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STRUCTURAL CAPITAL: ESSENCE AND ROLE IN ENSURING TECHNICAL AND TECHNOLOGICAL DEVELOPMENT

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Methods. The research is based on the use of such methods as: abstraction – when establishing the essence of the category of «structural capital», logical and historical – when researching the origins of theories of technological determinism, grouping – when classifying theories of technological determinism and components of structural capital, structural-functional – when determining the influence of each of the components of structural capital on the technical and technological development of society.

Results. The work defines the methodological origins of the theories of technological determinism and evolutionary concepts of technological changes. Within the theories of technological determinism, two groups of conceptual approaches to the study of technical and technological development are distinguished, namely: theories of economic futurology and transformation of the economy. The second group of theories is recognized as the most constructive in the study of the factors of technical and technological development, since it is in them that changes in structural and organizational and legal factors are considered. Different essential content of the «structural capital» category has been demonstrated. It is proposed to consider the components of structural capital in view of its material and immaterial characteristics. Material assets include the results of human activity that can be codified, documented and legally protected. Intangible assets include elements that reflect the intangible side of production processes and combine all those elements that cannot be codified, documented and legally protected.

Novelty. Taking into account the nature of changes caused by the action of technical and technological factors, the theory of technological determinism is divided into the concept of economic futurology and the theory of transformation of the economy. The use of the methodological potential of the latter made it possible to distinguish material and immaterial components of structural capital and establish the role of organizational factors in the technical and technological development of society.

Practical value. Improved methodological approaches to the classification of theories of technological determinism and the grouping of elements of structural capital allow to more accurately identify the factors influencing technical and technological development and predict the consequences for the functioning of the economic system of society.

Keywords: theories of societal transformation, theories of technological determinism, structural capital, material assets, intangible assets, human capital, technical and technological development.

Statement of problem. The main driving force of modern socio-economic development of society is the economy's ability to produce innovations and maintain high rates of economic growth based on them. It is due to innovations that radical changes in the natural, economic, social and socio-cultural environment of humanity occur, as they create unprecedented opportunities for satisfying human needs and development. Bringing significant advantages to mankind, innovations at the same time complicate economic processes, increase their uncertainty and instability. As M. Castells noted at one time, new information and communication

technologies, which are the basis for new sources of productivity, new organizational forms and the creation of a global economy, contribute to economic development and material well-being, as they enable power, knowledge and creativity. So far, their use is uneven both within one country and when comparing countries [1, p.11].

A significant number of researchers tried to explain this unevenness, as the facts showed that despite the openness of the world's economies and the simplification of their access to the world's treasury of knowledge, only a small group of countries was able to support technological progress as a source of innovative economic development. Other countries, as practice shows, proved unable to produce new knowledge and technologies on a permanent basis, as a result of which they remain dependent on the Western world to this day.

Analyses of recent papers. In the literature devoted to innovative development, the attention of researchers is focused on the factors that influence the economic growth of countries. In the first model of economic growth by R. Solow, such factors were considered physical capital and labor force, which was multiplied by technical progress. Later, in the theoretical constructions of P. Romer and R. Lucas, the emphasis was placed on the need to increase returns from physical and human capital. As is known, these models were based on the premise that all countries had equal access to the same technologies. The difference in the achievement of economic growth was exclusively associated with different amounts of R&D funding and different quality of human capital. With the appearance of Schumpeterian models of economic growth, the emphasis changes somewhat: the attention of economists is increasingly focused on the need to create favorable conditions for innovative activity. Such conditions included economic factors that formed the possibility for innovators to receive innovation rent, and therefore, the legal aspects of economic activity fell into the field of view of researchers. The latter covered issues of protection of intellectual property rights and regulation of market power of economic subjects [2,3].

Insufficient innovativeness of countries that invested considerable funds in education and creation of legal foundations for the functioning of the economy in the 2000s of the 20th century. began to be associated with the importance of geographical proximity. It turned out that the spatial proximity of the subjects of innovation activity is important for innovation processes, which improves the interaction of the participants of the economic process and promotes interactive learning. An important achievement in this direction of research was the formation by K. Friedman and the concept of national innovation systems. The latter are a set of legislative, structural and functional components (institutions) that are involved in the process of creating and applying scientific knowledge and technologies and determine the legal, economic, organizational and social conditions for ensuring the innovation process.

