CHAPTER 1

The global intellectual capital

1.1. Intellectualization of modern world economic development

A fundamental process that determines the formation of a new post-industrial stage of social development is a comprehensive process of intellectualization, which brings revolutionary changes to all components of the economic system, ways of interaction between the business entities, and the nature of competition itself. The process of intellectualization is accelerating, while transforming the trends and processes of world economic development. Knowledge and information become a key resource for the emerging post-industrial paradigm. Thus, the factor related to the intellectual component of socio-economic processes, namely the intellectual resources that directly determine the parameters of economic growth, creates the foundations for innovative development and the
formation of post-industrial society, is crucial.

The main processes in achieving success by various actors (the state, educational institutions, scientific institutions, enterprises, individuals) are the processes of knowledge creation, dissemination, and use. Ensuring and enhancing the international competitiveness of various actors in a highly competitive global economy is becoming an accumulated set of intellectual resources that are adequate to the requirements of the modern information revolution, which are capable to ensure the innovative character of the country’s development, which is the only possible process in today’s globalized environment. A society that realizes the idea of replacing the industrial production concept is basing on a qualitatively new economic base - the knowledge-based economy, in which economic well-being is made by high technology, innovative capabilities, and higher level of the society’s intellectual development.

The analysis of foreign and national economic literature shows both the great interest in this problem and many issues of present interest related to the intellectualization processes and their influence upon the world economy development, which leave room for scientific research. Various aspects of the intellectualization process development within the framework of the information society formation are presented in the works made by foreign scientists such as A. Toffler, D. Bell, M. Masuda, F. Mahlup. Their conclusions and generalizations are very important for understanding the impact of new technologies upon all spheres of public life, including the international economic relations. They focused on the role of information, knowledge, education, and intelligence in the transformation of the economic and social structure, and in the
processes that are forming a new type of employee.

In the works of such famous scientists as K. Marx, J. Keynes, D. Gelbraith, S. Strumilin, S. Glazyev, D. Bell, V. Inozemtsev, M. Kondratiev, E. Toffler, A. Chukhno, and J. Schumpeter, etc. a high profile is given to issues related to the analysis of the evolutionary processes of society, the transition from one technological mode of production to another, changes in the nature of labour, information components of these processes, quantitative models of evolutionary dynamics, changes occurring in the production system, and the conditions for social progress and economic development in the whole society.

The works by Chukhno, which noticed constantly growing role of information in the economic activity development, and the need to develop the elements of creativity, ingenuity, education, and talent, that is the intellectual component in the course of modern employee’s work, deserve a special attention. However, the problem how intellectualization makes influence upon the world economy development still needs to be further elaborated, with a focus on their dynamics, driving forces, and peculiarities of these global processes.

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1. workforce development accelerates as a result of higher education and increased funding for science and education;
2. the work process changes, as its environment

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becomes more information-intensive;
3. the increasing role of information makes changes in the production facilities, which are described by the intangible assets development;
4. the production process changes due to expansion of production factors;
5. the industrial relations system is undergoing transformation. Such transformation is manifested in the fact that together with the changing role and quality of the human factor, the labour relations and the relations in the organization and production management are also passing through transformation, which also require management of innovation activity;
6. then, the gradual transition to an innovative model of economic growth occurs.

We will consider each of these stages development below in more details. The technological revolution and the related informatization of society is the basis for modern evolution of the work content and nature. These processes are global in nature, although they have different dynamics due to the national features of their economies and their level of integration into the international division of labour. Thus, the emphasis shifts from the technical facilities to the human resource reproduction as the main value, which occurs due to the increasing value of the intellectual component in the social resource reproduction process. Qualitative changes are manifested in the diffusion of innovative management processes, in the increasing intellectualization, and informatization of all elements that the productive forces comprise. Moreover, as mentioned quality
factors evolved from price competition factor up to the goods quality factor (since mid 60s), then they evolved to the technology quality (70-s), eventually (80-s-2000-s) to the personnel quality.

Therefore, the old industrial type of economic development is being replaced by the humanitarian type of economic development, which is driven by scientific knowledge, creativity, and intellectual potential. According to A. Toffler, “...we are shifting from a workforce economy to a brain power economy… In the new society, knowledge is a major production factor”. “In the current economic context, knowledge becomes the new nucleus of progress. If in the traditional economy the production factors were land, labour, and capital, in the new economy knowledge is the major component of the productive system”\(^2\). The trend of increasing labour intellectualization accompanies the whole human development process, which is stated by many well-known national and foreign scientists\(^3\).

The essence of the intellectualization process and its role in modern society is revealed through a system of basic categories. Summarizing the approaches to the intellectualization process that are most popular and demanded in the current research, we proposed a scheme that ensures methodological identification of the key concepts in this field (Figure 1.1.1):


First of all, the concept of “intelligence” is the starting point. There is no single, commonly accepted definition of intelligence. In the economic encyclopedia, “intellect” (from the Latin “intellectus”) is defined as cognition, understanding, mind, ability to think, rational cognition\(^4\). In S. Ozhegov’s dictionary, the following definition is given: “intelligence is a mental ability, a mental beginning in a person’s existence”\(^5\).

\(^4\) Eкономична енциклопедія. В трьох томах. Том 3. - 2002
\(^5\) Oзгєов, С.І. (1993) Словар русского языка. – М., 1993
Generally speaking, despite the differences in the interpretation of intelligence, it is rather a mental energy embodied in knowledge, experience, information, and intellectual property. When mental energy is organized with a focus on creating new values, intelligence becomes a production facility.

The essence of intelligence and, accordingly, the process of intellectualization is a subject for studies in various sciences: biology, psychology, cybernetics, social sciences. In modern context, the study of intelligence is reflected not only in the humanities and technical knowledge, but also in the field of economics, which creates the conditions for its formation, use, and functioning.

As a particular type of human activity, the intellectual work can be reproductive or creatively productive, when an intellectual product is made. The results of intellectual work are the driving force for the material production development, the economic system expansion and complication, and the intellectual-intensive industries deployment. The new quality and level of well-being are linked to the use intellectualization of labour and production processes.

The concept of “intellectual work”, influencing the basic fundamental characteristics of labour, the parameters and patterns of employment formation, is expanding and becoming complicated by its content. The intellectual work should be considered as a process for human informational and transformative activity. The essence and content of this process is in generation and implementation of innovations, which increase productivity, improve quality of life, and make knowledge itself more effective. The production of
common tangible property requires such factors of production as land, labour, capital. And this is not enough when creating intellectual property. For its creation, it is necessary that in the process of work includes an element of creativity, element of invention, education and talent. According to V. Goylo, the intellectual work is “a conscious activity of a human, a group, and the whole society in the generation of knowledge and information about them”⁶. In our view, intellectual work is a human activity aimed at creating material goods, providing services, organizing the functioning of the economy and society and managing them, in which intellectual and mind functions predominate.

Quite often, the problem of intellectualization of work is viewed from a technocratic standpoint, that is, it is narrowed to the computerization and spread of information and communication technologies (ICT). The idea of creating artificial intelligence, which has become the subject of research on various theories, is popular. Generally speaking, the development of artificial systems problem that can perform intellectual work is implemented in two directions. The first one is represented by the researchers of cybernetic school, whose efforts are aimed at modeling the systems that reproduce the human brain functioning. On the whole, it has not yet been possible to create the artificial intelligence that could compete with the natural intelligence⁷.

The second direction combines research in which the term “artificial intelligence” means the development of systems

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that enhance the intellectual activity. Thus, in those fields of science and activity, where it is impossible to use mathematical modelling, the logic-linguistic models are presented in electronic computers in the text form. In particular, in the works of I. S. Ladenko, conceptual development of the theory of “intellectual systems”, in which technical facilities and specialists of different spheres are integrated, occurred. At the same time, the development of theories and the implementation of artificial intelligence programs have some obstacles, due to the uncertainty of the concept of the essence of intelligence and its structure. Generally speaking, the technical sciences, including cybernetics, intellect as a mental capacity and thinking as a mental activity are not distinguished yet.

Work intellectualization is primarily manifested in changes in the content and nature of work. The content of the work is determined by the technical and functional side and reflects the balance of its complexity, qualification and scientific level of the workforce, the ratio of stereotyped thinking and creativity, routine and innovation. This is the nest way how to use an employee’s physical and intellectual abilities. The complexity of the work content necessarily requires new production facilities, which are the embodiment of complex intellectual functions and, as a result, themselves capable of performing complex, information-rich operations. Modification of the work content leads to qualitative changes in the nature of work: complication of property relations, diversification of objects of property, including information,
strengthening the interdependence between individual and general, globalized labor.

Considering the genesis of the work content, S. G. Strumilin notes that the machine first makes unnecessary physical force, and then the skills of the worker who manages the machine; at the same time, the human intellect is of great importance\textsuperscript{10}. In the history of mankind, intellect, knowledge have always been the driving forces, and the mechanical work, in the process of which ready know-how is periodically used, was the last. In this regard, in any field of activity, it is possible to distinguish a routine work, which is conducted based on an established scheme, and innovative, creative work, aimed at creating new goods and production methods.

The progress that is observed in the content and nature of work has always been achieved in the result of its subject and social environment development. In all structural elements of the work process, changes, which determine and reveal the process of intellectualization, occur. Modern scientific and technical revolution introduces fundamental changes in the way of work and in the way of interaction of factors of production. There is a radical transformation in the production facilities, labour tools, energy, production technology, and production management. K. Marx pointed out: “Economic epochs differ not in what is produced, but in how it is produced, by what labour facilities”\textsuperscript{11}.

The spread of information technology in the context of the modern scientific and technical revolution is gradually dematerializing production, making it more information-

\textsuperscript{11} Marx, K., Engels, F. Soch., т.23, s.188-189, т.46, ч. II, с.110
intensive, highlighting the post-industrial mode of production through the active use of knowledge and intelligence. The information revolution and the emergence of the information society are also changing the relationship between traditional material and immaterial elements of production. In modern context, microelectronics and “artificial intelligence” bring new trends, saturate traditional technology with intellectual functions.

