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**INFORMATION AND THE KNOWLEDGE BASED APPROACH
THE DETERMINATION OF THE PARADIGM OF SOCIO-ECONOMIC
DEVELOPMENT**

***Abstract.** The modern socio-economic development aimed at the usage of intellectual labor, which is based on information and knowledge, man and society. Within the theoretical and economic analysis, it is defined that information and knowledge are instrumental in the formation of the postindustrial economy. The interaction of the system which is predicated on information, people and knowledge with the system which is predicated on society and man, forms the scientific and the methodological basis for the innovative development of the postindustrial economy. Synergy is the foundation of natural and social creative processes. The article shows the applicability of the systemic approach to understanding the inside interconnection between information-category and knowledge-category. It is examined the interdependence between “the individual autonomy” and simultaneous “the affiliation with the entire” while passing the definite stages of development. It is suggested a new paradigm of modern social and economic development, which consists of six interrelated levels.*

***Keywords:** system, the innovative development, information, knowledge, synergy, individual and social information, society, postindustrial economy, paradigm.*

INTRODUCTION

In Ukraine the level of socio-economic development has essentially deteriorated since the independence. In 2014, it was received three UAH for each invested UAH in innovation from sales of products, but in 2015 – approximately two UAH. In 2015, knowledge-intensity of GDP has become 0.62%, particularly out of public funds – 0.21%. In 2015, the government expenditures on the scientific investigation have declined to 0.18% from GDP, which is almost ten times lower than exponent, prescribed by the Law of Ukraine “On Science and Scientific and Technology Activities”. Since independence, scientific and technological potential has attained a minimum. Unfortunately, in our country, the norms of current laws are not in progress in scientific and innovative spheres, and the reaches for deepening of understanding of postindustrial economy are not held.

Many factors affect the current socio-economic development, but the key factors are information and knowledge. In our opinion, when developing the national innovative economy, it is necessary to investigate the role and importance of information and the knowledge-based approach. So far these categories were investigated as separate, and they were not considered in their systemic interconnection. While investigating, a demand arose in use of systematic approach, because information and knowledge are the results of the interaction between man and society.

PROBLEM STATEMENT

In the modern global economy, changes are in process, and these changes are based on information and knowledge. Such changes are possible in the interaction between man, society, information and knowledge. An analysis of scientific works shows the strong interrelation between information and knowledge, society and man and its impact on the socio-economic processes. There is the problem of understanding the mechanism of the interconnection between these categories, and the impact of this mechanism on the formation of the

postindustrial economy and the development of an open society. In an open society, there are the comfortable access conditions to databases of information and bank data storage, and it helps to break new ground for further development of the postindustrial economy. The formation of an open society is active in terms of the socialization process that transforms interconnection between man and society in a category of interdependence. That's why it is necessary to conduct the investigation using a systematic approach, which will provide the deeper understanding of the foundations of modern economic processes aimed at the formation of information, knowledge-based and innovative development of the postindustrial economy.

MAIN PART

Information-category and knowledge-category are important, and that's why in the scientific literature, each of them is dedicated many investigations. Difficulty in understanding these definitions involves the fact that information and knowledge, their nature and content is, in fact, a significant problem of modern science because they are developing at the intersection of philosophy, cybernetics, logic, economy, psychology and other sciences. The existing definitions reflect the usage of information and knowledge in a certain field or features of professional person's activity who has formulated the definition.

Despite the extension and the increasing importance of information and knowledge for human life and activities, in modern economics, there is not unambiguous understanding of information and knowledge. Therefore, every researcher, lecturer, and the user put own viewing and understanding in the content of these terms. The ambiguity of information-term and knowledge-term complicates the creation of scientific and methodological basis of intellectual development of man and society, and model development of the postindustrial economy.

When analyzing certain scientific investigations about the understanding the essence of information-category and knowledge-category, we recognize that they

are in progress simultaneously and separately from each other, and the inside interconnection between information and knowledge were not considered.

