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TRANSFORMATION OF ECONOMIC RELATIONS AND WAYS OF THEIR IMPLEMENTATION UNDER DEVELOPMENT OF DIGITAL TECHNOLOGIES

Abstract. *The paper offers the author's response to the matter of direction of transformation of economic relations and ways of their implementation under the influence of digital technologies. This goal is achieved by solving two objectives: (1) to generalize the existing methods of depersonalization of property under the influence of modern information technologies and (2) to clarify the directions of changes in two key areas of circulation of two objects of existing economic relations – information as well as financial and monetary capital. To ensure this, the following research methods were used: dialectical method of cognition, methods of analysis and synthesis, method of scientific abstraction, interdisciplinary approach to transformation of economic relations around property relations at the technological angle.*

Based on the understanding of the specified "narrow scopes" of economic relations, the author defends the idea that today not only a large-scale digitalization of existing economic relations takes place, but also their virtualization both through digital platforms and ecosystems, and through numerous investment "mixers". In the modern virtual and cross-border financial economy, impersonal property dominates, i.e. non-personalized property. Among the objects of property, an increasingly important role is played by those objects of property that, firstly, reflect legal and institutional elements, and, secondly, those that help to manage, make managerial decisions and redistribute the resource. A working conclusion is made that transformation of existing economic relations regarding property under the influence of digital technologies is associated with a gradual process of their individualization with the simultaneous implementation of existing socialization of relations within the framework of the global economy development.

The fundamental direction of transformation of economic relations regarding

property is determined as follows: the processes of digitalization and virtualization of the economy inevitably and more and more absorb market entities and cause the transformation of economic relations of property, and this is an important condition for development of a global post-industrial society. The paper summarizes five main characteristics of information as an object of property rights, a modern tool for the accumulation of wealth and a form of wealth, which together distinguish information from other previous dominant goods in the past. Two directions of isolation of financial and monetary capital as an object of property that globally influences modern economic relations have been determined, and this, finally, made it possible to clarify the four fundamental characteristics of transformations in the economic relations of property.

An important final conclusion has been made that virtual values and virtual assets are gradually becoming a new factor in social development. New competitive advantages of private companies and countries are contained in their possession of modern virtual property.

Keywords. Economic relations, digital asset, virtual assets, transformation of relations, property relations, information economy.

JEL: O31, O33, D83

Problem statement. Over the last 10–15 years, the rapid development of technologies, globalization and broad digitalization of almost all spheres of life have not only facilitated cross-border economic cooperation, but also generated new economic and institutional phenomena. Together they create new global economic trends, virtual economies and digital ecosystems with their own rules of law (OECD, 2020) and even morality within them (Misic, 2021). Now a fundamentally different, new innovative model of the world economy is being formed, which is based on the groundbreaking information technologies, high level of trust and interest of millions of people. At the same time, it is firmly based on previously transformed economic relations and the principle of two living spaces of a modern subject of the economy — real and virtual. The ongoing transformation of economic and institutional relations between consumers and producers of goods and services contributes to the creation of new economic conditions that requires identification and substantiation of both new forms and objects of economic relations and institutions regulating markets.

An important feature of the modern economy is its high dynamism and “plasticity of forms in the network logic of behavior” (National Intelligence Council (2006) : 84). This is manifested in the constant changes in technological parameters of the economy (Mokiy et al., 2018) (especially a platform economy as a new insufficiently explored type of the market economy), in the emergence of new industries and types of business, sectors, types of services and products, in changing geographical and professional structure of the international and national economy. In fact, the spread of information technologies has a contradictory effect on economic uncertainties: on the one hand, many computer simulation technologies allow studying hundreds of economic situations; on the other hand, the dynamics of information flows greatly increases instability and uncertainty, and hence uncertainty of economic relations, which is most evident in stock exchange activities and the movement of financial flows. An important consequence of this is that the technical and technological diversity (for example, comparing traditional “analog” business with business within large information platforms), which is inherent in the

elements of the newest productive forces, is the reason for the existence and interaction of different technical and social ways of ownership and profit rationing throughout the whole “chain” of participants involved. Based on them special structures emerge and function in the modern economy, as well as a range of layers of modern economic relations regarding the distribution of rights and especially rights to most of the added value (for example, shareholder rights and copyrights) (Dunayev, Kud et al., 2021). All this indicates that the modern information economy is characterized by a complex intertwining of functions and forms of economic activities of enterprises of different sectors, which together form and complicate a “tangle” of complex economic relations.

