

# INFORMATION AS A STRATEGIC RESOURCE FOR PROTECTION OF TECHNOLOGICAL SECURITY

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**Abstract:** Two approaches to a new factor of production – information – are defined. The modern system of factors of production and income, in which information is the only resource that can have unlimited number of participants of the global economy, is represented. It is proved that information activity has a number of features which distinguish it from other activities due to specific of new kind of social division of labor. The essence of the phenomenon of asymmetric information and information situations that arise during negotiations and making bargains is analyzed. Classification of information asymmetry on different criteria is proposed. Actions to prevent threats to information are proposed. It is determined that the availability of the information resources deficit can not be regarded as a question of it's "non-participation" in global development. The statement of the problem under the new ideology of the current stage of globalization is the presence of fixing the problem, whose solution is the key element of forms, rates of entering the country in the new world structure.

**KEYWORDS:** INFORMATION, TECHNOLOGICAL SECURITY, INFORMATION RESOURCE, ASYMMETRY, GLOBALIZATION.

## 1. Introduction

The phenomenon of information picture of the world as a scientific and methodological means of study of information reality reflects an important aspect of social life. Various areas of modern science in some way take into account information factor. The hour of information reign, the hour of its study and systematization of knowledge about this phenomenon in the socio-economic world has come.

Problems of providing technological security of regions and state as a whole, and information as strategic resource for technological security, in particular, were investigated in publications of the following leading scientists: G. Akerlof, Yu. Bajal, V. Geyets, A. Gritsenko, I. Maliy, W. Naysner, R. Nuruyeyev, S.Nekrasov, R. Sternberg, G. Styhler, L. Fedulova, A. Chukhno and many others.

At the same time, it is necessary to admit that now the scope of human activity is based on the power of information and knowledge, the rate of appearance of which increases daily, and the spread of information and communication technologies is uneven across countries and sectors of society. Therefore, issues related to information as a strategic resource for technical security is extremely important and requiring further deeper investigation.

One of the forms of systematization of knowledge about the information reality is informational world picture, which is characterized by a number features [1].

First, the current socio-economic world is experiencing technical and information stage of development, it exists in the form of information civilization. Modern technologies in ever increasing degree concentrate new forms and methods of collection, production, storage and dissemination of information around them.

Second, world picture is transforming due to changes in the information environment of a person, on the basis of information and increasing globalization of the world.

Third, intensive research of information has created the preconditions for determining information first as discipline and than in interdisciplinary research area.

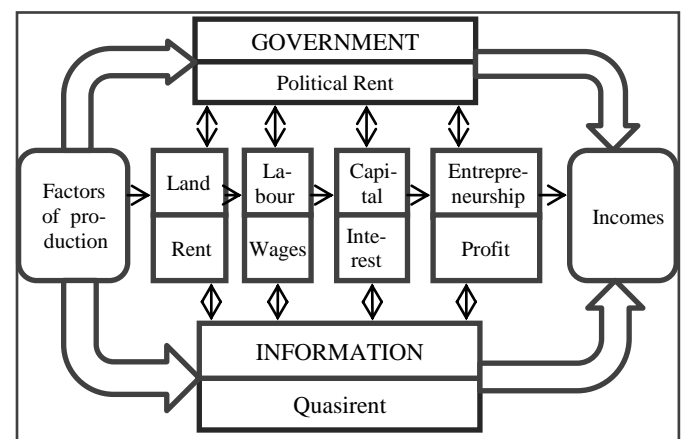
Fourth, the development of information sphere actualized the problem of the relationship of goals and objectives, tools, values and rules of scientific research.

Thus, the information picture of the world can be interpreted as the World Bank of Information that allows a person to perceive adequately the surrounding world. By providing specific information resources, classifying them accordingly, organizing access to them, the information picture provides a choice of particular system of values. The formation of an information society and changes in information world picture are prerequisites for the evolution to the next stage of human development, the civilization and technological foundation of which is the information industry, production of intellectual innovations, and continued modernization of the economy and the formation of cultural standards on the basis of intellectual innovations [2].