The analysis of the information-term suggests that information theory mainly considered quantitative aspects of this concept, not paying proper attention to its essence. As the result of an attempt to move beyond telecommunication problems were coming up against significant philosophical, mathematical and other problems [2]. Claude Elwood Shannon, Norbert Wiener, Leon Nicolas Brillion and others in their scientific works identified informational measure and the essential nature of the phenomenon of information remained almost unexplored and it is not disclosed [3-5].

The analysis of scientific works shows that there are a lot of definitions of information-category and they are usually aimed at the understanding of the quantitative characteristics. Unfortunately, very few investigations are aimed at the essential deep characteristics of information, its importance in our lives and, in particular, for contemporary socio-economic development.

In scientific literature there are a lot of definitions of knowledge-term, for instance:

- knowledge is useful information, proven by practice;
- knowledge is an object of commercialization and automation;
- knowledge is an experience of reality, proven by practice, regular reflection in the final version, in the human thinking;
- knowledge is information in the memory of people, society or technical equipment, [6-10] etc.

Information and knowledge are considered as separate categories by scientists and their interconnection deals with few little investigations [5; 11-12].

The analysis of the systematic interconnection between society-category with man-category is important. But the investigations of the interconnection between information-category, knowledge-category, society-category and man-category are even more important. Few such comprehensive investigations have been carried out, and therefore it is necessary to summarize the systematic vision

of the interconnection between information and knowledge, society and man and to show its importance for the methodology of the formation of the postindustrial economy.

RESULTS OF INVESTIGATION

According to the Robert Slowly and Paul Romer's theory, information and knowledge have become a major source of socio-economic development [13-14].

Modern technological, economic, managerial, social processes are based on new knowledge.

The analysis of modern understanding of the information-term and knowledge-term has shown that the definitions are intrinsically interrelated. Knowledge is based on information, and these two categories are constantly beside for civilized development of the mankind.

We are of the opinion that information is a natural category [5, 15]. The nature with the aid of information signals on certain processes. Nature like a man, constantly functions, creating new materials, forms new sources of energy, controls the movement of various transformations.

We give our definition of knowledge-term, knowledge is the result of personal analysis and synthesis; it is information, which is reformed by the person in an individual virtual knowledge [15-17]. When knowledge of an individual is fixed and published on various kinds of media, it becomes social information. The same creative product is knowledge at the same time for some conditions and subjects, but for other conditions it is information.

In the report [17] it is proven that the information and knowledge function in the form of a dialectical system, its operation is ensured by the obligatory participation of the people, that's why this system is the economic basis of socio-economic development of society.

People transform information into knowledge in a dialectical information-man-knowledge system. Knowledge is a source of personal creative human movement. The basis of the creation of knowledge is a natural synergy-category.

The dialectical information-man-knowledge system operates on the principle of synergy. Nature and man function on the use of synergy, which is a fundamental principle of all creative processes.

It should be stated that information is a natural category, which reflects the laws of the existence of matter and it is the basis for the creation of new knowledge. Knowledge after the publication is information for its following use. The understanding of the connection between information and knowledge as a dialectical system gives reason to suggest the existence of two types of information such as social and natural.

Natural information can't be the result of human labor. "As a miner produces new ore minerals from the rocks, and research officer produces from the darkness a new being, which he/she does not create, but reveals, like he/she sets free to life" [17].

Social information is knowledge about the result of creative human labor, which is deliberately transferred to the rank of information, and it makes information available for use by the society [17]. The process of creating knowledge always ends with the decision.

There are two kinds of knowledge: general scientific (fundamental) and applicative. The owner of knowledge decides the fate of its use, a person can leave it in the form of know-how, to patent or to transform into information by publishing [17].

It is fair to say that there are two types of information: natural (fundamental) and social (applicative) and two types of knowledge: fundamental and applicative.

Synergy, which is described by the general system theory, is the fundamental basis of the passage of natural and social creative processes. The examination of the interconnection information-man-knowledge system with synergy and fundamental propositions of general system theory makes it possible to show indirectly the validity of the systematic approach to the understanding of the intrinsic interconnection between information-category and knowledge-category. The process of transference of information into knowledge occurs in the

stage of scientific knowledge, and the depth of information transforming into knowledge depends on the stage of scientific knowledge [18-20].