The emergence and introduction of the fifth generation of computers with embedded intelligence to production creates a further basis for the intellectualization of labour. Artificial Intelligence becomes an integral part of the work process. It is clear that this dramatically changes the place of human in the production process, and the nature of his work. Human labour in the maintenance of machinery in the industrial economy is transformed into the activity of managing and controlling their work. Under these contexts, information becomes a facility that is optimally combining all factors into a single intellectualized production process.

The use of such complex, information-intensive products and production facilities in the production process changes the work process itself. It reduces the proportion of mechanical, routine, physical functions, and, conversely, the need for a creative approach to the work process, analytical and innovative functions, grows. Changing the content of the employee also requires increasing the level of education, skills, intelligence, business qualities, innovation, responsibility and creativity as integral features of the modern worker.

Intelligence and intellectualization cannot be considered only as the accumulation of information, since information alone, without human emotions, is not capable of changing
human culture and contributing to the progress of humanity. It is also impossible to narrow intellectualization only to external forms of its manifestation (spread across the enterprise, industry, economy as a whole).

The intellectualization process is manifested both in the development of new information technologies and in the growth of intellectual labour share in aggregate labour. The concepts of “intellectual labour” and “intellectualization of labour”, though closely related, reflect different phenomena. The intellectual work and the intellectual nature of work indicate on the activity nature that is implemented precisely to develop and use knowledge and information. Intellectual work is a form reflecting activity with predominant performance of intellectual functions, functions of generation, transmission and use of knowledge and information is manifested. On the other hand, intellectualization is a process that has its own dynamics and represents certain changes in the structure of work, which are determined by the increase of qualitative features of an already set parameter of intellectual work and their spread.

The intellectualization of work is associated with the strengthening of theoretical, analytical thinking in human labour. Currently, there is a significant increase in proportion of executive operations in mental work, and they also require a fairly high level of intellectual activity, initiative, self-organization and responsibility. The most widespread point of view is that the intellectualization of labour is to change the correlation of physical and mental functions in the work of production workers.

In the modern process of work, regardless of the place of the worker in the production process, there are several
levels, the nature of which is both physical and intellectual. The intellectual component of the modern work process has considerable variations and different content of creativity. Creative work in its pure form is the prerogative of the field of fundamental and applied scientific research, education, public administration, top-management of large enterprises, etc. At the same time, the elements of creativity become integral as the scientific and technical revolution deepens, not only in all fields of activity, but also at all hierarchical levels.

The process of labour intellectualization is confirmed by an analysis of the increase in the education level of the population occurring in the whole country, by individual sectors of employment, by occupational groups and qualification groups. Specific features of the intellectualization process are increasing the share of mental functions in the process of work, improving the qualification and educational level of employees, increasing the intellectual component in the process of work and the production process generally speaking, the increase in the share of intellectual products.

Thus, intellectualization is a general tendency of socio-economic development of society, which is manifested in the increase of volume and role of intellectual activity. The intellectualization of economy is manifested in the change in the economic structure in the direction of increasing the share of information and intellectually intensive industries, the reduction of low technological and mining industries; increasing the proportion of highly skilled workers; raising the scientific and technological level of the production facilities and increasing the shares of science-intensive and high-tech products in GDP. The intellectualization of work is the
process of changing the nature and character of work, which is manifested in the increase of its intellectual component.

As a result of the work intellectualization, a modification industrial relations system occurs, which, together with the change in the role and quality of the human factor, transforms labour relations, relations in the organization and management of production, which necessarily imply the management of innovation activity, and changes in the social division of labour. One of the peculiarities is that there is a radical restructuring of the production process, which, firstly, requires a significant increase in the educational, professional level of workers, and secondly, is manifested in the increase in value added created.

The defining feature of the present is the growing need for education, retraining of employees - during an active life, a person in the information society is forced to constantly learn, improve own skills and even change profession. The requirements for the intellectual and creative abilities of the person, for his psychophysical features are increasing. There is a problem of unemployed people who are in active age, but their ability to work does not meet the new requirements. The problem of adequate high pay for intellectual labour and the readiness of representatives of other social groups is exacerbated.

An information society focused on intellectual development and immaterial wealth (intelligence, information, knowledge) forms a new paradigm, in which intellectualization becomes a decisive factor. Intellectualization means not only the growth of intellectual functions in the process of work and, accordingly, the improvement of the educational level of employees, but also the strengthening of the cultural and ethical component. Economic activity is increasingly being built on a combination of
economic interests, ethical, cultural and environmental values. Modern sophisticated production requires such an economic mechanism that it gives the individuals greater opportunities to realize their abilities and self-expression. The results of the production process are manifested in the development of innovative activity, which is implemented on the basis of a combination of scientific and technological developments and their introduction into production.

Among the institutes of post-industrial knowledge economy, in our opinion, the most important role is played by the institute of intellectual property, the formation of which in modern sense reflects the evolution, on the one hand, of organizational forms of scientific and technological progress, and on the other, property relations themselves (Figure 1.1.2):

As a key tool for innovation policy, the institute of intellectual property ensures the exchange of intellectual product between creators, intermediaries, end consumers; activates systematic scientific and technical research, inter-subject and interdisciplinary diffusion of innovations, cooperation between subjects of innovation process through technology transfer, integrates resources for joint research, promotes development of new forms of patent-license cooperation of firms, involvement of consumers; extends the boundaries of national innovation systems by reflecting the latest scientific and technological developments in the process of registration and protection of domain names on the Internet, the functioning of electronic patent filing and processing systems, the formation of modern elements of infrastructure, the spread of audit and mechanisms of intellectual property insurance, the development of diverse structures, integration into innovative small and medium-sized business systems; contributes to the development of a
system of financing innovative activities, rationalization of the cost structure based on compensation and capitalization of innovative costs through the realization of intellectual property items, sale of intellectual property rights, signing licensing agreements, enticing national and foreign investments, setting a favourable image of innovative formations, interlacing on intellectual property objects with the latest innovations and economic relations.

It should be noted that among national and foreign scientists, there is no consensus on the essence of the concept of intellectual resources and its relation with such interrelated
categories as “human capital”, “intellectual capital”, “intangible resources” and others. In the economic encyclopedia, “workforce” is interpreted as the ability of a person to work, a set of needs, physical, intellectual and other abilities, acquired knowledge and experience used in the production of material goods and services12. However, with the advancement of human progress, labour has ceased to be merely a factor in production. Investments in the workforce (such as education, health care, culture, and qualification) form a new quality, which is a new form of human wealth. Therefore, in the modern sense, the concept of “human resources” as the embodiment of all human abilities that can be used in the production process is widespread.

Human capital is considered as a set of the human capabilities that are realized, included in the system of economic relations for the creation of a new product and additional income. The basis of human capital is the natural qualities of a person, which can be developed through investment in its formation. Moreover, these investments bring a high return, which is manifested at the individual level - for a person, and at the public level - for the enterprise and the economy as a whole.

The concept of “intellectual resources” is both broader and narrower in terms of human resources. On the one hand, it necessarily includes human as the primary carrier of intelligence. But not all qualities of human resources can be attributed to intellectual ones. Yes, the purely physical features of human resources can be hardly attributed to a direct component of intellectual resources. On the other hand, intellectual resources include the results of human intellectual activity: new knowledge, new technologies, patents, and so on.

12 Economicnichna enciklopedia. V trjoh tomah. Tom 3.- 2002
Intellectual resources are becoming a major factor in ensuring economic growth and, generally speaking, the new quality of social development. One of the most important modern trends is that the economy has acquired new, distinctive of the classical era, features. It has become a “brand”, the main features of which are super-informatization, intangible assets, post-traditional pricing formula of the final product. An illustrative example of this is the reflection of the value of intellectual capital and value of the world’s leading companies. Up to 88% of the average company value is now a direct result of the only active source of intellectual capital - its people. The average is at least 50% higher than the Dow Jones Industrial Average (DJIA). At Pfizer Company, the cost of intellectual capital is 11% higher than the market value of the company. Boeing owns intellectual capital that exceeds the company’s value by 7.4% and Apple - by 4.07%. Generally speaking, given the total value of the company, these amounts are quite significant. Moreover, the value of intellectual capital of multinational companies included in this rating is not lower than 50% of the value of the company itself, which confirms the crucial role of intellectual capital in the formation of competitiveness\(^\text{*}\).

The main factors behind this relationship are know-how, patents, copyrights, management technologies, business reputation, brand or trademark. The peculiarity of intellectual resources in relation to other factors of production is in the fact that the costs of these are the nature of long-term investments, the return on which can be obtained much later than from other types of investments.

\(^{13}\) 2016 Intellectual Capital Index. URL: https://talentgrowthadvisors.com/our-big-idea/ici
https://talentgrowthadvisors.com/our-big-idea/ici/djia-2016-ici
Thus, in the current context, the intellectual property is the leading factor in the system of factors that shape the potential of economic development and provide the country’s international competitiveness. Intellectual resources create opportunities for breakthroughs in economic and scientific and technological development even for those countries that do not have significant natural resource factors for this purpose. Intellectualization, acting as a global trend, has a specific manifestation in individual economic systems. The manifestation of this tendency in individual national economies is realized as a nonlinear, but at the same time consistent and progressive process of accumulation of intellectual features. Today, we can consider not only the leadership of the USA, Western Europe, Japan, China, and new industrialized countries. In the recent years of the twentieth century, leaders in the international arena included Hungary, Finland, Sweden and Ireland. These countries were able to take their competitive advantage in the production and trade of information and communication technology products and to enter the world market. Thus, the intellectual factor has unlimited potential for development, creates for each country the opportunity to realize its internal resources and find competitive advantages in a globalized economic environment.

