

Function of Information and Knowledge in Society

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Abstract: Results of problems' solution, data analysis, checked information generalized in the form of laws, theories, combination of views and concepts-all these transform into knowledge. Many students are planning to invest knowledge obtained at university into foundation of their business in order to be more successful in modern life. Now information and knowledge substitutes capital and labour-the foundations of industrial society. Economy of knowledge eliminates the boundaries between public and private wealth; society of knowledge distributes wealth among their members more evenly. Future of economy of knowledge is based on education.

Key words: Information • Data • Knowledge • Information technologies • Internet-resources • Digital generation • Education system • Information explosion • Information crisis • Information society • Information revolutions • Information security of a man • Education environment • Economy of knowledge • Economy • Future • Wisdom

INTRODUCTION

Last 100 years of philosophic discussion led the scientists to conclusion that the Toffler's forecast made by him in last century, that science and technologies develop by jerks, (“waves”), [1] has become true.

Formation of modern knowledge is a key lever of acceleration of economic and social development of society. Economic growth at present time is based on scientific-technological progress, information and knowledge. Data is an abstraction, “raw material” for information and information itself after the analysis becomes raw material for knowledge. It is also necessary to point out that notion “information” while being the subject of study of many sciences, is specified and enriched by every science in its own way. Notion “information” is a key in modern science and that is why it can not be defined strictly with the aid of more simple notions. A man must process information in creative way in order to get new knowledge. Knowledge suggests the comparison of object of study, cognition of its essence only gives a clue. This is reliable notion about something, not like a possibility opinion [2]. Knowledge in philosophy is a checked by practice result of reality cognition; to be more exact, its correct

representation in human mind; experience and understanding which are right in subjective and objective aspects, which can be used for building conclusions which seem reliable enough to be considered as knowledge [3]. Capital and labour as foundation of industrial society give a way to information and knowledge in information society (IS), at the new stage of its development-economy of knowledge.

MATERIALS AND METHODS

Observation over processes which are taking place in society in the era of wild flourishing of ICT since 2000 allows us to make some conclusions. All objects are in the state of continuous motion and change which is accompanied by exchange of energy and its transformation from one form into another. Data is fixed facts of environment. The following interpretations of “data” are given below:

- Facts, figures and other information about real or abstract persons, objects, phenomena and events corresponding to some discipline, presented in digital, symbolic, graphical, audio or any other format;

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- Information presented in the form useful for its transmission and processing by automatic means.

We choose from all numerous approaches to definition of notion "data" the most appropriate one which describes data as information about events happened in material world as they are registration of the signals originating as a result of these events.

However data do not possess characteristics of information. Transformation of data into information depends on the fact if there is known method of transformation of data into known concepts. In other words, in order to extract information from data we must find appropriate to this data form method of obtaining information. Data which contains information has attributes which define adequate method of obtaining this information [3].

Here we should take into consideration the fact that information is not a static object-it is changing dynamically and exists only in the moment of interaction between methods and data. Information exists only at the moment of realization of information process. The same data at the moment of use represent different information depending on the degree of adequacy of the interacting methods. Intrinsically, data is objective because they are the result of registration of objectively existing signals caused by changes in material bodies or fields. So, information appears and exists at the moment of dialectical interaction between objective data and subjective methods.

We must understand that information has some specific parameters. If we have 1000 m of fabric and give 500 m to somebody we shall have only half of initial amount. But if we have some amount of information and we give half of it to another man, we shall still have all the information. If we allow somebody to use this information, it will be logical to think that third party will share something useful with us. While bargains with tangible things result in competition, exchange of information leads to cooperation. Thus, information is a resource which can be shared with other people without damage for the one who has this information. Another specific feature of information usage is that apart from use of material things or energy which result in increase in entropy in the universe, use of information lead to opposite effect-it increases human knowledge, improves organization in environment and reduces entropy [4].

We can say that knowledge is an information but not all information is knowledge. Transformation of information into knowledge occurs due the whole number of reasons, still leaving some gap in this transformation. "Knowledge" can be interpreted in the following way:

- A kind of information which reflects knowledge, experience and perception of a man-expert in some particular discipline;
- Set of all current situations in the objects of specific type and the ways of transition from one way of object's description to another;
- Understanding and interpretation of specific information with due regard to the ways of its best use for specific purpose.

Main Part: Term "economy of knowledge" was introduced by Fritz Machlup in 1962 in his book "Production and distribution of knowledge in the USA". We understand economy of knowledge as such type of economy in which knowledge performs key function. In accordance with terminology of World Bank, economy of knowledge is such type of economy which provides efficient use of knowledge for solutions of tasks of socio-economic development thanks to, among other things, direct borrowing of foreign scientific inventions or their adaptation for special use [2]. The foundation of economy of knowledge is education. In modern world the driving force of economy is competition. And it more and more often means competition of knowledge. The knowledge itself is connected with definition of the following notions: information, IS and information culture. Knowledge in the market is not a product in spite of the fact that "triad-education, science and innovations-is the whole integrity" [5].