The investigations are relevant to the systematic intrinsic interconnection between information, knowledge, society and man, because man is always between information and knowledge, and man is the member of society.

The man is both individual and social, and therefore there is constantly an active interaction between man and society. The individual component is implemented with the aid of information-man-knowledge system, and the social function realizes as a result of the interaction of the society-man system. The consideration of such interaction provides answers to many questions of our time. The duality of human nature shows the possibility of using natural synergy to its endless self-improvement.

In modern conditions of society development, there is a close intertwining of its interests and human capabilities, and their interdependence is expanding. When the basis of progress is information and knowledge, then man and society are forced to act as identical vectors, pointing to a single specific goal. The imbalance of public and human interests is unacceptable. The man is a key figure in information-man-knowledge system and in the social society-man system.

The man has “individual autonomy” and “affiliation with the entire”. The principles of “individualization” and “socialization” come under the notion of natural character. In real life, it is impossible to achieve absolute independence (individuality). Man lives in society, and therefore the understanding of herself /himself and the environment (society) happens at the same time.

The interaction between “individual autonomy” and “affiliation with the entire” pass the appropriate stages of development. The characteristics of these stages are listed in the table 1.

Table 1

The principles of individualization and socialization depending on the stage of socio-economic development

The name of the stage	The essence of economic development	Components of the system of interaction between the individual and social	The model of connection between the individual and social
Extensive (agricultural)	The amount of recycled material	The interaction at the level of bio-social laws	The total dependence on the owner
Intensive (industrial)	The amount of recycled energy	The combination of radical and structured diversity of the environment with the development of individuality	The economic dependence on organizational structure (head officer)
Information and knowledge-based (self-development)	The amount of used information and knowledge	The condition of the relative homogenization with a rich diversity and development of the principle of “individuality”	The finding of the balance of interests and compromises between the components of the functional system

Human`s interaction and dependence of society grow in transition from one stage to another and vice versa. The principle of “identity” establishes the rights of the individual, and the principle of “sociality” legitimizes law of social behavior.

Current social and economic development of society is based on the balance of interests. Establishment of modern economic paradigm is subject to finding a compromise between the individual and social. At the core of such relationships is the information and knowledge period of development, which becomes the basis of modeling information-knowledge paradigm of post-industrial economy. Information-knowledge method of forming a new paradigm is justified and appropriate.

This approach is implemented by the interaction of the economic system “information – human – knowledge” with the social system “society – human”. The interaction of economic and social systems affect the conditions for human creative activity, the number of created knowledge, and technological conditions for transferring of creative product in production. The interaction of economic and social system becomes a scientific and methodological basis for the formation of a new paradigm of modern socio-economic development.

Applying a systematic approach, and basing on the analysis of natural processes, we offered information and knowledge paradigm formation of innovative post-industrial economy, which consists of six levels.

I – *synergistically-creative*, that provides self-development of the system with the formation of intellectual capital;

II – *interaction of economic* (“information – human – knowledge”) *and social* (“society – human”) *systems* that perform scientific and methodological function of forming information -knowledge paradigm;

III – *functioning national innovative system* that acts as a universal technology platform of implementation foundations of postindustrial economy, that provides conditions for human creativity and application of knowledge in practice;

IV i V levels are provides the formation of human as a creative person and staffing the national innovation system;

VI – level provides the control system with post-industrial economy.

We formed a list of systems that are the basis of information and knowledge paradigm of post-industrial economy. We divided such systems into 5 parts,

synergistic and creative, interaction of economic and social systems, national innovation system, the system of formation of the new man, staff training and management system of post-industrial economy.

The first system is responsible for self protection and social movement, the second is a scientific and methodological basis of information and knowledge paradigm, the third system serves as a universal technology platform, the fourth is a system of formation of the new human, the fifth is responsible for staff training, and the sixth - responsible for intellectual information and knowledge management.