The development of labour intellectualization processes in transition economies has its own peculiarities. Ukraine is known to have a sufficiently high intellectual and educational potential and today remains an exporter of scientific ideas along with their owners. That is why the problems of reproduction and use of intellectual resources are of particular importance

for Ukraine, which has experienced difficult conditions of transformation of social relations and now faces the challenge of making a breakthrough in the economic and innovative development of the country. The third wave of the scientific and technological revolution, which is manifested in the spread of information technology, has influenced upon national production only partially, which is the lag of almost all branches of material production in terms of technology and technics, and brainpower outflow. Manufacturing and reproduction in the new management context is implemented on the outdated technological base or basing on outdated foreign technologies. The new quality of intellectual resources is a necessary prerequisite for the country’s development, while the solution of technical modernisation problems in the national economy provides more opportunities for an innovative breakthrough in a competitive market, which in modern context is possible only due to the development of intellectual resources in the society.

The process of intellectualization, acting as a global feature of modern global development, transforms not only the internal structure of the countries’ economies, but also the whole system of external relations, the integration of countries into the new world economic space. This is confirmed by the development of scientific and technical cooperation, the migration of highly skilled labour, the growth of trade in high-tech products, and the change in traditional forms of international economic relations.

The process of intellectualization can be characterized by various indicators, which can be grouped as follows:

1. indicators of human resources development (increase of the level of education of the
population, increase of the share of population with higher education, number of students, scientists, creative professions, etc.);

2. indicators of adaptability to manufacturing and production development (intellectual capacity, level of computerization, number of patents, etc.);

3. indicators of production outputs (share of high-tech products, share of innovative enterprises, venture capital, etc.).

Thus, intellectualization is manifested as a constant trend in world economic development, which is highly dynamic and determinative in the new economy formation process in the present context. In order to ensure a country’s competitiveness in a highly globalized environment, and the improvement of the achieved positions, it is necessary to provide a targeted selection of people interested in the process of activity and creative work, to create and support favourable conditions for it in different ways. This direction should be of priority for the society, the state, and should be manifested in the formation of a strategic vector of social development on the basis of inclusive intellectualization, creating the conditions for the breakthrough development of education and science, their close interaction with the real sector of the economy. It is necessary to adopt a targeted innovation policy, develop an appropriate climate, image and comfort for the development of human and intellectual resources within national innovation system (Figure 1.1.3).
At the same time, the availability of even considerable intellectual resources is not sufficient, since this potential becomes a real factor of innovative development only if there are effective mechanisms for its realization. Only the inclusion of intellectual resources in the system of economic relations with proper valuation in the market or in society makes them intellectual capital - a key factor in technological, economic and social progress. Further studies of intellectual capital, its structural dynamics, and integrative interconnection with network, creative, and social capital are actualized at the
fundamental and prognostic level in line with the leading trends of
global development. The phenomenon of artificial intelligence,
capable of qualitatively transforming not only technological,
but also socio-economic and civilizational paradigm of social
development, requires special research attention.

1.2. Intellectual capital: identification and
measurement issues

Formation and development of knowledge-based
economy in the early 90’s of the last century have largely
contributed to an update of matters related to the interpretation
of a category of “intellectual capital”, definition of the
structure and value of intellectual capital. It should be noted
that the question of existence of intellectual capital has been
already touched upon in 1964 in a work of management
guru Peter Drucker “The Concept of the Corporation”\textsuperscript{15},
in which he spoke about the “knowledge workers”. The
term “intellectual capital” has been introduced in scientific
environment by an American scientist John K. Galbraith\textsuperscript{16} in
1969. In a letter to an economist Michael Kalecki dated 1969
John K. Galbraith wrote: “I wonder if you realize how much
those of us in the world around have owed to the intellectual
capital you have provided over these past decades”\textsuperscript{17}. In
the 90’s of the 20\textsuperscript{th} century, thanks to the works by Thomas
Stewart\textsuperscript{18}, the term “intellectual capital” has gained ground.

\textsuperscript{17} Feiwel, G.R. (1975). The Intellectual Capital of Michal Kalecki: A Study in Economic
Nicholas Brealey Publishing, Business Digest, New York, 1997
Thomas Stewart defines intellectual capital as intellectual material – knowledge, information, intellectual property and experience – that can be put to use to create wealth. Theoretical and methodological studies of intellectual capital are also introduced in scientific works by Leif Edvinsson and Michael S. Malone; they emphasize the importance of intellectual capital in organizations, paying attention to the matters of measuring and management approaches of intellectual capital; Annie Brooking, who has considered the processes of identifying, documenting, and measuring intellectual capital; Adam Smith, who has proposed the original idea of “human capital”; Hubert Saint-Onge, who has created the concept of “customer capital”; Nick Bontis has considered conceptual measures and models regarding intellectual capital and its impact on business performance; Karl E. Sveiby; Daniel J. Knigh; Goran Roos, Stephen Pike and Lisa Fernstrom; Olena Grishnova and other scientists.

19 Ibid


Intellectual capital can be expressed in monetary terms, by determining the cost of intangible assets of the company, its product innovation. The ability to form the intellectual
capital defines the intellectual potential of the company, and the knowledge appears as a result of the intellectual potential. The table below illustrates the definitions and components of intellectual capital (see Table 1.2.1).

**TABLE 1.2.1. Definitions and components of intellectual capital**

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<tr>
<th>Authors</th>
<th>Definitions and components</th>
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<tbody>
<tr>
<td>Galbraith (Feiwel, 1975; Bontis, 1998)</td>
<td>It is more than just “intellect as pure intellect” but rather incorporated a degree of “intellectual action”. In that sense, intellectual capital is not only a static intangible asset per se, but an ideological process; a means to an end.</td>
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<td>Saint-Onge (1996)</td>
<td>It is composed human capital, structural capital, and customer capital</td>
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<td>Brooking (1996, p.12)</td>
<td>“Intellectual capital is the term given to the combined intangible assets which enable the company to function.” Intellectual capital is comprised of four types of assets: market assets, intellectual property assets, human-centred assets, and infrastructure assets</td>
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<td>Stewart (1997)</td>
<td>It is intellectual material – knowledge, information, intellectual property and experience – that can be put to use to create wealth. It is collective brainpower. It’s hard to identify and harder still to deploy effectively. But once you find it and exploit it, you win</td>
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<tr>
<td>Edvinsson and Malone (1997)</td>
<td>They describe intellectual capital as a knowledge that can be converted into value. It equals the sum of human and structural capital. It encompasses the applied experience, organizational technology, customer relationships and professional skills that provide the company with a competitive advantage in the market.</td>
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38 Ibid, p. 33.
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<tr>
<th>Author (Year)</th>
<th>Definition</th>
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<tr>
<td>Sveiby (1997)</td>
<td>It consists of three parts: individual competence (employees’ skills and abilities), internal structure (the organisation’s processes and procedures); external structure (the organisation’s image and relationship with its customers)</td>
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<tr>
<td>Bontis (1998)</td>
<td>It consists of three elements: human capital (human intellect), structural capital (organizational routines), customer capital (market relationships)</td>
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<td>Stewart (2002)</td>
<td>It is just that: a capital asset consisting of intellectual material. To be considered intellectual capital, knowledge must be an asset able to be used to create wealth. Thus, intellectual capital includes the talents and skills of individuals and groups; technological and social networks and the software and culture that connect them; and intellectual property such as patents, copyrights, methods, procedures, archives, etc. It excludes knowledge or information not involved in production or wealth creation. Just as raw materials such as iron ore should not be confused with an asset such as a steel mill, so knowledge materials such as data or miscellaneous facts ought not to be confused with knowledge assets.</td>
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<tr>
<td>Roos, Pike and Fernstrom (2005)</td>
<td>It can be defined as all nonmonetary and nonphysical resources that are fully or partly controlled by the organization and that contribute to the organization’s value creation. Intellectual capital is divided into three categories: relational, organizational and human.</td>
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Andriessen and Stam (2004, 2008, p. 490) It can be defined as all intangible resources that are available to an organization, that give a relative advantage, and which in combination are able to produce future benefits. The three types of intellectual capital should be interpreted as follows: human capital, structural capital, and relational capital.

Lin and Edvinsson (2011, p. 4-5) National intellectual capital mainly consists of five types of component capital – human capital, market capital, process capital, renewal capital, and financial capital.

Source: compiled by the authors

Intellectual capital is an agglomerative category. Most scientists (Saint Onge, 1996; Sveiby, 1997; Bontis, 1998; Roos, Pike and Fernstrom, 2005; Stam and Andriessen, 2008) indicate three elements as its components: human capital, structural capital, and customer capital (see Figure 1.2.1).

The economist Adam Smith (1776) was the first to propose the human capital concept in the 18th century. He noted: “The acquisition of ... talents during ... education, study, or apprenticeship, costs a real expense, which is capital in [a] person. Those talents [are] part of his fortune [and] likewise that of society.”

by Jacob Mincer\textsuperscript{45}, Theodore Schultz\textsuperscript{46}, and Gary Becker (1962\textsuperscript{47}, 1964\textsuperscript{48}).

\begin{table}[h]
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\begin{tabular}{|c|c|c|}
\hline
\textbf{Intellectual Capital} & \textbf{Human Capital} & \textbf{Structural Capital} & \textbf{Customer Capital} \\
& & (or Organizational Capital) & (Relational Capital or External Capital) \\
\hline
• Genetic inheritance & • Systems & • Supplier Capital & \\
• Education & • Structure & • Alliance Capital & \\
• Experience & • Strategy & • Community Capital & \\
• Attitudes to life and business & • Culture & • Regulatory Capital & \\
\hline
\end{tabular}
\caption{Components and elements of intellectual capital}
\end{table}

\textit{Source: compiled by the authors}

The term “human capital” almost had not been used in the English language until the late 1950’s. After the middle of 20\textsuperscript{th} century, the usage of the term increased until today, with a somewhat greater uptick in the last decade of 20\textsuperscript{th} century than previously\textsuperscript{49}. Gary Becker hesitated to use the term “human capital” in the title of his book “Human Capital: a Theoretical and Empirical Analysis”\textsuperscript{50} and used a long subtitle to avoid criticism\textsuperscript{51}.