Difference of knowledge from ordinary product is that we can not offer a part of knowledge for testing in order to sell the whole batch afterwards. Knowledge market is based on reputation, trust. It is reputation and quality of knowledge which are most expensive in this sphere. Economy of knowledge, to a greater extent, than ordinary economy eliminates the boundaries between public and private wealth; society of knowledge distributes wealth among their members more evenly. Concentration of relevant knowledge and transition to knowledge management will open new efficient ways of problems' solution in education system. In opinion of many competent scientists the companies which form their

activity and business-plans with the use of knowledge management system will be leaders in the markets of XXI century. Analysis of prioritized spheres of study of most developed countries demonstrates that formation of the future picture of the world will be globally influenced by organization of the process of obtaining new knowledge through Internet [9]. Internet provides quick distribution of information about key scientific discoveries and technology inventions in prioritized spheres of science.

Economists understand information as “data “sieved” for specific people, problems, aims and situations”. Considering information in philosophic aspect V. Glushkov has formulated the following definition: “Information in its most general understanding is a measure of non-uniformity of matter and energy distribution in space and time, a measure of changes which follow all happening in the world processes” [8].

In 90s in Russia we almost had the knowledge market, consumers of which were both separate social circles (first of all, those who are interested in it by objective reasons-students, school children, newly formed entrepreneurs and appropriate institutions (humanitarian centers, schools, universities). The latter have dual role: they give knowledge and attract necessary certified specialists and information for educational and scientific activity. For example, in order to confirm high level of professional English language in the sphere of economy and finances a specialist must obtain international certificate. In the sphere of accounting and financial management it is ICFE (International Certificate of Financial English). A BEC certificate of English language is appropriate for all spheres of education activity. Possessing such certificates is a pass for work in big international companies. The exams can be passed at the university. In this case students can participate in international student conferences and students' exchange programs, they can attend lectures of the best foreign professors with active participation in the discussion, getting grants from foreign organizations. The necessity to form student information culture as well as global character of the task to prepare a young generation for life in IS are understood by any country as tasks of paramount significance. Solution of these problems is impossible without general education institutions.

Let us recall the history of IS formation. D. Bell was the first who defined characteristics of IS. He defined the essence of future society through the changes happening in contemporary society, he underlines those features which will differ “post-revolutionary” society from the present one. D. Bell says that in oncoming century the

formation of new life mode based on use of telecommunications will be of utter importance for economic and social life, ways of knowledge production and the character of labour activity. Key function in revolution in organization and processing of information and knowledge will be performed by computer. This revolution goes on simultaneously with formation of post-industrial society [6].

Tourain Å. defines post-industrial society as follows: “here investments are made into another level than in industrial society, into production of production means. This has two forms: firstly, these are innovations, or ability to produce new goods, in particular, as a result of investment into science and technologies; secondly, it is self-government, in other words ability to use complex systems of information and communication” [7]. Thus, IS is a civilization which is founded on special intangible substance, which we can call information in broad sense-it interacts with both spiritual and tangible human world. The last feature is especially important for understanding of the essence of new society, because on the one hand, information forms material environment of people’s life acting as IT, computer programs, telecommunication protocols etc. and on the other hand, it is key tool of interpersonal interaction, constantly appearing, changing and transforming in the process of transition from one man to another. In such society information determines both socio-cultural life of a man and his existence. These circumstances open new economic perspectives [3].

Let us consider some data of the last investigations of the Center of humanitarian technologies (CHT) describing modern society. Here we can look at some specific indicators which characterize influence of information and knowledge on the changes in society:

- The Knowledge Economy Index is a complex indicator which characterizes the level of development of economy of knowledge in the world countries and regions. It is calculated by the World Bank method. This page contains actual list of the countries ranked by the Knowledge Economy Index. WB report presents data for 2011, this report covers 146 states and territories. Russia is on the 55th place, having index of.-5,78 [10].
- Education Index is combined indicator of UN development program calculated as index of literacy of grown-up population and index of total proportion of learners who are getting education. Web-page of CHT contains actual list of states and territories of the world with confirmed estimate of population’s

education level ranked by Educaion Index. The list presents data for 2011, Russia is on the 49th place, having index of 0,78 [10].

- The Happy Planet Index is a combined indicator of Britain Research center New Economic Foundation which measures the level of happiness in world countries. This page contains actual (regularly renewed) list of 151 states, ordered by the Happy Planet Index. in 2012. Index measures the indicators of satisfaction of people of every country and average length of life in correlation with amount of consumed natural resources.
- The Global Competitiveness Index is a global research and resulting ranking of world countries by the indicator of economic competitiveness calculated by WEF, where Russia is on 64th place [10].