We have defined the goal of each system and the way to achieve it. The first system is aimed at development of social infrastructure, the second -at finding a compromise in the “society – human”, the third – at creating conditions for the creation and implementation of knowledge into practice, the fourth - for the implementation of the principle of interdependence of human and society, the fifth system proves the entry of intersectoral group to the list of interdisciplinary specialties, the sixth system is based on building trust and coherent objectives between society and human.

We also uncovered the mechanism of achieving the goal of an appropriate system. The first system is aimed at creating intellectual capital, the second – at creating the legal and regulatory framework, the third – at the development of model of national innovation system, the fourth is based on finding a compromise between the individual and society, and it is responsible for creating conditions for human`s creative work , fifth aimed at developing a methodological framework for a range of inter-industry specialties, the sixth is responsible for creating an effective system of post-industrial economy development management.

All components of the structure of information and knowledge paradigm of social and economic development are important and interrelated. Comprehensive analysis of the components of the information and knowledge paradigm suggests that the system that is responsible for the technological capabilities of functioning of postindustrial economy has a special importance.

According to the US experts , establishment of national innovation system demonstrates the special role of the national innovation system in the socio-economic development. The law of Ukraine “On innovation activity” defines that *“Innovation focused on the use and commercialization of research and development and causes the release of new competitive products and services”*. Performing this purpose of the national innovation system is possible *by creating the technological basis for the continuous generation of new knowledge and transform this creative product in the production of its subsequent use*.

Intended purpose of innovation system, prescribed by law, is the same as our approach to understanding the main features of the national innovation system, which consists of it`s defining as a *universal technology platform* for creating, using and commercialization of human creativity.

It is not so simple to form such system. The development of any technology requires the involvement of different specialists , and is a complex task. Therefore model development of the national innovation system will also be a challenge. That's why we devote this system in the of Information and Knowledge paradigm as a *priority for the present*. Unfortunately, our country has not developed a model of national innovation system yet. [21, 22].

Thus, the proposed structure of post-industrial economy paradigm offers new opportunities for the improvement of public administration innovation economy.

Building dialogue with state, society, business and individual is possible only with proper understanding of the importance of intellectual work. The basis of this work is the people and information. Human turns information into knowledge.

CONCLUSIONS

- Modern social and economic development aimed at the use of intellectual work. the basis of intellectual work are information and knowledge. Information and knowledge, creative work, active human and society behavior become a priority;

- Within theoretical economic analysis the authors identified the key role of information and knowledge in forming post-industrial economy, and showed that the essence of categories of “information” and “knowledge” was not actually found up to now.
- Interaction of “information - the human – knowledge” with the system “society – human” is the foundation of scientific and methodological innovation for the development of post-industrial economy;
- There suggested the structure of the new information and knowledge paradigm of modern social and economic development, which consists of six interrelated levels.

REFERENCES

1. Chyzhevskiy B. (2016) Innovatsiyni rozvytok: chomu vidсутnia politychna volia ta zaprovadzhuiutsia vykonavcha i finansova blokady [Innovative development: why there is no political will? Why the executive and financial blockade introduce?]. Holos Ukrainy [Voice of Ukraine], no. 145 (6399).
2. Malyshev O.V. (2012) Informaciya kak soznatel'nyj fenomen [Information as a conscious phenomenon]. Matematychni mashyny ta systemy [Mathematical machines and systems], no. 3, pp. 166–177.
3. Chursin N.N. (1982) Populyarnaya informatika [Popular Computer Science]. Kyiv (in Ukraine): Tekhnika, pp. 158.
4. Shennon K. (1963) Rabota po teorii informacii i kibernetiki [Information theory and cybernetics work]. Moscow (in Russian): Izd-vo inostranoj literatury, pp. 19.
5. Glushkov V.M. (1986) Kibernetika. Voprosy teorii i praktiki [Cybernetics. Theory and practice]. Nauka, pp. 488.
6. Stepanova T.E., Manohina N.V. (2008) Ehkonomika, osnovannaya na znaniyah (teoriya i praktika): uchebnoe posobie [Economy based on knowledge (theory and practice): a tutorial]. Moscow (in Russian): Gardariki, pp. 238.