Oxford English Dictionary defines human capital as “the

\begin{thebibliography}{9}
\end{thebibliography}
skills the labor force possesses and is regarded as a resource or asset.” Human capital is defined in the Collins English Dictionary as “the abilities and skills of any individual, esp. those acquired through investment in education and training, that enhance potential income earning.” Human capital has connection with investments in people (education, training, and health) and it increases an individual’s productivity.

Staff, which has some knowledge and experience, professional skills, values and heritage represent human capital at the level of enterprise, where human capital is the source of innovation and strategic renewal. Human capital includes both the innate qualities of the person and acquired: his/her level of education, skills received in the course of employment, etc. Human capital has also been defined on an individual level as the combination of these four factors: your genetic inheritance, your education, your experience, and your attitudes to life and business. Human capital cannot be owned by the company.

Structural capital is a technological, information and organizational support for the implementation of the staff capacities in the enterprise. It ensures the effective usage of human capital, contributes to the accumulation and acquisition of new knowledge, perfection of staff competencies through the usage of modern techniques of collaboration, business management

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principles, systems, training of specialists, communication systems, principles of organizational culture. Structural capital can be owned by the company and thereby traded. Structural capital is also referred to as organizational capital.

The structural capital of the company consists of four elements:57

- Systems – the way, in which the organization processes (information, communication, decision-making) and outputs (products/services and capital) proceed;
- Structure – the arrangement of responsibilities and accountabilities that defines position of and relations between members of an organization;
- Strategy – the goals of an organization and ways it seeks in order to achieve them;
- Culture – the sum of individual opinions, shared mindsets, values, and norms within the organization.
- The structural capital is all that stuff from computer software to policies, procedures, and business practices that allow the human capital be its best.58

Customer capital is also referred to as relational capital and external capital. Customer capital defines the image of the company; brands, and the customer database of the company belong to it. It consists of bonds and strong relationships with customers, suppliers, and competitors. One of the main

58 Ibid
purposes of customer capital formation is the creation of an effective structure of the interaction of consumers and company personnel.


- Supplier capital – the mutual trust, commitment, and creativity of key suppliers;
- Alliance capital – reliable and beneficial partners;
- Community capital – organization capabilities and reputation in its surrounding community;
- Regulatory capital – knowledge of laws and regulations as well as lobbying skills and contacts;
- Competitor capital – critical understanding and knowledge about competitors.

Hubert Saint-Onge\footnote{60}{Saint-Onge, H. (1996). Tacit Knowledge: the Key to Strategic Alignment of Intellectual Capital. Strategy and Leadership, 1996, No. 2, p. 10-14} noted: “if the structural and human capitals are not minimally aligned, it is the customer who loses. Customer capital is the clients or customers that pay us for what we do and produce – they are our lifeline to the future.”

According to Leif Edvinsson and Michael S. Malone\footnote{61}{Edvinsson, L., Malone, M.S (1997). Intellectual Capital: Realizing Your Company’s True Value by Finding Its Hidden Brainpower. N.Y.: Happer Business, 1997}, intellectual capital is the combination of two components: human capital and structural capital. Structural capital also includes customer capital (market capital), the relationships developed with key customers, and organizational capital. The organizational capital consists of two elements: innovation capital (renewal & development capital) and process capital. Innovation capital indicates how well a company is preparing itself for the future. Process capital indicates the efficiency of
the work processes and the commitment of the company to improve the quality of these processes\textsuperscript{62} (see Figure 1.2.2).

<table>
<thead>
<tr>
<th>INTELLECTUAL CAPITAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Capital</td>
</tr>
<tr>
<td>Human Capital</td>
</tr>
<tr>
<td>Customer Capital</td>
</tr>
<tr>
<td>Organizational Capital</td>
</tr>
<tr>
<td>Innovation Capital</td>
</tr>
<tr>
<td>Process Capital</td>
</tr>
</tbody>
</table>

Figure 1.2.2. Components of intellectual capital according to L. Edvinsson and M.S. Malone\textsuperscript{63}

Source: Compiled by the authors

Four components (human capital, customer capital, innovation capital, and process capital) when added together form intellectual capital. This structure of intellectual capital is represented by non-financial building block together with financial building block of Swedish Insurance Company Skandia’s value scheme to estimate the company’s market value\textsuperscript{64}. According to Leif Edvinsson, market value of a company is a sum of financial capital and intellectual capital.

Five components of intellectual capital (human capital, market capital, process capital, renewal capital, and financial capital) have been identified by Yogesh Malhotra\textsuperscript{65}; Edna


Pasher and Sigal Shachar\textsuperscript{66}; Carol Yeh-Yun Lin and Leif Edvinsson\textsuperscript{67}.

Annie Brooking\textsuperscript{68} noted that intellectual capital is combination of four types of assets: market assets, intellectual property assets, human-centered assets, and infrastructure assets (see Table 1.2.2).

**TABLE 1.2.2. Components of intellectual capital by A. Brooking\textsuperscript{69}**

<table>
<thead>
<tr>
<th>Components</th>
<th>Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARKET ASSETS</td>
<td>• Service brands&lt;br&gt;• Product brands&lt;br&gt;• Corporate brands&lt;br&gt;• Champions&lt;br&gt;• Customers&lt;br&gt;• Evangelists&lt;br&gt;• Customer loyalty&lt;br&gt;• Repeat business&lt;br&gt;• Company name&lt;br&gt;• Backlog&lt;br&gt;• Distribution channels&lt;br&gt;• Business collaborations&lt;br&gt;• Franchise agreements&lt;br&gt;• Licensing agreements&lt;br&gt;• Favourable contracts</td>
</tr>
<tr>
<td>INTELLECTUAL PROPERTY ASSETS</td>
<td>• Patent&lt;br&gt;• Copyright&lt;br&gt;• Design rights&lt;br&gt;• Trade secrets&lt;br&gt;• Know-how&lt;br&gt;• Trade marks&lt;br&gt;• Service marks</td>
</tr>
</tbody>
</table>


\textsuperscript{69} Ibid
### Intellectual capital can improve the efficiency of the company through the development and use of innovations.

One of the first scientists to emphasize the importance of innovation was Austrian economist Joseph Schumpeter, who described innovation as “creative destruction” that is essential for economic growth. Schumpeter pointed out five forms of innovations:

- New product or service;
- New method of production;
- New source of supply;
- New market or application;
- New method of organising your firm or industry.

World English Dictionary describes innovation as: 1) something new or different introduced; 2) the act of innovating; introduction of new things or methods.

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The Law of Ukraine “On the innovation activity”\(^\text{73}\) defines innovation, which is used with the following meaning: innovations are newly created (applied) and (or) improved competitive technologies, products or services, as well as organizational and technical solutions of manufacturing, administrative, commercial or other nature, which significantly improve the structure and quality of production and (or) social sphere.

According to legislation of Ukraine\(^\text{74}\) the innovation activity means all scientific, technological, organisational, financial and commercial actions that indeed lead to implementation of innovations or design for this purpose. In Ukraine the innovation activity includes researches and developments not directly associated with the preparation of specific innovation.

The company is considered innovative if it has introduced any type of innovation (marketing, organizational, process or product innovations) for the period of time specified in the survey. Marketing innovations include the introduction of a new method of sale, including significant changes in design or product packaging, its storage, market promotion or sale price fixing, aimed at satisfying customers needs, opening new markets or gaining new positions for product in the market in order to increase sales volume. Introduction of a new organizational method in the enterprise activities, work place arrangement or external affairs are the organizational innovations.

Process and product innovations are included with the technological innovations. Process innovation is the introduction


\(^{74}\) Ibid
of a new or considerably improved production or delivery method of a product. Product innovation is the introduction of a product or service, which is new or considerably improved in terms of its properties or methods of use.

Managing intellectual capital at the micro level provides the formation and development of its every component, its usage for the development and production of high technology products, innovative services. The formation and operation of intellectual capital in the company is affected by many factors. These factors can be divided into two groups: environmental factors and factors of internal environment\(^75\) (see Table 1.2.3).

**TABLE 1.2.3. Groups of factors, which have impact on the formation and operation of intellectual capital\(^76\)**

<table>
<thead>
<tr>
<th>Groups of factors</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVIRONMENTAL FACTORS</td>
<td>• company image</td>
</tr>
<tr>
<td></td>
<td>• relationships with contractors</td>
</tr>
<tr>
<td></td>
<td>• the level of competition in the market</td>
</tr>
<tr>
<td></td>
<td>• the saturation of the existing and potential markets</td>
</tr>
<tr>
<td></td>
<td>• the availability of communication links with outside agencies</td>
</tr>
<tr>
<td></td>
<td>• their intensity and effectiveness of legislative and regulatory control</td>
</tr>
<tr>
<td></td>
<td>• the political situation in the country</td>
</tr>
<tr>
<td>FACTORS OF INTERNAL ENVIRONMENT</td>
<td>• the financial and economic factors and the level of business activity,</td>
</tr>
<tr>
<td></td>
<td>• organizational methods of enterprise management</td>
</tr>
<tr>
<td></td>
<td>• the level of research intensity of its products</td>
</tr>
<tr>
<td></td>
<td>• the availability of specialized software</td>
</tr>
</tbody>
</table>


\(^{76}\) Ibid, p. 34-35
**FACTORS OF INTERNAL ENVIRONMENT**

- the development of internal communication systems
- intellectual capacity of the personnel in the enterprise
- its psychological compatibility
- the level of conflict in the team

*Source: compiled by the authors*

Measurement of intellectual capital is the process of identifying, measuring and managing strategic intangible resources to gain insight in the strength of them in order to manage the strategic resources in the best way\(^{77}\).

