activities has the potential to impact organisational value, a matter of significance for all participants in economic relations. The efficiency with which organisations operate is directly linked to the manner in which they create and utilise intellectual capital. Intellectual capital is a pivotal factor in the development and competitiveness of organisations.

Title	Types Of Capital	Constituent Parts
The organisation's intellectual capital	Human capital	Employees' knowledge, experience and skills
	Structural capital	Processes, database, patents and organisational culture
	Relationship capital	The sum of business connections, reputation and interactions with external partners.

Figure 1 The composition of intellectual capital proposed by Roos J., Pike S. and Fernström L

Intellectual capital - in turn, is the sum of an organisation's intangible assets, including (figure 1):

- Human Capital - the knowledge, experience and skills of its employees.

- Structural Capital - processes, databases, patents and organisational culture.

- Relational Capital - the sum of business relationships, reputation and interactions with external partners [5].

The intercompatibility of these components paves the way for the team to enhance its innovative intensity and chosen strategy.

D. Wang, S. Chen identified the link between intellectual capital and high-performance systems (certain human resource practices – recruitment, large-scale training, knowledge and skill reward systems, teamwork, and employee participation in company management) and innovative opportunities [6].

The impact of intellectual capital on competitive advantages and business performance was studied by authors such as Chahal H, Bakshi P, have studied the impact of intellectual capital on competitive advantages and business performance. They examined the role of organisational innovation and self-learning in the relationship between intellectual capital and a company's competitive advantage [7].

Another researcher who focused on intellectual capital was Hollis E. He devoted his international research to the role of intellectual capital in the operations of firms. The research results showed that 94% of the senior managers surveyed consider the management of intangible assets to be one of the most important issues facing the company, while 49% of the managers surveyed believe that intellectual capital is the primary source of the stability of owners' welfare in the long term [8].

It is widely recognised in the literature that intellectual capital consists of the knowledge owned by the organisation – the knowledge also contributed by its employees [9].

According to some scholars, employees create intellectual capital through their competence, capabilities, and intellectual agility. Competence is primarily formed through education, opportunities are mainly developed through employees' behaviour, and intellectual agility is associated with the ability to solve problems with innovative solutions. Another definition of human capital is derived from Sveiby [10], according to which intellectual capital can be defined as «the ability to act in different situations to create tangible and intangible assets» [11].

Based on empirical research, all the constituent elements of intellectual capital are shown to successfully foster success and to be crucial as a key factor in enhancing market competitiveness and achieving an organisation's economic growth objectives.

The degree of intellectual development of human capital within the framework of organisations makes a significant contribution to macro-level development across the country.

It should be noted that the state plays a significant role in shaping the country's human capital by influencing the many factors that contribute to the development of citizens'

education, skills, and health. The most important factors include education, healthcare, investment in scientific research and development, employment opportunities, migration of the working-age population, support for cultural and scientific development, and others. Taking into account the main factors affecting human capital, it is possible to draw conclusions about its level in the country [12].

For Kazakhstan, which is implementing strategic priorities in industrial and innovative development, digital transformation, and economic diversification, the issue of forming intellectual capital and using it effectively is of paramount importance. Taking into account the distinctive nature of the institutional environment in the Republic of Kazakhstan, its sectoral structure, and the strategic objectives of socio-economic development, it is crucial to identify the priority directions for developing intellectual capital.

In the case of Kazakhstan, the development of intellectual capital is considered a strategically important factor in establishing a knowledge-based economy and ensuring the country's integration into the global innovation space. Experts from economic research institutes conduct a comprehensive assessment of the efficiency of using intellectual capital at the regional level, as well as the need to develop scientifically grounded strategies aimed at its development in the context of the digital transformation and spiritual renewal of society.

Moreover, empirical studies in the information technology sector prove that the financial results of companies are directly dependent on the level and quality of intellectual capital management. The formation of innovative competencies and the systematic development of intangible assets are becoming a decisive factor in increasing the economic efficiency of organizations in the country at the present stage.

A country's economic growth is measured in terms of gross domestic product (GDP). High GDP growth indicates a strong economy, while low growth indicates a weak one. High GDP growth shows that the company's performance growth is exceptional [13].

Moreover, if GDP has a positive and significant relationship with investment returns, this result indicates a high growth rate in the country's GDP, helps organizations improve their operations, and leads to higher market indicators [14].

The intercompatibility of these components lays the foundation for enhancing the team's innovative intensity and the effectiveness of its chosen strategy. The share of domestic funding for research and development (R&D) in the country's GDP is identified as the primary indicator of scientific capacity. Analysing the share of the high-tech sector in the Republic of Kazakhstan's economy makes it possible to substantiate the need for the formation and development of intellectual capital scientifically,

Analysing the indicator of domestic funding allocated from GDP for research and development in Kazakhstan shows a positive result, with growth continuing for the second consecutive year (figure 2).