## 2. Information in the system of the factors of production

A small article of the future Nobel Prize winner George Joseph Stigler [3], the one of the founders of "The economics of information" contained an attempt to answer the question: how long will the problem of search of information about the seller of a particular product that offers the best price be ignored? Later he said in his Nobel lecture: "The proposal to explore the economics of information were adopted quickly and widely and even without any decent minimum objections."

So, regarding the new factor of production – information – Ukrainian economists use two approaches. The first, which is embodied in the government's modernization program, focuses on intelligence and innovation, which means intellectualization and innovatization of economy, the widespread use of information and communication technologies as an important condition of solution of problems of economic modernization. Second, as academician A. Chukhno considered, – it is a confusion, denial of information and knowledge as an independent factor of production, limitation of its action with the sphere of material production [4]. Figure 1 represents a modern system of the factors of production and incomes, proposed by I. Maliy [5]. Therefore, the information is the only resource that can be simultaneously owned by unlimited number of agents of the global economy.



**Figure 1.** The information in the modern system of the factors of production

It is clear that the laws of reproduction of information significantly differ from the laws that regulate of reproduction of material things. But modern society tries to regulate economic relations, arising in the production, distribution, exchange and use of

information, and on the basis of ideas and system of categories, which have formed on the basis of industrial-market economy. Such regulation may not be adequate to the new economic structure that is formed. The uncertainty of the legal framework and conflicts in intellectual property are associated with that. It is also a factor, contributing to the property stratification of members of society and updates the validity of the distribution of the national product and income.

However, today the strategy of development of information and knowledge society is considered as the central system core of the of social and economic policy in developed countries, allowing them to take advantage of the most dominant informational technological and economic structure of the evolution of human civilization.

The benefits of new information technologies have caused the existing economic and technological gap between rich and poor countries. Rejection of dynamic development of information and knowledge society lead to the strengthening of the accumulated crisis potential in any country, as well as contemporary issues of their economic development are related primarily to intellectualization of work, giving the highest priority to processes of producing new knowledge in the information economy that can provide socio-economic progress of society [6].

The result of comparative analysis of industrial production and knowledge industry, conducted by D. Busygin and N. Antipenko [7] and improved by the authors is shown in Table 1.

**Table 1**  
*Comparative analysis of industrial production and the industry of knowledge in the information economy*

Economic category	Industrial production	Industry of knowledge
Marketing	The study of market conditions, competitors, prices, prospects and results of the use of goods	The research of the subject area of science, identifying areas of research and development, prospects of their implementation
Planning	Business plan of production of a good or development of an innovative project	Development of research program taking into account the availability of intellectual resources
Investments	Calculation of equipment needed for the project, attracting investors	Public financing and investors searching
Buildings	Production areas, required for the production	Intelligent workplace
Raw materials	Material resources	Information
Energy	Electricity, gas, fuel	Intelligence and experience
Labour force	Human resources and personnel	Intelligent personnel
Means of production	Equipment and tools	Information and computer equipment and communication
Logistics	Transport facilities	Computer networks
Technologies	Organization of the production process technology	Organization of scientific inquiry, freedom of creativity
Compensation of employees	Wages depending on the quantity and quality of manufactured goods	High wages and dividends on intellectual capital
Management	Production management	Knowledge management, information management
Effectiveness	Profit, profitability, return on investment	Intellectual property, the number of citations, bonuses for implementation

A number of features due to specific new type of social division of labor distinguishes information activity from other activities. The main difference is the use of information as a resource, as a result this activity is the information ie it is regarded

as a productive resource and as a commodity. On the one hand, information resource has a number of features that are common to all resources, and, on the other hand, those features, that are inherent to this type of resource and increase its value (Table 2).

**Table 2**  
*Features of Information Resources*

The same with other resources	Inherent only for information resources
Increase the value of products and services	Repeated use without additional costs
Allow to collect, store and transfer, improve own consumer qualities for users	Synergism the use of information – combining information with other types of resources, as well as other information enables a greater effect than the conventional combining of certain beneficial effects caused by each resource
Can utilize used information as a archiving with the ability to restore your data as secondary information resources	Operate in various forms of electromagnetic fields as communications and data display in memory of the entity (person, vehicle), as well as a variable structure of different physical media
Are created in a process of specific – higher human activity – intellectual work	Are transmitted by various channels on almost any distance and for 24 hours a day
Create only information products and services	A new form of knowledge provided in the alienated from the direct producer form

Robert Sternberg [8] identified three types of intelligence components that are responsible for processing information:

I. *Metacomponents - management processes* that regulate the processing of specific information. They include:

- 1) recognition of the problem;
- 2) awareness of the problem and selection of processes suitable for its solution;
- 3) selection of strategy;
- 4) selection of mental presentations;
- 5) distribution of "intellectual resources";
- 6) control over the solution of the problem;
- 7) assessment of effectiveness of the decision.