These ideas brought to economic science the understanding that innovativeness cannot be evaluated in isolation, but must be considered in connection with other components of the economic system. That is why the attention of researchers is increasingly focused on the study of structural, cognitive, behavioral, social and political barriers that arise on the way to the exchange of knowledge and scientific and technical information [4]. Focusing attention on these aspects of the research of innovative technical and technological development, attention should be paid to the existence of inconsistencies in certain theoretical and methodological issues regarding the nature of the impact on the innovativeness of the specified factors. First of all, there is a coexistence of several terms that denote the same processes, and there is also a different interpretation of the specifics of the influence of certain factors on innovativeness. This mostly concerns those factors that are related to social and organizational aspects of the interaction of economic subjects.

Aim of the paper. The purpose of this article is to highlight factors of a social and organizational nature that affect the ability of the economy to produce innovations and direct technical and technological development to ensure high and stable rates of economic growth.

Materials and methods. Speaking about the formation of favorable conditions for innovation, one should turn to the theoretical origins of this issue. In this respect, the work of

the founder of institutionalism, T. Veblen, «Theory of the Business Enterprise» (1904), is indicative, in which the scientist demonstrated that society changes as a result of the natural selection of institutions, which are structures similar to genes in biology. They change under the pressure of the circumstances in which society falls in each specific historical period and are dependent on the development of technologies. This view of socio-economic development became the beginning of the evolutionary economic theory. The combination of social Darwinism methodology with institutional analysis, carried out by T. Veblen, later served as a basis for the development of two directions of research into the role of the technical and technological factor in the development of society, namely: the theory of technological determinism and evolutionary ends -ption of technological changes.

When talking about theories of technological determinism, one should pay attention to their heterogeneity. Scientists conducting research in this field use slightly different approaches in determining the driving forces of development and its consequences. For these reasons, it is important to distinguish the factors that determine technical and technological development. We consider it expedient to divide the theories of technological determinism into two groups depending on the nature of the changes they describe in view of the influence of the technical-technological factor. The first group, which we define as theories of the transformation of the economy, unites those conceptual approaches that reflect the transformations taking place in the middle of the economic system as a result of the action of various factors that change its industry structure, the level of concentration of production, the organizational and legal system of enterprises containers, etc., with a further demonstration of how these changes affect some components of the social and political spheres of society. This group should include the theories of post-industrial society by D. Bell, super-industrialism by E. Toffler, technotronic era by Z. Brzezinski, information age by M. Castells, information society by F. Mahlup, T. Umesao and Y. Masuda.

To the second group of theories of technological determinism, we consider it expedient to include concepts that record not just transformations within the economy, but demonstrate a change in the very nature of development and are focused on finding their general basis. Since these theories study movement, show the future of economic society, it is appropriate to call them theories of economic futurology. Representatives of theories of economic transformation depict changes in the existing society as a result of transformational changes in the economy caused by the influence of various factors, in particular, the new nature of people's needs, the concentration of production, industry structure, equipment and technology. Such theories include the concepts of the «tertiary sector of production» by K. Clark and J. Fourastier, stages of economic growth by U. Rostow, industrial (R. Aron) and new industrial society (J. Galbraith).

Having carried out such a classification, we come to the conclusion that in order to single out factors of a social and organizational nature that affect the ability of the economy to produce innovations and direct technical and technological development to ensure high and stable rates of economic growth, the most constructive will be the use of theoretical and methodological principles on which theories of economic transformation are based. It is in these conceptual approaches that changes in the structural and organizational and legal factors of technical and technological development are considered.

Considering the role of human capital in the production of technical and technological development, one should pay attention to the fact that the carriers of human capital are combined within certain organizations (firms, research institutions, universities) and direct their efforts to achieve the final results of their functioning. These organizational formations are directly dependent on the effective management of the human capital potential of each employee, the possibility of its "release" to realize the goals of the entire business structure and the creation of access for each employee to the general pool of knowledge and experience. It is quite clear, that this requires an appropriate organizational environment and the practical possibility of using the effect of investments in human capital.

The study of literary sources, which to one degree or another relate to the organizational aspects of the functioning of human capital, revealed the ambiguity of approaches to the design of these aspects in the form of an economic category. Some authors, following T. Stewart, who called structural capital «the stock of knowledge that has been transformed into information existing in the structures, systems and databases of the organization» [6], also use this name [7]. Along with the category «structural capital» to reflect the organizational aspects of the functioning of human capital, scientists also use other concepts, in particular, «organizational capital»[8], «intellectual assets» [9], «infrastructural assets» [10], «internal structure» [11], etc.