Analysis of the latest research. In recent years, the various aspects of this “tangle” of economic relations have been the subject of the numerous economic and interdisciplinary research around the world. Among the wide variety of such aspects, our research includes economic relations related to the transfer, verification and/or transformation of property rights in the context of globalization and visualization of the economy and only using modern digital technologies, in particular blockchain based digital solutions. In this regard, the range of well-known economic and legal publications is much narrower. Thus, the general limits of transformation of the economic property relations influenced by globalization are described quite prominently in the recent research of D. Gladkikh (2019), V. Yurchyshin, M. Ozhevan (2017), P. Pyvovar (2021), J. Pisani-Ferry (2021), J. Stiglitz (2019) and others. In terms of regulation at sectoral and micro levels, and introduction of new information technologies, the transformation of property relations is described in the research of D. Horvat and H. Kroll (2019), S. Yanisky-Ravid (2020), as well as in several recent publications of UNCTAD and the Organisation for Economic Co-operation and Development (2020, 2021a; 2021b) and others. However, they have almost no answer to how subject-object property relations have changed under the influence of capability of some technologies (for example, blockchain) to significantly reduce the number of intermediaries in economic relations, as well as how object characteristics of property are changed, and which organizational

infrastructure (digital platforms) with unified behavior rules inside can and how influence that.

The aim and objectives. The aim of the paper is to substantiate the main direction of transformation of the existing economic relations and ways of their implementation under the influence of advanced digital technologies. This aim has been achieved by solving two research objectives:

1) to generalize the existing methods of depersonalization of property under the influence of modern information technologies;

2) to clarify the directions of changes in two key areas of circulation of two objects of existing economic relations – information as well as financial and monetary capital.

The methodological basis of this research are dialectical method of cognition, method of scientific abstraction, methods of analysis and synthesis, interdisciplinary approach to transformation of economic relations around property relations at the technological angle.

The main research results. “Economic relations” are the original concept of this paper. As is well-known, economic relations are relations between people concerning appropriation of the means and results of production (Bobrovska, Polyanska, 2018), i.e. property relations. If so, then the institution of property is always not alone in society, but in a rigid environment of certain norms and rules, which, accordingly, are inextricably connected with economic relations as such. Economic relations are implemented through economic behavior of subjects, i.e. through a set of deeds and actions aimed at meeting needs. This indicates that the current transformation of economic relations under the influence of digital technologies should be considered taking into account both legal and institutional informal norms, which will be done below.

There are two theoretical planes of economic relations:

1) economic relations, in a narrow sense, are a type of social production of social and economic nature consisting of economic as well as social public production, which includes all relations related to property;

2) economic relations in a broad sense are connections and relations that have a direct connection with production of goods and services, their distribution, exchange and consumption in society.

It is assumed that the further emphasis will be placed on the part of socioeconomic relations related to property: the emergence of property rights to certain property through the alienation of part of the production resources (factors of labour and/or means of labour), as well as the transition, confirmation and protection of property rights by legal means. This corresponds to the narrow sense of understanding economic relations.

The objects of economic relations are economic goods and resources regarding which economic entities pursuing their own goals conduct economic actions: exchange, purchase and sale, donation, other form of alienation or acceptance. The subjects (holders) of economic relations are buyers, sellers, producers of goods and services, owners of goods, users of goods.

In addition to the large-scale digitalization of existing economic relations and the economy as a whole, they are being virtualized through digital platforms and ecosystems, as well as through numerous investment “mixers” (UNCTAD, 2017): investment and venture funds, exchanges and especially cryptocurrency exchanges. Today, the ongoing virtualization of the economy and the spread of relevant economic relations in it form the institution of property, which is new in nature and mechanisms of implementation. Among the objects of property (property of any kind) an increasingly significant role is played by those objects of property that, firstly, reflect legal as well as administrative and institutional elements and, secondly, help or even themselves (for example, artificial intelligence systems) are able to manage, make managerial decisions and redistribute the resource (Vial, 2019). Now everything points to the fact that these ongoing simultaneous transformation of economic functions, statuses and existing relations under the influence of both digitalization and virtualization will continue to spread around the world.