7. Bruking E. (2001) Intellektual'nyj kapital [Intellectual capital], [trans. from English]; ed. L.N. Kovalik. SPb.: Piter (in Russian), pp. 288.

8. Malyshev O.V. (2009) Voploshchennoe znanie [Embodied knowledge]. Matematychni mashyny ta systemy [Mathematical machines and systems], no. 1, pp. 55–69.

9. Porat M. (1977) The information Economy: Definition and measurement. Washington.

10. Dehvid P., Foreh D. (2003) Ehkonomicheskie osnovy obshchestva znaniya [Economic foundations of the knowledge society]. Ehkonomicheskij vestnik Rostovskogo gosudarstvennogo universiteta [Economic Herald, Rostov State University], no. 1. — pp. 29–55.

11. Gojlo V.S. (1998) Intellektual'nyj kapital [Intellectual capital]. Mezhdunarodnaya ehkonomika i mezhdunarodnye ehkonomicheskie otnosheniya [International Economics and International Economic Relations], no. 11, pp. 64–76.

12. Chubukova A.Y. (2006) Ehkonomika informacii: uchebnoe posobiye [Information Economy: Textbook]. Kyiv (in Ukrainian): Norta print, pp. 254.

13. Solow R.M. (1956) A contribution the Theory of Economical Growth. Quartery Journal of Economics, pp. 3–4.

14. Romer P. (1986) Rastushchij oborot pribylej i dolgosrochnyj ehkonomicheskij rost [Rising turnover profits and long-term economic growth]. Voprosy politicheskoy ehkonomii [Questions of political economy], no. 94, pp. 1002–1011.

15. Parkhomenko O.V. (2011) Dialektychna systema “Informatsiia – znannia” yak vyznachalniyi factor realizatsii pryntsypu “obiednannia mozhlyvostei” v umovakh funktsionuvannia innovatsiinoi ekonomiky [Dialectical system “information – knowledge” as a determining factor of the principle of “combining opportunities” under conditions of innovative economy]. Naukovo-tekhnichna informatsiia [Scientific and technical information], no. 4 (50), pp. 8–13.

16. Parhomenko V.D., Parhomenko A.V. (2007) Informaciya i znaniya: sovremennye predstavleniya, vnutrennyaya vzaimosvyaz' [Information and knowledge, modern representations, the inner relationship]. Informaciya i innovacii [Information and Innovations], no. 4. pp. 4–14.

17. Parkhomenko O.V., Parkhomenko B.V. (2007) Informatysiina analityka i tvorchist [Information Analysis and work]. Visnyk Kyivskoho natsionalnoho universytetu tekhnolohii ta dyzainu [Bulletin of Kyiv National University of Technology and Design], no. 6 (38), pp. 181–192.

18. Porev S.M. (2012) Universytet i nauka. Epistomatolohiia, metodolohiia i pedahohika vyrobnytstva znan: monohrafiia [University and science. Epistemology, methodology and pedagogy knowledge production: monograph], Kyiv (in Ukrainian): Khimdzhest, pp. 384.

19. Starish O.H. (2005) Systemolohiia: pidruchnyk [Systemology: textbook], Kyiv (in Ukrainian): Tsentr navchalnoi literatury, pp. 232.

20. Synerhetyka i tvorchist: monohrafiia (2014) [Synergetics and creative work: monograph]. Ed. V.G. Kremen. Kyiv (in Ukrainian): Instytut obdarovanoi dytyny, pp. 314.

21. Kontseptsiiia rozvytku natsionalnoi innovatsiinoi systemy. Skhvalena rozporiadzhenniam Kabinetu Ministriv Ukrainy vid 17 chervnia 2009 r. (2009) [The concept of national innovation system. Approved by Cabinet of Ministers of Ukraine on June 17, 2009]. Uriadovyi Kurier [Governmental Courier], no. 114.

22. Krapyvnyi I.V. (2011) Perspektyvy rozvytku natsionalnoi innovatsiinoi systemy v Ukraini [Prospects of development of national innovation system in Ukrainian]. Mekhanizm rehuliuвання ekonomiky [Mechanism of economic regulation], no. 1. pp. 73–79.