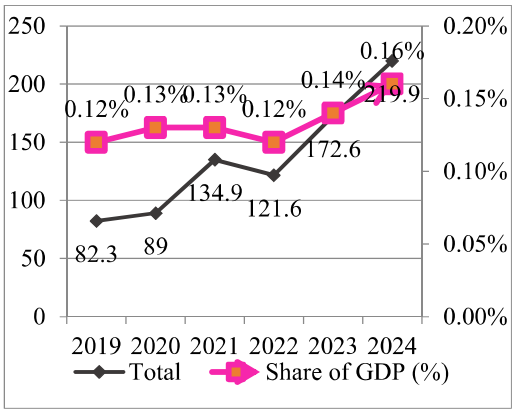

Figure 2 Percentage share of financing for R&D in GDP of the Republic of Kazakhstan for 2019–2024 [15]

According to data from the National Statistics Bureau of the Ministry of National Economy of the Republic of Kazakhstan, funding for science increased by 42% in 2023 and by 27,3% in 2024.

Although the economy's demand for science has increased due to the growth of financial transfers, the indicator remains low, at 0,14% to 0,16% of GDP. According to data from the UNESCO Institute for Statistics, Kazakhstan is an underperformer compared to many developed countries. For example, the share of R&D in GDP is 3,4% in Japan, 6% in Israel, and 2,3% in the Netherlands. The target Kazakhstan wants to achieve by 2027 is at least 1% of GDP.

Detailed data on the ownership structure of organisations shows that state-owned organisations account for more than half of all R&D funding. Last year, they allocated 132,6 billion tenge of the total science funding. State-owned enterprises were responsible for the growth in the overall volume of funding. The funding source structure shows that two-thirds of science funding comes from the budget. Last year, basic, grant and programme-targeted budget funding for R&D amounted to a total of 162,7 billion tenge, or 74,1% of the total. A similar proportion of state funding has also been observed in recent years [16].

Analysing the number of organisations conducting scientific research and experimental development in the formation and development of today's economy is important for justifying the need to create and develop intellectual capital. This indicator reflects the level of innovative activity among organisations in Kazakhstan, as well as the extent to which businesses participate in creating new knowledge and technologies — the main components of intellectual capital. Changes in the number of organisations conducting R&D&I allow us to assess the state of the national innovation system, identify trends in the development of scientific and technical potential, and determine existing barriers to knowledge generation.

Figure 3 shows that the number of organizations carrying out R&D in the Republic of Kazakhstan directly affects the results of research and development.

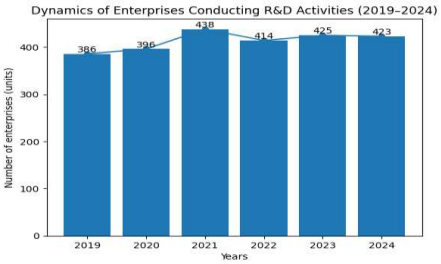

Figure 3 Dynamics of Enterprises Conducting R&D Activities in Kazakhstan (2019–2024)

Based on the data, the highest number of organisations implementing R&D in the country was 438 in 2021. Last year, the total number of such organisations was 423, one-third of which - 142 institutions - were located in the city of Almaty. Almaty plays a leading role in Kazakhstani science. This is evidenced by the fact that it has the largest number of enterprises, higher education institutions and R&D institutes engaged in scientific activities.

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As the centre of research activities in Kazakhstan, Almaty is distinguished not only by its strong material and technical base, but also by its significant intellectual potential. Empirical data shows that human capital is the main driving force behind scientific achievements and will retain this role. For instance, according to last year's figures, Almaty implemented 39,2% of the total number of research projects conducted under the Government of the Republic of Kazakhstan's grant funding programmes (MoE RK, 2024). Of the 27,100 employees of these scientific organisations, approximately 10,600 are based in Almaty and participated in projects from this city. It is also noted that the number of scientists and researchers in Almaty has grown by around 20% over the past five years.

To assess the level of researcher involvement in research and development (R&D), experts often use indicators such as the number of researchers per 10,000 workers. For instance, among Organisation for Economic Co-operation and Development (OECD) countries, this indicator ranges from 40 to 238 (figure 4).