II. *Executive components* – processes of lower hierarchy level. According to R. Sternberg they include coding, identifying relationships, attitude, which calls to actions, use of comparison, justification of answers.

However, W. Naysner [9], criticizing the R. Sternberg position argues that the number of executive components can be infinite, and their specificity is determined by the characteristics of tasks. Scientist believes that at least this part of the concept of researcher less detailed and justified.

III. *Components of acquiring the knowledge* necessary to the subject to learn to do what the megacomponents and executive components do. According to R. Sternberg they include:

- 1) selective coding;
- 2) selective combination;
- 3) selective comparison.

### 3. Classification of information asymmetry in the market

Prices and conditions for granting information is very important. The significance of this question is obvious. However, due to its complexity, that is: necessity of determination of precise classification of products, measurement units of volume, certain standards or standard units, analysis of variations in prices for some information products and services on the basis of quality, terms and conditions for granting, guarantees and price comparison of "shadow" and "official" markets, – all of which requires a separate study. Managerial decision making is preceded the agreement on the sale of information. Such transactions in the market of information services are very often aimed at reducing of asymmetric information at the conclusion of commercial agreements in the future [10]. The essence of the phenomenon of information asymmetry was

investigated by G. Akerlof. It consists in the fact that subjects of business that operate in a particular market and act as potential or actual business partners, have unequal or asymmetric information on: the subject of the transaction – counterparty of the agreement; object of the transaction; possible or quite likely future events, that may cause business risks to subjects who do not have such information [11]. Analysis of information situations that arise during negotiations and agreements, makes it possible to classify types of asymmetric information on different criteria.

The phenomenon of unilateral asymmetric information occurs when one of the two partners of the agreement is better informed about the subject of the transaction, the unfavorable factors of external environment and so on. If the partner can get additional information, which his/her counterparty do not have, then such information situation is transformed into a phenomenon of bilateral asymmetry information. If the agreement for the period of its implementation brings together three or more participants, each of whom is informed about the subject of the agreement or terms of cooperation in differing degrees, informational situation at the moment of signing the agreement or contract can be characterized as a phenomenon of multilateral asymmetric information.

Typically, partial information asymmetry occurs when concluding agreements, since the subjects of business avoid transacting business under conditions of complete uncertainty. Full information asymmetry occurs when concluding transactions in the market with asymmetric information, also called market with imperfect competition. The level of acceptability shows: acceptable or unacceptable asymmetry information according to the law, terms of the contract and so on.

In particular, systematic information asymmetry arises at completing transaction on the emerging market of information. Specific information asymmetry is caused by the financial possibilities of business agent on collecting (buying) of the necessary information, and his/her experience, competence, degree of specialization, etc. The potential information asymmetry becomes available simultaneously with the emergence of real events that make up the content of asymmetric information.

The phenomenon of information asymmetry is typical at completing transaction in the market of information services. Because the presence of asymmetric information between the buyer and seller leads to the need for agreements of such type.

According to the proposed classification, a situation, typical for agreements on sale information, can be considered as a phenomenon of unilateral, intentional and systematic asymmetry. Such information could meet the situation of complete or partial, acceptable or unacceptable asymmetry, depending on the certain circumstances.

Therefore, the information asymmetry reduces the efficiency of the economy as a whole and the effectiveness of the entities in particular. Such information situation is caused by several reasons [12]:

- 1) macroeconomic cause of information asymmetry is the immaturity of the market of information services;
- 2) collecting and acquiring information involves additional previous costs of partners and, in addition, collected information may be irrelevant;
- 3) better awareness of a single business partner enables him/her to control the situation and dictate the terms of the transaction;
- 4) information capacity of each partner depends directly on his/her experience, competence, level of specialization and other objective factors that influence the situation;
- 5) doubts about the reliability of the information.