There are two general approaches for intellectual capital measurement\(^{78}\):

- to do a using unique units of measure for each element of intellectual capital at different levels in an organization (in instance, at the work unit level or at the organizational level as a whole);
- to measure the value of intellectual assets in financial terms at the organization level without reference to individual components of intellectual capital.
- The first approach “Component-by-Component Measurement” include two models:
- The Edvinsson/Malone model, which uses the Skandia “Navigator” approach for measuring


intellectual capital. Skandia is a Swedish insurance and financial services company, since 1997 the company publishes supplement its annual report “Visualizing Intellectual Capital in Skandia”\(^7\). Leif Edvinsson was the corporate director of intellectual capital for Skandia, he developed a framework for reporting as a combination of traditional financial reporting with measures of intellectual capital. The Skandia “Navigator” represents past financial information about an organization and additional information about intellectual capital to understand both an organization’s current and future capabilities. Five focuses is in core of the Skandia “Navigator” according to the Edvinsson/Malone’s components of intellectual capital: financial, market, human, process, renewal & development focuses (see Figure 1.2.3).

Figure 1.2.3. The Skandia “Navigator”\(^8\)


• The Brooking model – “Dream Ticket”/Intellectual Capital Audit was presented in 1997\textsuperscript{81}. The components of the model listed in Table 2. Seven elements are in a core of the Brooking model: the goal, intellectual capital, “dream ticket”, audit, index, target, and measures. The “dream ticket” is the set of intellectual assets to achieve the organization’s goal. The audit provides information about the strengths and weaknesses of the intellectual assets of the organization and it is the basis to construct index to compare audit results with the “dream ticket” for each intellectual asset. The status of the intellectual asset can be high if it matches the “dream ticket”; or the asset may be given a score as low as zero if the asset is very weak in comparison with the “dream ticket”. A target represents the status and category of all organization’s intellectual assets and is divided into four quadrants. The target provides information about a situation with intellectual assets whether the situation is expected to become better or worse\textsuperscript{82}.

The second approach “Organization Level/Financial Basis Measurement”\textsuperscript{83} is based on three measures of intellectual


\textsuperscript{83} Ibid
capital suggested by Thomas Stewart\textsuperscript{84}:

- **Market-to-Book Ratio** provides information about difference between book value and market value of the company (the market price per share of common stock multiplied by the number of shares outstanding) and gives approximate intangible measure of intellectual capital, which are not presented in the company’s balance sheet;

- **Tobin’s q** is a measure developed by James Tobin\textsuperscript{85} in 1969, a Nobel prizewinning economist, to predict investment decisions. It can be calculated by using the company’s book value, adding back accumulated depreciation, than making appropriate adjustments for price changes in different classes of company’s assets from the time of purchase. If Tobin’s q is higher than 1 and greater than the other similar companies’ q then the analysed company can produce higher profits than the competitors;

- **Calculated Intangible Value** was used by the Internal Revenue Service in the U.S. (IRS) for calculating the fair value of intangible assets for tax purposes. IRS Ruling describes the process of calculating, which was discussed and illustrated by Thomas T. Steward\textsuperscript{86} (1995) and David H. Luthy\textsuperscript{87} (1998).


At the global level results of intellectual capital measurement have been presented by Christiaan Stam and Daan Andriessen (2004\textsuperscript{88}, 2008\textsuperscript{89}); and Carol Yeh-Yun Lin and Leif Edvinsson\textsuperscript{90}.

In 2004, Stam and Andriessen\textsuperscript{91} published the report “Intellectual capital of the European Union” and introduced results of intellectual capital measurement for 15 countries and for 27 countries of the European Union in 2008\textsuperscript{92}. The authors have identified three components of intellectual capital: human capital, structural capital, and relational capital. They added a second layer of classification. Each components of intellectual capital are monitored from three perspectives to emphasize importance and differences between past, present and future developments:

- Assets give an indication of the present power of a country and provides an outlook of the current main assets.
- Investments give insight into the future power of a country to maintain or strengthen its present


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power, organizations should make investments in their potential constantly.

- Effects show future developments and the extent to which the country has made its intangibles productive during the previous period\(^93\).

In total, Stam and Andriessen have used 38 indicators, which have been combined into one value. The European Commission’s perspective has been used to identify indicators for intellectual capital estimation and perform a multidimensional value measurement. The author used the 3x3 matrix of the intellectual capital monitor (a combination of indicators from all three components and all three perspectives). Measures in itself do not have interpretation. They use to compare of measures of one country against another, or of one period against another, that provides meaning to the figures.

Lin and Edvinsson\(^94\) consider intellectual capital as “future earning capabilities”. It is about “an opportunity in waiting, about sustainability, thinking ahead and adding values”\(^95\). According to authors, “national intellectual capital is comprised of the knowledge, wisdom, capability, and expertise that provide a country with a competitive advantage over other countries and determine its potential for future growth”\(^96\). Lin and Edvinsson focused on 40 countries and identified five components for intellectual capital measurement: human capital, market capital, process capital, renewal capital, and financial capital. Each of the five components of intellectual

\(^{93}\) Ibid, p. 490


\(^{95}\) Ibid, p. 5

\(^{96}\) Ibid, p. 5
capital have been rated by the authors on a 10-point scale, based on a comparison of the factors that form the corresponding partial index. The total level of the country’s intellectual capital index is calculated as the sum of the estimates of all five pre-calculated indicators of the corresponding components of national intellectual capital.

At the present stage of economic development, the success of a company and nation depends on the level of intellectual capacity, which is determined by the efficient usage of intellectual capital as one of the main strategic resources in today’s economic environment. In addition, the development and intake of intellectual capital are inextricably linked to the information flows in the process of information exchange between the various elements of business management systems, as well as the interaction of the company with its environment.

The specific feature of intellectual capital management is manifested in the fact that it is the product of intellectual activity, and creative efforts. Information and knowledge are in its core. Knowledge can be defined as the information stock obtained in the course of training, research and by other means; this is in privacy of a person, company, and society as a whole.

Market value of a company depends on financial capital and intellectual capital. Most scientists identify such components of intellectual capital: human capital, market capital, process capital, renewal & development capital.

The two groups of factors have impact on formation and operation of intellectual capital: environmental factors and factors of internal environment. The authors have offered classification of these factors.

There are two levels for measuring of intellectual
capital: micro (at the work unit level or at the organizational level as a whole) and macro (at the global level). Each of them has different approaches for intellectual capital measurement, which were considered in the paper. In instance, a common characteristic of “Organization Level/Financial Basis Measurement” methods is that they all use capital market values to estimate the aggregate value of intellectual capital without reference to individual components of intellectual capital; a common characteristic of approaches for measuring intellectual capital at global level is building the country’s intellectual capital index. Finally, different measurement approaches have been examined how intellectual capital can be estimated at the component-by-component, organization, and global levels.

1.3. Intellectual global competitive leadership

Common economic conditions are transformed under the influence of globalization and knowledge economy formation, which are accompanied by aggravation of competition at all levels, rapid change of competitive positions, significant stratification of the competitive environment, and change of rules and methods for competition. The economic globalization in a dominant trend in the world development at the start of the third millennium, which pulls the implementation and strengthening interpenetration and coherence of national economies on the one hand, and to strengthen the processes of regionalization and integration on the other hand. All these processes take place against the background of intellectualization that provides effective participation of the national economies to transnationalization processes
and inclusion of innovative waves. In order to strengthen the interaction and interdependence of national economies, these trends require a special attention to new phenomena and processes that have a dramatic transformative character from different levels of the global economic entities.

Under the present highly competitive environment, not only economic development, but first of all - achieving leadership positions, which is a tool of competition, is an important task for any country. Identifying leadership becomes important both to individuals (in politics, business and other circles), and at the level of companies, and national economies. In the present context, the understanding of leadership, which is perceived much broader than psychological phenomenon, has undergone substantial changes; leadership becomes an element of the collective management process and, as evidenced in practice, is increasingly moving into the economic analysis field at different levels of the social order. Leadership is a competitive advantage, being not only an objective, but also a competition tool that is capable to bring higher economic returns.

In modern economic conditions, rapid and constant change in competitive positions, changes in the rules and methods of competition make it necessary to review the place and role of many economic and management processes. Together with increasing interdependence and interpenetration of national economies, these processes result in further stratification of the competitive environment.

Under classical approach, leadership is perceived rather as a psychological process or operating results. The leadership in its modern sense ceases to be the object of study purely in psychology and management aspects. The
nature of leadership is changing, and therefore its role in the contemporary environment is changing as well. The transition to a sixth technological wave is markedly different by the emergence of new competitiveness factors for a company or a country based on intelligence, application of the latest achievements, and new technologies. New factors are not simply related to human resources; the basis of the new factors is intellectual activity, its results in the form of the latest achievements and technologies, and their application. The strength of the intellectual component in leadership takes on a new meaning in the new context, which requires to explore its nature and forms of manifestation at various levels. The challenges of modern globalization caused by the extreme aggravation and complication of competition factors, the emergence of a knowledge society, the spread of ICT, make tangible adjustments to the manifestations of leadership. The leadership features now become good opportunities to change and implement its potential in the conditions of emergence of the knowledge economy.

In most scientific approaches, the study of leadership at the individual level prevails, when it is considered purely as a manifestation of personal activity. It is noteworthy that its economic component and economic characteristic in manifestations of leadership qualities remain beyond the attention of scientists. The economic impact of leadership, competitiveness, new market conditions, and the ways of doing business have shaped the need for leadership research to a new level. The economic effect of leadership, competitiveness, new market conditions, and the ways of doing business have shaped the need for leadership research to a new level. The
complication of the subjective basis of leadership is manifested in the separation of such basic types both as individual and institutional (or organizational) leadership. The subject of manifestation of individual leadership is an individual who influences himself and others. The subject of institutional leadership is an organization that influences itself and other organizations. This approach reflects the division of human activity into personal and social-group, which is substantiated in the works of V.G. Kremen\(^97\).

The economic nature of leadership is most often manifested at the organizational level, which is displayed not only in establishing control of a market or region, but also in actively influencing other enterprises, organizations, or institutions. Moreover, the possibility of such influence is important not in itself, but above all to determine the future development of the organization itself. Within the framework of P. Senge’s theory of self-developing organization, the organizational leadership is defined as the ability of a particular community to determine its future and, above all, to support the process of change that is needed. “The source of leadership is the ability to sustain the creative tension and energy that arises when people tell the truth and convey to others their ideas of the future and the understanding of the present”\(^98\).