Table 1 Dynamics of the number of personnel engaged in Research and Development (R&D) in Republic of Kazakhstan, 2019-2024

Indicator	2019	2020	2021	2022	2023	2024
Total number of personnel engaged in R&D, thousand people	21,8	22,7	21,6	22,5	25,5	27,1
Including in Almaty city, thousand people	8,9	9,3	8,7	9,2	10,0	10,6
Share of Almaty city, %	40,8	41,0	40,3	40,9	39,2	39,1

Source: Official statistics of the Ministry of Science and Higher Education of the Republic of Kazakhstan (2024).

According to the National Report on Science of the Republic of Kazakhstan, the country's indicator was only 25,5 researchers per 10,000 workers in 2023. Within the country, the highest figure was recorded in the city of Almaty, at 106 researchers per 10,000 workers.

Despite measures being taken to encourage the commercialisation of scientific research, a significant proportion of the results from applied scientific projects and programmes are not in sufficient demand in the domestic market. This trend is confirmed by the relatively low proportion of commercial projects within the total volume of applied scientific research. According to the data, this share was 23,5% in 2018, decreasing to 20% in 2019 before increasing to 25% in 2020 and 26,1% in 2021, reaching 29, 4% in 2023 [17].

The analyses conducted identify the need for Kazakhstan organizations to build intellectual capital and the structural problems in their development vectors. More than half of all funds allocated for scientific research and experimental development (R&D) are spent on scientists' and researchers' salaries. Even under these conditions, in 2024, this funding item amounted to 115,2 billion tenge in Kazakhstan, an increase of 32,1% compared to the previous year.

The analysis conducted shows that in the field of developing science and the intellectual capital of organizations in Kazakhstan, there are not only achievements but also a number of significant obstacles. The main problems include the following:

- Limited system for training scientific personnel: The need to expand the base of existing scientific schools.
- State dominance in R&D funding: A high share of public participation in domestic R&D funding, which limits investment from the business sector.
- Misallocation and instability of funding: Mismatch and systemic shortages in

R&D funding across different types of scientific research and development.

- Lack of applied results: A low share of engineering and design work in the total volume of R&D funding.
- Weak business demand for innovation: Low level and fragmentation of demand from the business sector to solve complex scientific problems.
- Low innovative activity: Limited innovative activity of enterprises.
- Human capital shortage: A lack of highly qualified personnel, especially specialists in specialized fields.
- Lack of international integration: Insufficient integration of Kazakhstan into global innovation chains.
- Lack of strategic planning: The absence of systematic corporate strategies for developing human capital within organizations.

Innovative activities and corporate profitability. Structural capital, which encompasses internal processes, information systems and organisational strategies, strengthens a company's knowledge base and facilitates the implementation of innovative ideas. Relational capital, which encompasses relationships with clients, partners, and other external entities, plays a pivotal role in cultivating a positive image and reinforcing the company's market position [18].

In the context of Kazakhstan, a number of strategic measures can be proposed to solve the aforementioned problems and effectively develop the human capital of organisations. These include:

- Developing an integrated research infrastructure: The establishment of science clusters that integrate education, science and business, particularly those based on leading higher education institutions. These clusters should include interdisciplinary research groups in priority sectors of the economy, involving business partners.
- Encouraging private sector funding: Introduce tax incentives, innovation vouchers and support systems for technology start-ups to boost domestic investment in research and development (R&D).
- Increase the stability of scientific funding. Implement programmes that provide the scientific sector with predictable, long-term government funding. This requires the development of a stable and clear national methodology for allocating funds among different types of research.
- Accelerating the commercialisation of applied results: Create mechanisms that incentivise the development of prototypes and the commercialisation of scientific research, such as granting special funding or tax incentives to organisations for their achievements in this area.
- Improve the quality and retention of human capital. Encourage the return of highly qualified professionals, including

Kazakhstani nationals educated abroad, by continuously updating educational programmes to meet current market needs. This should also include raising the salary level of research personnel in line with market requirements.

- Expand international scientific and technical cooperation by increasing active participation in international programmes such as Horizon Europe, OECD STI and Asian innovation platforms. This will support the international mobility of human capital and the exchange of knowledge within these organisations.

Conclusion

As a result, developing human capital (intellectual capital) within organisations is not just a modern management trend, but an objective necessity for any organisation seeking to lead the way and achieve long-term profitability in the digital era. Effective management of human resources, structural assets and external relationships enhances innovative potential and financial results, and is also a key factor in ensuring sustainable competitiveness in the digital economy. For the Republic of Kazakhstan, this aspect is particularly important within the framework of the National Strategy for Digitalisation and Economic Modernisation.

Therefore, an organisation's competitiveness is directly linked to its ability to continuously develop, renew and utilise human capital effectively to address internal operational challenges and external threats. The success of this process requires the harmonious integration of human, structural and relational capital to ensure innovative development and continuous growth.

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