At the same time, different authors refer to the composition of the capital (assets) of the organization as quite different components. In the theory of T. Stewart, structural capital is represented by the organizational capabilities of the company to meet the needs of the market, to which the researcher includes patents, licenses, technologies, management systems, technical and software, as well as organizational structure and culture [6]. A similar approach is implemented in the concept of G. Saint-Onge, where structural capital is represented by four components: the hierarchy of the organization, which determines the relations and positions of its members; systems that reflect how the organization works; a strategy that determines the goals of the organization and its achievements, as well as a culture within which the values, norms and thinking of the organization are formed [12].

Along with such ideas, there is a position of scientists regarding the emphasis on socio-cultural components of structural capital. For example, A. Brooking believes that a company's infrastructural assets include a structure that strengthens the organization and formalizes its organizational culture, as well as the interaction between employees and processes [13]. A similar position is taken by K. Svei-by, who combines in the internal structure of the firm intangible assets formed from culture (common identity and values) and «organizational spirit» [14]. G. Petrash also gravitates towards the inclusion of cultural and social components in social capital [15].

The attempts of scientists to present the components of structural capital are not limited to the approaches presented above. A number of researchers try to combine the components of structural capital within certain groups based on the application of various criteria. According to the ideas of L. Edvinson and M. Melon, structural capital consists of two parts: organizational and client capital. Organizational capital, according to the authors, is formed, on the one hand, by innovation capital, which is represented in the form of intellectual property and other components used in the implementation of new products and services, and, on the other hand, by process capital, which includes all kinds of processes, procedures and principles that support the efficiency of production of goods and provision of services. «Structural capital can best be described as the embodiment, expansion of opportunities and support of the infrastructure of human capital,» say the authors [7, p.45].

There is also the opinion of Ukrainian researchers, formed on the basis of studying foreign literature, that structural capital is divided into two groups: electronic and social elements. The latter grow out of personal communication between people and are embodied in the norms of relationships, mutually enriched by life experience [16, p.427]. Yu. Yereshko notes in this regard that «structural capital is knowledge that provides conditions for the functioning of human capital (culture, customs, databases, processes, patents, copyrights, trademarks, information systems, organizational structure, corporate culture, etc.). Due to the multifacetedness of structural capital, its elements are also distinguished: organizational, process and innovation capital» [17, p.110]. However, the majority of representatives of domestic economic science consider the elements of structural capital as a whole, without grouping it into individual components.

Summarizing the review of the most common approaches to filling structural capital in economics, all authors talk about the elements that form the environment, working conditions and the way it is performed, as well as the knowledge contained in the information systems of the organization, although combine them in separate groups in different ways. Along with

this, it should be noted that in accounting practice, intangible assets of the business entity are evaluated, where patents, licenses, and trademarks are most often reflected. This is where the practice of calling the latter intangible assets as opposed to tangible assets comes from. We believe that the use of the balance sheet method is not correct when classifying the components of structural capital (at least in view of the fact that not all elements of the latter can be reflected in the accounting statements). At the same time, we believe that to carry out the necessary grouping, you can use the existing names, however, filling them with new content.

For a better understanding of the influence of structural capital as the organization's ability to extract economic benefits both from the tangible knowledge that belongs to it and the living knowledge inherent in employees who are carriers of human capital, we consider it necessary to divide its components into two groups: material and intangible assets.

The first group includes those results of human activity that can be codified, documented and legally protected (technologies, inventions, patents, trademarks, software, databases, scientific publications, etc.). This component of structural capital creates the very opportunity for personnel to work, exchange knowledge and realize their human capital in the process of economic activity. The second component reflects the non-material side of production processes and combines what cannot be codified, documented and legally protected. In fact, these are invisible elements that arise during the interaction of people within the organization and affect the process of creating and using tacit knowledge (group effectiveness, social cohesion in the team, a favorable climate for learning, organizational routines as patterns of repetitive interaction, roles, precedents, procedures, organizational culture).

The first part reflects the accumulated assets, in which the results of people's intellectual activity were materialized in the previous periods of the organization's functioning, and at the present time conditions have been created for the production process to be supported on their basis with the help of human capital and training, dissemination of existing and creation of new knowledge, as well as ensuring a unique perception of the entire organization by representatives of the external environment. Since these accumulated assets help to increase the productivity of individual carriers of human capital in the organization and, at the same time, to form its positive image as a means of increasing competitiveness, they are considered as auxiliary elements, which are often called the infrastructure of structural capital [18] .