CONCLUSION

So, fixed and perceived facts of surrounding world represents data. But data has no characteristics of information. In order to obtain information we need to find appropriate to data form method of getting information Today these methods have changed, they suggest wide use of ICT and internet-resources. Information resulting from processing of objectively existing data lies in the core of knowledge. In its turn knowledge allows to develop new methods of data processing which facilitate obtaining new information and new knowledge. On the other hand, knowledge in IS is a foundation for development of this society and its economy. This leads to increase of well-being of almost all members of this society. The man himself has changed and society has become information society: it is based on economy of knowledge. Today almost everyone has access to information. We achieved one more degree of freedom. But does it mean that the happiness has come? What makes a man happy? What does the Happy Planet Index mean obtained by CHT researches? The ranking authors emphasize that in those countries where emphasis is made on development of production and economic growth which is associated with it, people, as a rule, does not become happier, because economic theories has nothing to do with life of real people.

By Ackoff R. 4 categories (data, information, knowledge and understanding) deals with what was or is known. Only 5th category-wisdom-deals with future because it includes the vision of future. Using wisdom people can build the future, not just understand present and past. But achievement of wisdom is not easy, we have to pass in series other categories in our cognition

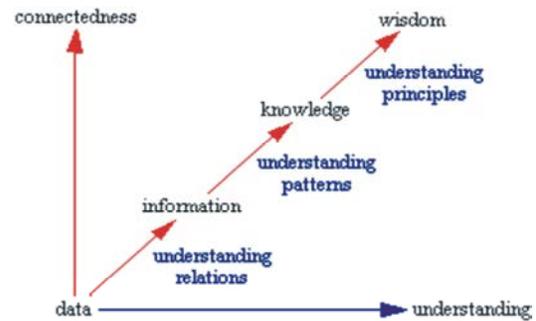


Fig. 1: Diagram of transition from data, information and knowledge to wisdom



Fig. 2: information hierarchy [3].

(Figure 1) or, in accordance with research works, through information hierarchy of DIKW pyramid (Figure 2) [3].

DIKW (*data, information, knowledge, wisdom*) is information hierarchy where every level adds some specific attributes to the previous level.

Inference: Many postulates of IS has proved to be groundless. Computers will never have ability to achieve wisdom. Wisdom is a unique human gift. Wisdom demands a soul -because it is not only in mind but in heart as well. And a machine will never have soul [11, 12]. Representatives of digital generation spend little time in libraries, looking through card files. Communication by means of gadgets has substituted real communication. Mankind distributes itself into network communities-pseudo-elites of society-looking for communication. “In a system where all participators chase their own interests the damage is incurred not only by the whole society but by separate individuals as well” [5]. We believe that it is necessary to improve intellect of new generation, awaken interest in face-to-face (alive) communication, we must teach to think -this is the target of modern education. The target of education is to teach to learn how, while having immediate access to information, to use it in the right way in the process of cognition, passing information hierarchy in direction of wisdom. On this way every man can win, but not everybody.

REFERENCES

1. Toffler, E., 2004. The 3rd Wave. Moscow: AST.
2. Makarova, V., 2003. Economy of knowledge, Lessons for Russia, 5(73).
3. Sharma, Nikhil, The Origin of the Data Information Knowledge Wisdom Hierarchy, Date Views 12.01.2014 wiki.km4dev.org/DIKW_model.
4. Markus, M.L. and T. Connolly, 1990. Why CSCW applications fail: Problems in the adoption of interdependent work tools. In Proceedings of CSCW'90, Los Angeles, Calif, Oct. 7-10, pp: 371-380.
5. Aleksandrov, V.V. and N.D. Gorsky, 1993. Image Representation and Processing, Dodrecht /Boston/London: Kluwer Academic Publishers, pp: 155-157.
6. Bell, D., Social framework of information society, pp: 330.
7. Tourain, À., 1997. The Post-industrial Society: Tomorrows social history: classes, conflicts and culture in the programmed society. N.Y., pp: 414-415.
8. Glushkov, V., 1964. About cybernetics as a science.
9. Dahlman, C., 2003. World Bank Knowledge Economy Products and Strategy: Emerging lessons. Washington DC, pp: 45.
10. Center of humanitarian research (CHR), Date Views 12.01.2014 URL: gtmarket.ru/ratings/education-index/education-index-info.
11. Ackoff, R.L., 1989. From Data to Wisdom. Journal of Applies Systems Analysis, 16: 3-9.
12. Gadowski, A. Information, Preferences and Knowledge, An Interesting Evolution in Thought.