In economic theory, providing organizational leadership is possible on the basis of internal processes, because it is formed “at all levels of the organization” (K. Blanchard)\(^99\).

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and in the form of counteracting external factors. According to M. Kets de Vries, leadership organizations are very sensitive to the environment. That is why they are united, have a strong structure, a shared vision of the world and a system of thinking. They “are supporters of distributed leadership, encouraging leadership at all levels of the organization. They support continuous innovation, which is the source of organizational life. They encourage an optimistic mood of employees, produce a culture of learning, the reality of mistakes, the perception of diverse thinking and actions. They produce a systemic perspective, and forming a synergistic effect”100. Organizational leadership is manifested as a competitive advantage that secures a position in the market for a company. Thus, leadership within a company is considered not as a social phenomenon, within which a person’s position is defined, but as an economic phenomenon that becomes a source of enrichment for the company. In this aspect, marketing and financial indicators and their change depending on changes in the structure and methodology of management, are the measures of organizational leadership effectiveness. The combination of economic activity of the company, which determines the methods of market outreach, competition and aggressive marketing provide leadership positions. Leadership in today’s conditions is both a prerequisite and a effect of competitiveness. However, leadership is not limited to the level of individual and organizational management. Complication of the concept of leadership is manifested in the multiplicity of its

forms\textsuperscript{101}. The countries that make significant efforts to develop their intellectual potential and implement it in the economy can become the world leaders and retain leadership positions. High values of indicators and dynamics of development of such countries as Germany, Japan, South Korea, Singapore, Taiwan, Iceland, Finland, etc., are supported by considerable investments in research and development, realization of their results in products and services, and also qualitative changes in the spheres of life. In today’s world, the leader country is first and foremost an intellectual center, which is an integrator, initiator and organizer of dynamic actions. That is why the issue of leadership in the context of gaining competitive advantage and ensuring competitiveness is becoming relevant.

The transformational tendencies activated in the world economy development such as globalization, networkization, and technologicalization contribute to the formation and development of the global intellectual space. Globally, new players are emerging (new countries, companies, universities, and other institutions), and the range of international exchange facilities is expanding (not only goods and services, but also patented know-how and licenses), new financial flows, and new systems of economic relations between different levels of entities are being formed. These dynamic processes require thorough analysis and identification of common trends in the emergence of a global innovation space.

The formation of a global intellectual space is a complex process that accompanies the current stage of the global economy development. A key feature of the current stage of the

world economy development is the reorientation to innovative development, which is the basis of the Fourth Industrial Revolution. The Fourth Industrial Revolution determines the further orientation of the production development on the basis of robotics use, the expansion of network use and ICT technologies, etc. Characteristics of today’s market are the “offshoring” of the labor market, changing the structure of production, development of the opportunities due to high-technology and network technologies, active export of services, the formation of global flows of knowledge, information, patents, and so on.

Overall, the realization of intellectual potential can occur at different levels, but the processes of globalization make it easier for lower-level entities to move to higher levels (from the individual to the global). It allows to solve problems at all levels - individual, public (national), regional and global\textsuperscript{102}. At the present stage, the hierarchy of competition is complicated. At the same time, the role of the entities in the overall market structure is changing to provide and realize intellectual leadership. The loss of individual entities’ positions in the market is associated with a change in the overall structure of both the market and international relations.

In our view, the assessment of intellectual leadership requires a more systematic approach that takes into account the characteristics of intellectual activity. It is believed that intellectual leadership in modern environment should be determined by the basic levels that characterize certain stages of intellectual activity and have their own characteristics. Three levels act as those stages: the level of resources, the level of results of intellectual activity, the level of end results. The

\textsuperscript{102} The Global Innovation Index 2016 - URL: http://english.gov.cn/r/Pub/GOV/ReceivedContent/Other/2016-08-15/wipo_pub_gii_2016(1).pdf
level of resources is characterized by the availability of basic intellectual resources. Their availability and general potential characterize the ability of the country (or any other entity) to provide intellectual activity. In addition, the availability of intellectual resources is an important condition for leadership, but it does not yet mean actual leadership. More realistically, it can manifest itself at the next level, characterizing the results obtained by the entity. The level of results of intellectual activity involves a comprehensive evaluation of specific results: patents, licenses, know-how, publications, etc. The final results are those that concern not only purely intellectual activity but also the economy or society as a whole. In our view, only such a systematic approach to assessing each of these levels by a set of indicators makes it possible to characterize intellectual activity and to evaluate general competitive positions of different entities. Therefore, all indicators for assessing intellectual leadership take into account either the potential of intellectual resources or the results of intellectual activity realization.

First-level leadership can be defined as resource-based. At this level, the country’s ability to achieve intellectual leadership due to the formation of intellectual capacity and the mechanisms for enhancing it are determined. Key development resources are divided into financial, human, and intellectual. Thus, developing a coherent system of indicators for countries’ intellectual leadership has a considerable room for improvement, to account for all potential components and reserves of this type of leadership. The intellectualization of the economy in the transition to a “knowledge economy” becomes an objective necessity, which necessitates setting of a system of indicators and development benchmarks. It allows to estimate the current
state of accumulation of intellectual resources, dynamics of their development, prospects of realization; to identify the main directions of increasing the efficiency of their implementation and further intellectualization of the economic system.

The set of indicators that characterize intellectual resources is defined as a system by which indicators can assess the potential of a particular country or any other entity (Figure 1.3.1).

The educational and scientific indicators are both

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**Figure 1.3.1. The system of intellectual leadership indicators of the first level**

Source: Compiled by the authors
resources and results, but they are a result-based resource. These include the number of world-class universities, scientific and technical publications, and the number of Nobel laureates. Infrastructure indicators first of all include possibilities of using technologies for development of innovations, the last group of indicators are technological indicators (Figure 1.3.2).

The third level of intellectual leadership is the level of end results, which are revealed not only by themselves but also

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**Figure 1.3.2. The system of intellectual leadership indicators of the second level**

*Source: Compiled by the authors*
in relation to economic indicators. Most often, this is recorded by various indexes, rating, etc. At the global level, partial assessment of individual leadership in a generalized format and confirmation of its need for economic growth are found in some recent world indexes. Thus, the Global Innovation Index provides an analysis of the human capital role in the growth of economic indicators, including innovation performance. Another index that takes into account the individual component of leadership is the Global Talent Competitiveness Index, which is entirely based on a study of the human capital situation in the country\textsuperscript{103}. Of course, these indexes only summarize the current trends and do not consider individual leadership as a separate element of the economic system.

Confirmation of the importance of intellectual factors in achieving leadership at the global level can be the distinction of this component in the global rankings. Table 1.3.1 provides a summary of the major world rankings and analyzes the proportion of indicators that characterize intellectual activity and human capital components in their effects.

Of course, the list is not exhaustive, but it includes the most important and popular world rankings. All of them reflect the processes of increasing the role of the human factor and its transition to a new level of leadership positions provision. The world’s leading countries are demonstrating a creative transformation that becomes a platform for a successful society and a prosperous nation. This is confirmed by a study by the Human Development Index, which examines three components: health and life expectancy; education and access to it; the standard of living estimated by the GNI per capital

\textsuperscript{103} INSEAD. – URL: http://global-indices.insead.edu/index.cfm
by purchasing power parity (PPP) in US dollars. This is a confirmation of the key tendency of modern world economic development - wide intellectualization of production and trade, priority development of science, and spread of complex intellectual labor. It is this that forms the centers of development of world civilization and becomes a prerequisite for the formation of a knowledge-based society.

**TABLE 1.3.1. Global rankings and indexes**

<table>
<thead>
<tr>
<th>Rankings and indexes</th>
<th>An organization that calculates a metric</th>
<th>Indicators</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Development Index, HDI</td>
<td>UN</td>
<td>• Level of education</td>
<td>1 subindex of 3 5 indicators from 21</td>
</tr>
<tr>
<td>Educational index of the countries of the world</td>
<td>UN</td>
<td>• Literacy level index  • Share of learners</td>
<td>2/3 1/3 in total</td>
</tr>
<tr>
<td>The Social Progress Index</td>
<td>The Social Progress Imperative</td>
<td>• vailability of basic knowledge and literacy of the population  • Duration of training for women  • Duration of higher education  • Global ranking of universities  • Inequality in accessibility of education</td>
<td>5 indicators from 48</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>-----------------------------</td>
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<td>-----------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Intellectual component of human resources</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Global Innovation Index</td>
<td>WIPO</td>
<td>• Human capital and research in the sub-index of innovation costs</td>
<td>1 indicators from 6</td>
</tr>
<tr>
<td>The Global Innovation Index</td>
<td>WIPO</td>
<td>• Human capital and research in the sub-index of innovation costs</td>
<td>1 indicators from 6</td>
</tr>
<tr>
<td>The Bloomberg Innovation Index</td>
<td>Bloomberg Rankings</td>
<td>• Tertiary efficiency (5 %)</td>
<td>1 indicators from 7</td>
</tr>
<tr>
<td>The Global Competitiveness Index, GCI</td>
<td>WEF</td>
<td>• Health and primary education • Higher education and vocational education</td>
<td>2 metric groups from 12</td>
</tr>
<tr>
<td>The Legatum Prosperity Index</td>
<td>Legatum Institute</td>
<td>• Quality of education indicator</td>
<td>1 subindex of 8</td>
</tr>
<tr>
<td>Satisfaction with Life Index, SWL</td>
<td>OECD</td>
<td>• Achievement of education</td>
<td>1 subindex</td>
</tr>
<tr>
<td>Academic Ranking of World Universities (ARWU)</td>
<td>Institute of Higher Education, Shanghai Jiaotong University</td>
<td>• Takes into account the activities of the leading universities and their scale</td>
<td>100 %</td>
</tr>
<tr>
<td>Webometrics ranking of world’s universities</td>
<td>Cybermetrics Lab Spanish National Research Council, CSIC</td>
<td>• Considers the activities of the leading universities on the Internet and their scale</td>
<td>100 %</td>
</tr>
<tr>
<td>World Trade Organization report</td>
<td>WTO</td>
<td>• Includes enrollment in both primary and secondary education</td>
<td>2 indicators from 8</td>
</tr>
</tbody>
</table>
| The results of intellectual activity | The Global Innovation Index | WIPO | • Sub-index of innovation costs  
• Sub-index of innovative results | 100 % |
|-------------------------------------|-----------------------------|------|--------------------------------------------------------------------------------|------|
| The Bloomberg Innovation Index      | Bloomberg Rankings          |      | • R&D intensity (20%)  
• High-tech density (20%)  
• Concentration of researchers (20%)  
• Patent activity (5%)  
• Technological capabilities (10%) | 5 indicators from 7 |
| Rating countries by number of patents | WIPO                        |      | • Considers specific indicators of intellectual performance | 100 % |
| Rating countries by number of Internet users | Based on statistics |      | • Considers specific indicators of intellectual performance | 100 % |
| Ranking countries by mobile phone users | Based on statistics |      | • Considers specific indicators of intellectual performance | 100 % |
| Rating of countries by level of export of high-tech products | Based on statistics |      | • Considers specific indicators of intellectual performance | 100 % |
| The Global Competitiveness Index, GCI | WEF                         |      | • The level of technological development  
• Innovative potential | 2 metric groups from 12 |

