

# Information Revolution as a Starting Point for Building a Modern Innovative Society

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**Abstract**—The article is devoted to the role of the information revolution in the formation of the modern innovative society. We made an attempt to clarify the relationship of the phenomena that characterize the development of information society: information revolution — information explosion — information society. The analysis of information society formation was performed on the basis of the concepts of information revolutions of A. I. Raktov, E. Toffler, D. Bell. We also highlighted main trends in the development of modern electronic environment, which are characterized by the intellectualization of information technologies. Positive and negative aspects of the development of modern information technologies, in particular, the Internet technologies, are shown.

**Keywords**—*information revolution; information explosion; information society; Internet technologies*

## I. INTRODUCTION

The development of modern information technologies and the increase in information arrays on a global scale have led to the uprising of new trends in the development of modern science and to the problems associated with it. Scientists started to talk about the so-called information explosion, the information revolution, the theory of the information society formation [1] [2].

The works of many scholars, such as D. Bell, J. Galbraith, A. Toffler, Z. Brzezinski, T. Umesao, J. Neisbit, M. Castells, are devoted to studying the theory of information society.

The very concept of “information” was introduced into science in 1928 by the American R. Hutley to designate a quantitative measure of information distributed via communication channels.

In the context of the information society theory, this concept has been transformed: information is now understood as a high-tech and intellectual product, presented

in the form of data, programs, systems, created by the majority of society members and that became an object of economic relations, as well as a source of social development [3].

## II. ANALYSIS ON THE ESSENCE OF THE THEORY OF INFORMATION REVOLUTION IN THE CONCEPT OF A. I. RAKITOV, E. TOFLER, D. BELL

The development of information and telecommunication technologies not only gave rise to various social effects, but also led to the emergence of a new trend of social thought, known as the “The information society theory”.

This theory has its own history of development. The first works on this subject appeared in the 60s-70s of XX century.

The most comprehensive one is the information revolutions theory of A. Raktov [4].

A. Raktov identifies five information revolutions:

- The first information revolution was introduction and advancing of the language into activity and consciousness of a person.
- The second information revolution is connected with the invention of writing.
- The third information revolution was the invention of book printing, it had a number of distinct differences from two previous ones. This revolution made it possible to make information, in particular scientific knowledge, mass-produced goods.
- The fourth information revolution lied in the use of electrical equipment, as well as of electricity-based devices and instruments intended for the speed and mass distribution of all types of information and knowledge.

- The fifth information revolution includes the following characteristics:

creation, continuous filling and expansion of giant automated databases and knowledge;

creation of ultra-high-speed computing devices - computers (including personal);

creation and rapid growth of transcontinental communication networks.

In the context of studying this problem, it is necessary to mention the concept of information revolutions of O. Toffler, who singled out three “waves” in the development of society: the agrarian when switching to agriculture, the industrial when switching to classical capitalism and the information one when switching to a society based on knowledge [5].

The recognized classic of the theory of post-industrialism D. Bell highlighted exactly three, not five, informational revolutions in his works [6]. Here is his reasoning about this.

Today, the curve of technological progress has steeply gone up, and this suggests that we are experiencing a third global technological revolution. Having passed the stage of invention and innovation, we entered the most important era - the period of mass distribution and introduction of new technologies. Their pace in different countries will depend on the economic situation and political stability, but this process can no longer be reversed, and in its consequences it can surpass even two previous technological revolutions, which at one time have transformed the West, changing lives in other parts of the world.

More than two hundred years ago, a steam engine was invented, which marked the first technological revolution. With the use of steam power, technological innovations that were previously inconceivable were introduced.

The second technological revolution, about 100 years ago, is characterized by achievements in two areas: electricity and chemistry. Electricity is a new more advanced form of energy, which unlike steam can be transmitted over enormous distances. This opened up the prospect of new forms of production decentralization, which was impossible when machines were gathered in a factory for minimization of steam energy losses. Electricity also gave a new source of light that changed the night and day rhythm of human life. It allowed to transmit coded messages over wires and transform voice into electrical signals, which caused the appearance of radio and telephone. Chemistry for the first time made it possible to create synthetic materials that do not exist in nature.

Today the third technological revolution is taking place - the information one. Without a doubt, today we are dealing with a new revolution in the production system. If the industrial revolution was about using the machines to perform physical work, and brainwork was the unshakable prerogative of human intelligence, then the modern scientific and technological revolution creates computers that, with unthinkable productivity for humans, perform many elements of mental work. There is a point of view that we are

entering the age of "industrial information production". Just as in a result of the industrial revolution, conveyor production was born, which increased labor productivity and produced the society of mass consumption, now the in-line production of information should arise, ensuring appropriate social development in all areas” [7].

The main prerequisites of the information revolution are:

The machine production development in the middle of the XX century, which contributed to the creation and operation of the first machines in the field of material production.

The change-over to full automation of industrial production, by the end of the 1970s which was possible because of the widespread development and implementation of microprocessors and industrial robots.

The most vivid examples of fully automated enterprises are the factories of the Japanese company Fanuc, as well as assembly enterprises of automobile companies in Sweden and the USA.

Active use of the management information systems in industrialized countries since the mid-1980s led to the spread of automation and computerization processes from the level of direct wealth creation to the level of their management. It resulted in radical reassessment of the values: information, the intangible resource, became the main factor determining development.

Globalization of the late 90s, associated with the functioning of the united information systems. The systems that integrated processes and resources which were used separately previously as well as the development of modern information technologies and telecommunications.