The second part, which is represented by invisible, intangible moments that are manifested only in the interaction of people, form their perception of knowledge and experience, generate implicit language codes for information exchange, create conditions for maintaining and developing uniform rules for all behavior in the organization, vision of its mission and goals. It is quite clear that the described two components of structural capital in their totality and interaction ensure both the ability of the organization to combine and effectively use the potential of the human capital of its employees during economic activity, and to achieve higher final results.

Conclusions. Technical and technological development has always been in the field of scientific interests of many researchers. However, the works of the founder of institutionalism, T. Veblen, had the greatest influence on the formation of the methodological foundations of the study of this phenomenon. The use of institutional analysis in combination with social Darwinism served as the basis for the emergence of theories of technological determinism and evolutionary concepts of technological change.

Within the theories of technological determinism, two groups of conceptual approaches to the study of technical and technological development are distinguished: theories of economic futurology and transformation of the economy. The latter are considered the most constructive when studying the factors of technical and technological development, since they are the ones that consider changes in structural and organizational and legal factors. These factors are described in the vast majority of studies using the concept of «structural capital». At the same time, the content of this category is not unambiguous.

Components of structural capital should be divided into tangible and intangible assets. The first include those results of human activity that can be codified, documented and legally protected. The second – reflect the intangible side of production processes and combine all those elements that cannot be codified, documented and legally protected.

Thus, the special quality of human capital, which consists in the ability to support thinking processes and transfer the accumulated stock of knowledge into new ideas and products, is not a resource of an individual. It cannot be formed without a sufficient level of cognitive and structural capital. That is why the quality parameters of human capital are a product of joint activity, interaction between people, which is realized in certain social and institutional conditions.

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СТРУКТУРНИЙ КАПІТАЛ: СУТНІСТЬ ТА РОЛЬ У ЗАБЕЗПЕЧЕННІ ТЕХНІКО-ТЕХНОЛОГІЧНОГО РОЗВИТКУ

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Методологія дослідження. Дослідження базується на використанні таких методів як: абстрагування – при встановленні сутності категорії «структурний капітал», логічного й історичного – при дослідженні витоків теорій технологічного детермінізму, групування – при здійсненні класифікацій теорій технологічного детермінізму і складових структурного капіталу, структурно-функціонального – при визначенні впливу кожної із складових останнього на техніко-технологічний розвиток суспільства.

Результати. В роботі визначено методологічні витоки теорій технологічного детермінізму й еволюційних концепцій технологічних змін. У межах теорій технологічного детермінізму виокремлено дві групи концептуальних підходів до дослідження техніко-технологічного розвитку, а саме: теорії економічної футурології і трансформації економіки. Останню групу теорій визнано найбільш конструктивною при вивченні чинників техніко-технологічного розвитку, оскільки саме в них розглядаються зміни структурних і організаційно-правових чинників. Продемонстровано різну сутнісну наповненість категорії «структурний капітал». Запропоновано розглядати складові структурного капіталу з огляду на його матеріальні і нематеріальні характеристики. До матеріальних активів віднесено результати діяльності людей, які можуть бути кодифіковані, документально оформлені і юридично захищені. До нематеріальних активів залучено елементи, які відображають нематеріальну сторону виробничих процесів і об'єднують всі ті елементи, які не можна кодифікувати, документально оформлювати та юридично захищати.

Новизна. З огляду на характер змін, що викликані дією техніко-технологічних чинників, здійснено поділ теорій технологічного детермінізму на концепції економічної футорології і теорії трансформації економіки. Використання методологічного потенціалу останніх дозволило розмежувати матеріальні і нематеріальні складові структурного капіталу та встановити роль організаційних чинників на техніко-технологічний розвиток суспільства.

Практична значущість. Удосконалені методологічні підходи до класифікації теорій технологічного детермінізму і групування елементів структурного капіталу дозволяють більш точно ідентифікувати фактори впливу на техніко-технологічний розвиток та прогнозувати наслідки для функціонування економічної системи суспільства.

Ключові слова: теорії трансформації суспільства, теорії технологічного детермінізму, структурний капітал, матеріальні активи, нематеріальні активи, людський капітал, техніко-технологічний розвиток.

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