*Source: Compiled by the authors*
Of course, the list is not exhaustive, but it includes the most important and popular world rankings. All of them reflect the processes of increasing the role of the human factor and its transition to a new level of leadership positions provision. The world’s leading countries are demonstrating a creative transformation that becomes a platform for a successful society and a prosperous nation. This is confirmed by a study by the Human Development Index, which examines three components: health and life expectancy; education and access to it; the standard of living estimated by the GNI per capita by purchasing power parity (PPP) in US dollars. This is a confirmation of the key tendency of modern world economic development - wide intellectualization of production and trade, priority development of science, and spread of complex intellectual labor\textsuperscript{104}. It is this that forms the centers of development of world civilization and becomes a prerequisite for the formation of a knowledge-based society.

Thus, we identify three key levels of intellectual leadership, each of which can be assessed according to the indicators identified. Of course, the availability of resources alone does not determine global leadership, but the availability of these resources is a necessary prerequisite for achieving intellectual leadership in the country by expanding its capabilities in a globalized world in a knowledge economy conditions. The resources listed above are not exclusive - they are based on demographic resources, secondary education of population, etc. However, at the present stage of development, literacy and basic knowledge do not become a prerequisite for leadership of the country.

Based on the frameworks of increasing the intellectual potential (and resources) of the country, two key approaches can be identified: increasing own resources and involving them from external sources. Own potential is formed first of all by the system of education Overall and higher education in particular. According to UNESCO, there is a significant increase in the number of students in developing countries and overall growth rates are much higher than in developed countries. The vast majority of developing countries show at least an average global growth rate. Turkey, India and China show the absolute leadership, with student population growth of more than 200% between 2006 and 2017. Of course, one of the reasons for this increase in student population is population growth, but quantitative trends are not the only reason.

The largest decline in student numbers is demonstrated by Eastern European countries, totaling over 30% of 2005 levels. Moreover, in Latvia, Hungary, Lithuania, the Russian Federation, Poland, Slovenia and Estonia, in Japan and Finland, the decline rates are slightly lower. Along with the development of the countries’ own intellectual potential, frameworks for involving human potential from the external environment are actively used. In the global market for educational services, centers of both inflow and outflow of young people for training have been formed. The export and import shares of students in countries around the world are significant there. The countries with lower levels of development showed a deficit with emigrant students, i.e. Brazil, Chile, China, Hong Kong, Colombia, Estonia, Greece,

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105 Enrolment in tertiary education, total number – URL: http://data.uis.unesco.org/#
106 Enrolment in tertiary education, total number – URL: http://data.uis.unesco.org/#
India, Latvia, Lithuania, South Korea, Slovakia, Slovenia, and Ukraine showed an excess of students going abroad over the number of foreign students, and a negative balance in these countries has existed since 2005\textsuperscript{107}. With it, volatility in attractive countries is much lower and shows a steady tendency to increase the balance of student numbers. The increase in the number of foreign students in Russia is due to the attraction of students from Asia, while the European countries have a wider geography of students. Overall, the growth rates are much higher than the decline rates and have a much higher concentration in individual countries.

The following block of indicators covers the financial resources involved in the formation of intellectual capital. This block includes absolute and relative indicators of financing education (including higher education) and science. These include government expenditures on education, higher education and science in monetary terms relative to general government expenditures and relative to GDP. Such a structure makes it possible to analyze not only quantitative but also qualitative parameters of financing and government’s attention to the education system. Government expenditures on education as a share of GDP is a very informative indicator that reflects the state’s involvement in the processes of primary intellectual potential formation. Overall, in the developed countries expenditures on education averages 5.26\% of GDP, while some countries show much higher rates\textsuperscript{108,109}.


\textsuperscript{109} Government expenditure on education as a percentage of GDP, selected countries URL: http://data.uis.unesco.org/
The funding of science in countries is also important. This is the highest stage of intellectual capital formation in the country and, accordingly, the most informative. The distribution of research expenditures in the world points out the obvious centers of expenditures that spend on science most of all, including the countries of North America, Europe and some Asian countries. The largest share of R&D expenditures is in the countries of South and East Asia, with 37.6% of global expenditures. North America ranks second in terms of expenditures with almost 28%, and European countries are the third with 21.6% of global expenditures. All other regions of the world spend on research not more than 3% in a region, or 12.8% from world expenses. In total, $1,917.9 billion was spent on R&D in 2015. Analyzing the geographic concentration of R&D, the differences are more obvious there. For example, in 2015, the United States remained the largest investor in the execution of R&D, with $497 billion, representing over 26% of total expenditures. China was the second with a total cost of $409 billion (21% of total). Japan, which allocated 9% or $170 billion, was the third. Israel has the highest level of government expenditures on R&D in the world, with a value of 4.25%; South Korea ranks second (4.23%). Overall, all Top 10 countries spend about twice of the global expenditures level. Modern economies have a high level of dependence on the skill level of the workforce, the level of investment in research projects and research. Leading industries are becoming those with science-driven activities, which have emerged only in recent years. The generated knowledge flows are defining new trends in financial, business services, education, healthcare,

pharmaceutical, aviation and space products. These products are becoming integrators for competitiveness in the global market.

The rapid growth and development rates are typical for developing countries, and conversely, the developed countries are showing some slowdowns, which is explained by a sufficiently stable and high level of funding, as well as the depletion of opportunities for development due to linear innovation. However, they are the developed countries that have more opportunities to form the opportunities of non-linear innovation and a new stage of development realization. Such active development of emerging economies is explained by their concentrated attention on science-intensive industries, an increase in the share of applied resources in R&D, and education. Grouping of countries by the level of GDP expenditures on the R&D was made in the table 1.3.2. As noted, only two countries (Israel and South Korea) spend more than 4% on science. Some countries account for more than 3% of GDP, while the vast majority of the developed countries showed 1.0-1.99% and 2.0-2.99% ranges. Unfortunately, our country belongs to the group of countries with the lowest expenditure shares on science.

The last group of indicators includes intellectual resources, which include absolute and relative indicators of the number of scientists (their number per 1 million population and among the employed). These indicators can also be classified as resultive ones, but they still characterize the available human resources potential and in particular, their intellectual component. The analysis of leading countries’ structures by the total number of scientific staff and per 1,000 of employed shows significant differences in the list of leaders,
which include China, Japan, Russia, Germany, India, South Korea, France, United Kingdom, Italy, Spain, the Netherlands, Turkey, Poland, Sweden, Switzerland, Belgium, Austria, Ukraine, Czech Republic, and Denmark\textsuperscript{111}.

**TABLE 1.3.2. Grouping of countries by R&D expenditure, % of GDP, 2017\textsuperscript{112, 113, 114}**

<table>
<thead>
<tr>
<th>Country Group</th>
<th>Germany, Denmark, Finland, Belgium, Iceland, Norway, Netherlands, Slovenia, EU-27, USA, China</th>
<th>United Kingdom, Czech Republic, Italy, Estonia, Portugal, Luxembourg, Hungary, Spain, Ireland, Russia</th>
<th>Greece, Poland, Croatia, Slovakia, Bulgaria, Lithuania, Malta, Cyprus, Serbia, Turkey</th>
<th>Romania, Latvia, Ukraine, Georgia</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 3 %</td>
<td>Sweden, Austria, Japan, South Korea, Israel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2–2.99 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–1.99 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5–0.99 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 0.49 %</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

If the number of scientists per thousand employees is analyzed, the structure of leaders is completely changing. Overall, these trends indicate the formation of three key intellectual centers as the main display of the modern stage of intellectualization. Of course, the resources needed to build intellectual capacity are not only exhausted by these indicators, but these indicators are key to understanding a country’s capabilities, increasing its competitiveness, and enhancing


\textsuperscript{113} Science, Technology and Innovation – URL: http://ec.europa.eu/eurostat/web/science-technology-innovation/data/database

\textsuperscript{114} Naukova ta innovacijna dijalnist Ukraini / Derg. Slujba statistiki Ukraini. – Kyiv – 2018. – 134 s
the prerequisites for achieving intellectual leadership on a macroeconomic level.

Resources are only a necessary prerequisite for the achievement of intellectual leadership, which is reflected in the results of intellectual activity and takes the form of second-level intellectual leadership, which includes indicators reflecting the infrastructural, educational, scientific and technological readiness to innovate and implement intellectual potential. In part, these indicators may indicate both the results of intellectual activities and be the resources or the necessary basis for the formation of new results of intellectual activity.