### III. INFORMATION EXPLOSION AS A STARTING POINT OF THE INFORMATION SOCIETY FORMATION

Taking the point of the concept of "information explosion" further, it is worth noticing that the emergence of this phenomenon is associated with the scientific progress and the information volumes increase. The information and technical means developed in the XX century increased the flow of information production and consumption many times, which resulted in rapid increase of human knowledge [8].

Thus, the information explosion was a result of the information revolution, which in turn led to the information society formation.

Another name for the changes taking place in modern society was the concept of “techno-biological evolution”, the specifics of which were concisely outlined by the French philosopher J. Ellul in 1963: “Human habitat is now not nature, but technology”.

In the process of this technobioevolution, a person becomes a technologized human being. According to F. Fukuyama, this is the coming end of a human, turning into a posthuman (2004).

“A man of the information society appears as the image of a *couveuse* - a transparent box with a newborn child inside, symbolizing the ontological unity of the human with the techno-environment. Here, the life and health of a small human being depends on the work of automatic devices, providing the comfortable temperature, oxygen supply, humidity” [9].

In French the word "*couveuse*" means "hen". In this context, we are talking about the replacement of nature with technical devices - the techno-environment, which is becoming a substitute for the natural human environment.

As I. Alekseev, V. Arshinov, V. Chekletsov note in their article:

“...we are at the beginning of a new technological revolution, which can be called the NBICS - revolution (of the nano-, bio-, information- and communication systems). It is not only about the increased level of development of science and technology, economic sector and industrial management, but also about new forms of sociality, value orientations, and a new understanding of the nature and humanity” [10].

According to another philosopher L. Baeva, "... the "third nature" is being formed - the world of virtual phenomena, which is a kind of synthesis of consciousness and high information technologies. Interpersonal communication, education, creativity, art, science, and leisure are moving into the sphere of electronic culture” [11].

Modern information and communication tools opened access to information databases to nearly any person living on Earth, regardless of its location. A man happened to be on the wave of the information revolution, began to experience difficulties not from lack of information, but from its excess. The modern world has changed dramatically, now not physical labor, but information is the main market product.

Such changes entail both positive and negative aspects. This is associated with the accelerated pace of development of modern information technologies. Problems arise faster than the human society respond to them or even realize [12].

Modern information era is characterized by the development of Internet technologies that qualitatively transformed the traditional forms of scientific communications. The digital format of presenting information (from text to multimedia) opens up tremendous possibilities for processing, recording, storing and transmitting information. It presents a wide range of tools for remote access to information, interactive communication, intellectualization of data processing, and the diversity of its visualization.

#### IV. STUDY ON THE POSITIVE AND NEGATIVE ASPECTS OF DEVELOPMENT OF MODERN INFORMATION TECHNOLOGIES

In modern society, research activities are carried out mainly in the electronic environment - on the Internet, which allows you to effectively and quickly distribute information among various categories of users.

For professionals involved in research activities, the Internet facilities substituted the conferences and symposia. For students and postgraduate students it replaces printed textbooks and other popular science literature in their fields of knowledge. This became possible with the advent of the Open Access system to various information arrays; replacing traditional letters with emails, with the possibility of high-speed transmission of information, as well as remote and virtual communication.

Rapid development of information and communication technologies gave rise to new forms of scientific communication [13]. Modern communication methods are a set of tools that support operation and creation of the collaborations, social networks, email, blogging, webinars, web conferences. Current stage of the electronic environment is characterized by the intellectualization of information technology.

However, being rapidly developed, information technology and communication capabilities of Internet technologies led to certain problems. L. Nurgaliyeva mentioned one of them: “The Internet has fundamentally changed the entire system of information circulation of the document flow and the very concept of the “access to information”. The Internet has become a potential field of resource interaction and a new environment for the exchange of ideas and communication, however, burdened with a stream of non-constructive information” [14].

The solution to this problem is necessary for comfortable search of this or that information, which requires highly qualified IT-specialists, who are able to create special software for accumulation, storage, exchange, standardization of information files [15].

Another problem of Internet development is the contradiction between the commercial interests of the creators and the public interests of users of electronic information resources. For a long time the legislative bodies of different countries and international organizations in the field of copyright protection have been making attempts to solve the problem. Their main task is to achieve balance between the authors' requirements for using their works and the public's right to obtain the necessary information [16]. The electronic environment that gave humanity an Open Access system has aggravated this problem.

#### V. CONCLUSION

The world has changed so much that information has become the main product of the market. In modern society human intelligence, rather than physical strength as it was before, is coming to the fore. All these trends are a direct consequence of the information revolution. Namely, the introduction of innovative technologies into all spheres of society, which makes a person adapt and learn to use them rationally. Undoubtedly, modern information technologies essentially ease human life, but there are also negative aspects of its influence.

First of all, we have in mind the problem of the break-off between information saturation and the moral principles of a

particular person or, in other words, the problem of using an information resource for immoral purposes [17]. The imbalance between information saturation and the ability to eliminate unnecessary, contradict to the life goals, knowledge is the most difficult task of choosing among the younger generation. If earlier the consequences of the lagging behind moral convictions in human activity from the use of ever-increasing technical capabilities concerned scientists, politicians, military officers, diplomats, that is, the elite of society, then in modern society global computerization touched every family.

That is why the Internet, as the most accessible means of transmitting information, is a challenge to all mankind and to each person individually [18].

In other words, if before scientific knowledge was available to a limited number of people, and not the worst in moral terms, today scientific knowledge is available to anybody. This increases the risks of using scientific knowledge by immoral people for selfish purposes. One thing is clear: the openness of knowledge, its availability and the ever-increasing amount of information do not by itself make a person better and kinder.

An Internet user is personally responsible for the selection of information resources and the information that he wants to receive.

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