The advantages in information support of a party of economic relations create conditions for receiving additional incomes, so-called information rent. In this case the information is a resource that has economic value. Also it is a source of competitive advantage and a means of reduction in uncertainty and risk.

In the conditions when there are no methods of evaluation of information or it is not enough fulfilled, the negative impact of

asymmetry will increase: buyers try to artificially understate prices for information, and sellers refuse from the providing of information services through their unprofitability. Must admit that some information products, or their fragments, in some cases, can be provided free. Sometimes certain set prices "per unit" of the product are an indicator, table, company, analytical development. Often the price is contractual, and the buyer is difficult to understand how it has been compiled. In general, the prices set by different vendors on similar information products (such, which can be conditionally comparable on the subject, scope and structure) fluctuate widely.

#### ***4. Information component of technological security***

As the objects of information of technological security are considered: information resources that contain information classified as commercial secrets and confidential confidential information, represented in the form of documented information files and data; information systems (tools and system of informatization) – means of computer and office equipment, computer networks and systems, system-wide and application software, communication systems and data communication, technical means of collection, recording, transmission, processing and displaying information, and their informative physical media.

The deterioration of these parameters information (information resource) as confidentiality, integrity, availability, reliability, etc. can lead to significant negative effects, such as:

- disruptions in the operation of technological process control systems and other systems;
- disclosure of data constituting commercial and other secrets;
- reduction in the reliability of financial documentation;
- unauthorized access to personal data of individuals and others.

The result of these actions may be:

- rupture of business relationships with partners;
- the failure of negotiations, the loss of beneficial contracts;
- failure to fulfill of contractual obligations;
- the need for additional market research;
- rejection of the decisions that have become ineffective because of publicity of information and ultimately financial losses associated with new developments;
- loss of opportunities to patent the results of scientific and technical activity or sell license;
- price reductions or sales of products;
- loss of reputation;
- more strict conditions for obtaining loans; difficulties in the supply and purchase of equipment and so on.

As already mentioned, in certain situations, the neglect of the protection of information can lead to complete loss of business.

Thus, it is important to detect and prevent threats to information. These threats can be divided into four groups: software, technical, and physical and regime.

To counter this threats, such measures should be implemented:

- firstly, to develop a technique of analysis and assessment of threats of information security of entity and corporate standards of system of its provision;
- secondly, to organize and carry out specific activities on the protection of information;
- thirdly, to organize the operation of technical means of information protection;
- fourthly, to implement technological audit and control of the system of information security [13].

As business information has received form of a good in Ukraine's information space, and comprehensive government regulation in this area absent, the industry quickly commercializes.

The question of ownership on the database are partly protected by the Law of Ukraine "On Copyright and Related Rights". The issues of access to information on pricing, determination of the reliability of information are decided by each party independently and arbitrarily. Some of these issues are reflected in the Law "On

information", Law "On protection of information in automated systems." However, article 5 of the Law "On Protection of Rights on Inventions and Utility Models" does not provide legal protection informational technologies, computer programs and integrated circuits.

## 5. Conclusions

Thus, the entire sphere of human activity is based on the power of information and knowledge, the rate of appearance of which increases daily. Development of software has created conditions in order to personnel can improve knowledge and develop skills much faster than at any time in previous years.

Internet is a universal communication space, in which very different interests and values coexist. Of course, the spread of information and communication technologies is uneven across countries and sectors of society. It should be mentioned prospect of transition to the information age depends primarily on the availability of education for all segments of the population, as well as the opportunities of operative learning and processing information.

However, establishing leadership and division of markets in the new global community are based on a new common cultural criterion, namely the degree of country ownership on scientific knowledge and forms of this ownership. The attitude to scientific knowledge guides the development of the world community and opportunities of each country to occupy a special place in it. It is important, that the availability of the deficit of information resources in a country cannot be regarded as a question of "non-participation" of it in the global development. On the contrary, ascertaining of availability of the problem of their shortage in the country according to the new ideology of the current stage of globalization is the fixing of the existing problem. Lack of knowledge is seen as the problem of shortage of knowledge whose solution is the key point of forms, rates of entering the country in the new world structure. Lack of information is identified as a threat to information security.

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