The first group of second-level intellectual leadership indicators includes educational and scientific indicators, such as the number of world-class universities, the number of Nobel laureates, and the number of scientific and technical publications in academic publications. The presence of world-class universities also indicates the country’s capacity to build and develop its own intellectual potential and at the same time, represents the results of intellectual activity. Key university rating evaluations show that the vast majority of these universities are concentrated in the US and Europe. So, according to the Shanghai rating, 16 of the Top 20 universities are located in the United States of America.

The last indicator, but not less important in the group of educational and scientific, is the number of scientific and technical publications in the cited publications. According to statistics, countries with lower levels of development in recent years are quite actively increasing the number of publications in cited publications, which affects the rank of universities in the

115 Science, technology and innovation: Total R&D personnel selected countries (in Full-time equivalents - FTE and Headcounts - HC). URL: http://data.uis.unesco.org/#
global rankings. Countries with lower levels of development show the highest growth rates. In particular, China has the highest number of publications per year in the world. Leaders China and the US are showing ambiguous growth rates. For example, while the United States stays at almost the same level, then China has grown significantly since 2005. At the same time, Japan, which ranked third in 2005, even reduced its performance by 7% and lost 3 positions in 2016. India occupied the third place in 2016, increasing its performance by 232% over the period. Germany and the United Kingdom show relatively small increases of 24% and 14%, respectively.

Important indicators for securing second-level leadership are a set of infrastructure indicators that characterize the economy’s willingness to spread ICTs and access to communications. These include fixed-line and mobile access, Internet access, and availability of secure Internet servers. Overall, these indicators are more technical in nature, but they point out the ability of developing the economy on a new basis. However, even these indicators can indicate the transition to new technologies and the use of these new opportunities. Growth trends can be observed by analyzing the growth of individual Internet users, which grew from 2005 to 2016 to 45% of the global population, showing a 191% increase. According to the World Bank, more than 90% of Internet users of the total population are in Iceland, Luxembourg, Norway, Denmark, the United Kingdom, Japan, South Korea and the Netherlands. By this indicator, the increase is no longer so unambiguous and it is not concentrated only on developing countries.

Another indicator that confirms the country’s ability to achieve second-level leadership is the number of reliable
Internet servers. This indicator has a huge growth rate, which is explained by the development of Internet and mobile technologies Overall, as most new phones can perform the functions of a personal computer. However, Overall, the increase in the number of secure Internet services since 2010 is extremely active, which proves the spread of technologies and opportunities for their use.

The third group of indicators covers the performance indicators. They measure the effectiveness of research and innovation and include patents, trademarks, industrial design, ICT goods and services, and high-tech products. One of the most important indicators is patent activity, given that patents indicate the results of scientific and research activities. China, the United States, Japan, South Korea, Germany, India, Russia, Canada, Australia and Brazil became the absolute leaders of 2016\textsuperscript{116}. China is the undisputed leader, exceeding the US by nearly 1 million patents, and showing 1189\% increase of patents number registered by residents from 2005 to 2017. However, there are countries where the activity of non-residents significantly exceeds the activity of residents, such as India, Brazil, Canada, Australia, Singapore, Mexico, Israel, New Zealand, Colombia, Chile, and Hong Kong.

One of the most representative indicators of intellectual performance is the implementation of patent activity in practice, which is reflected in the volumes of high-tech products (production, export, import, ICT products and services). According to reports of global organizations, Asian countries’ share of high-tech exports has steadily increased and declined

only in 2009\textsuperscript{117}.

Only Japan has reduced exports of high-tech goods over the selected period, but as a whole, there is a gradual increase. Almost all selected countries cut exports in the 2009 crisis year, due to the effects of the world economic crisis in 2008, but they had quickly restored their levels. China, Asia and the EU are leaders. Among the countries analyzed in our sample, the highest level of exports of high-tech goods converted to exports was totally demonstrated by Singapore, Ireland, and Switzerland\textsuperscript{118}.

The share of exports in the vast majority of leading countries is gradually declining, which is explained not by a nominal decrease in exports of high-tech goods, but by an increase in exports as a whole. Only Switzerland, France and Norway show an increase in exports of high-tech products in the designated TOP-10 ranking. Overall, the increase in this indicator is characteristic mainly for the countries that did not perform too high in 2005 and, accordingly, have considerable potential for growth, namely Turkey, Chile, Slovenia, Poland, Colombia, Slovakia, Russia, Greece, Lithuania, Latvia, Belgium, and Ukraine, but all of them accounted for less than 10% of high-tech exports in 2005. Thus, the maximum growth of 223% in Poland accounts for only 8.7% of exports of high-tech products of total exports in 2016. Exports of high-tech products are a rather powerful trade flow formed mainly by countries with high levels of development. However, even highly developed countries have significant imports of high-

\textsuperscript{117} Patents by country – URL: http://databank.worldbank.org/data/source/world-development-indicators#
tech products, indicating the formation of specific centers of gravity. Thus, despite the large share of exports, the US and EU are at the same time leading by the level of imports of high-tech products, which in turn proves the specialization and creation of global flows of products of this type and, accordingly, global markets. Leader countries in the export of high-tech products also have a high level of expenditures on R&D, which is sometimes ten times higher than competitors’ expenditures. With it, developed countries are investing in improving existing technologies and developing breakthrough innovations. However, countries with lower levels of development should focus on the initial stage of development.

The final effect is the ultimate performance of intellectual activity, which is expressed by the ultimate economic performance of the economic entity, in this case, the economy of the country. The countries’ national economies competitive positions and development can assessed basing on the global indices and ratings, reflecting the country’s position on the world economic map, the results of its economic activity and, accordingly, its competitive position with respect to other countries. Each index reflects the performance of the country’s economic activity in a particular sector, the results of the intellectual and creative activity implementation are reflected in the Global Innovation Index. Processes of innovative development in the global economy have long ago become an actual subject of scientific research: their factors, frameworks, tools, dynamics, etc. The formation of a global innovation space is a dynamic process that is accompanied by changes in the disposition of the countries of the world, including the most innovative countries. Innovation is gaining weight for all
countries as it becomes the basis for competitive advantage in leading industries. In order to achieve high ranking positions, both resources and results are important: input resources are institutions, human capital and research, infrastructure and market complexity; the results reveal patents, scientific articles, and creative results\textsuperscript{119}.

The Top 20 ranking of the most innovative countries are high-income countries. These countries have been in this position for several consequent years. However, a circle of leaders is gradually merging with some Asian countries, including China, which immediately shifted from 25\textsuperscript{th} position in 2016 to 22\textsuperscript{nd} in 2017. These countries are consistently demonstrating broad innovation opportunities: powerful scientific and engineering systems, active collaboration between education, science and business\textsuperscript{120}, \textsuperscript{121}. The Global Competitiveness Index is also included in the resultants’ indices. The TOP-10 countries by this index have practically not changed in the last decade, which proves the economic stability of the leading economies\textsuperscript{122}, \textsuperscript{123}.

Another index that clearly shows the intellectual component is the Human Development Index. In the ranking of this index, mainly European countries are leading\textsuperscript{124}, \textsuperscript{125}. In

\begin{itemize}
  \item High-technology exports (% of manufactured exports), selected countries. URL: http://databank.worldbank.org/data/source/world-development-indicators#
  \item Kulkarni A. Index shows the global innovation gap is growing / Anand Kulkarni. – 2017 – URL: http://www.universityworldnews.com/article.php?story=2017080106484882
  \item Global Innovation Index 2019 – URL: https://www.globalinnovationindex.org/gii-2019-report
  \item Global competitiveness Report 2006-07 – URL: http://www3.weforum.org/docs/WEF_
terms of human development, the list of leaders has changed significantly, Singapore and Germany increased their positions by more than 10 points. Finland, Sweden, and Japan lost their positions, leaving the Top 10 ranking. In addition, in 2018, Hong Kong entered the list of leaders, ranking 7th together with Sweden.

The next index that characterizes the performance and opportunities to transition to a knowledge economy is the Network Readiness Index. It is a symbiosis between the technological resources and the results of the technology implementation. Denmark, Iceland and South Korea have lost their positions in the TOP-10 due to a decrease of their positions by an average of 4 points for each. Singapore, Finland, the Netherlands, Norway, Luxembourg, the United Kingdom and Canada showed growth. Even relatively small countries, which demonstrate high activity and efficiency managed to enter into the ranking of top ten countries in the world by various indexes.

Thus, the intellectual leadership expresses itself on different levels and is characteristic for different entities. In today’s context, the new entities of intellectual leadership are emerging, and their influence becomes possible due to the formation of global networks. This enables the leadership of small entities and their extremely rapid development, which increases competition in the global market and accelerates economic and technological development. Considerable state policies to form the conditions for the development of such entities can be an incentive to ensure state leadership on the global level. According to research, intellectual leadership


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at various levels of manifestation is provided mainly due to the realization of the development of the factors that determine this level. So, we can distinguish three key levels of intellectual leadership: resource, resultant, and final (output). Each of these levels brings together a set of indicators that can assess the potential of a particular country. At the first level, intellectual leadership is represented via ensuring the realization of resource potential (mainly concentrating on the formation of basic advantages and development opportunities). These include the provision of funding for basic educational needs, the availability of human resources and their qualitative characteristics, and the availability of scientific staff of appropriate quality. Investigation of selected countries indicates that a focus on indicators of this level is typical for countries with lower levels of development, as this baseline is necessary for the development of higher level leadership.

Second-level leadership is manifested in the resources that have resulted from the implementation of the primary ones. It is an existing infrastructure that facilitates the involvement or formation of highly qualified staff and the availability of a sufficient base of intellectual property rights that can provide development in the modern conditions. This group includes educational and scientific indicators (country’s position on the global map of the educational services market and its competitiveness), infrastructural (availability of necessary basic infrastructural elements providing communication and access to global networks), technological (research and intellectual property rights). At this level, the countries with higher levels of economic development, with a well-developed base, and broad opportunities for leadership are leading.
Third, the final level is not only a prerequisite for leadership, but also to some extent its result, which allows to prove the country’s competitiveness on the global economic map. The results of state economic and social policy are reflected in numerous rankings and indexes, which, at the present stage, include more indices of intellectual development or formation of intellectual potential.