As is well-known (Lukashevich, 2009), the economic content of property is revealed through subject-object relations, firstly, in relation to production, distribution

(redistribution, exchange and consumption) of economic resources of society and, secondly, in terms of their appropriation (alienation), but already by all subjects of social relations (economic, legal, political and social) without exception.

In today's virtual and cross-border financial economy, impersonal property prevails, i.e. non-personalized property — one that can be easily passed from hand to hand. In case of virtual economy, property is often alienated from the subject. This is due to the fact that the virtualization of the economy causes the commercialization of cyberspace, where there are supermarkets and virtual banks that use their own virtual currency (or other similar means of accumulation and calculation, as in computer games), virtual document management is conducted. This leads to emergence of purely virtual products, virtual production and is not in the object, but in the image. Thus, the subject is not dealing with a physical object, but with a depicted image.

Until recently, such impersonal property was and is the result of the development of human activity and social division of labour. Only industrialization and growing specialization of economic activity gave impetus to the formation of impersonal property — the property, which is inflexible towards influence of its owner (or subject) and at the same time very sensitive to changes in the external environment. Both the virtual economy and international financial markets require a significant concentration of capital, which is possible only through its socialization. As a result, the degree of ability of the owner to make independent and autonomous strategic decisions decreases, and the influence of the external environment represented by creditors, stockholders and shareholders increases. In addition, the “development and complexity of technology, increasing scale of production have led to the division of capital-function and capital-property. The formation of impersonal property and the forms in which it is implemented is determined by the natural process of human development” (Haskel & Westlake, 2018). Thus, it can be said that the transformation of existing economic relations regarding property under the influence of digital technologies and especially the virtual economy caused by them is associated with their gradual individualization while implementing socialization of

existing relations within the global economy.

At the same time, it should be noted that the development of the institution of property as an intangible asset has caused some difficulties in applying laws developed for material goods. Thus, Rene Savatier (Savatier, 1974) emphasized the almost limitless expansion of the objects of property when considering the possibility of their change: legal and technical abstractions have supplanted corporeal things, because real things act in legal life only through the rights that are exercised in relation to these things and these rights are real or obligatory; and this means that with the advent of such a sale, rights become property (Kalenyuk & Tsymbal, 2020). All this is happening today in the information and virtual economy, but using various tools.

Although it is difficult to cover all the main features in the development of economic relations regarding property, the principal direction of their transformation is already clear: the digitalization and virtualization of the economy inevitably and increasingly absorb market entities and transform the economic property relations, and this is an important prerequisite for the development of a post-industrial society in the world. Indeed, the spread of the network economy through the “algorithmization of mutually beneficial economic relations” (Shabelnyk, 2020) and creation of a global public information environment, called “virtual space”, significantly change appearance of modern society as a global system and in particular economic relations in it. Under these circumstances, three main processes together constitute the meaning of the concept of “economy virtualization” and greatly define the achievable perimeter of modern transformation of existing economic relations under the influence of digital technologies:

- 1) creation of virtual images of all objects and subjects of interaction, as well as virtual environment and transfer of all information interactions to the virtual space;
- 2) increasing role of information resources in economic processes and transformation of the information into a technological resource (Haskel & Westlake, 2018);
- 3) algorithmization of existing economic and legal relations through cross-border

digital platforms, which almost destroys old business connections (Kud, 2021) due to the open infrastructure for its participants and establishment of new rules of the game (Shabelnyk, 2020).

It is known that the spread of a new method of production based on a breakthrough technology of its time (loom, engine, television, Internet, etc.) causes not only progressive changes in the entire system of productive forces of its time, but even changes in the object content and subject specifics of the relevant existing property relations. The history of the development of the productive forces of mankind proves that each time the role of the main regulator of the object of these relations shifts to a specific (for its time) type of productive goods (as a unique identifier or right to something), which becomes fundamental in the system of industrial contradictions and dependencies according to its time and key technology. This causes a change in the basic production ratio depending on the dominant type of goods for its time (currently it is information), and the participants involved become the main socioeconomic subjects of the respective mode of production and are a kind of “modern indicators” of the success of social changes. Ownership of other goods becomes derivative and dependent, and the previously dominant type of existing economic relations is either adapted and overcome (Haskel & Westlake, 2018), or simply pushed.

Under the influence of digitalization and virtualization, modern economic relations regarding property, for their part, have already begun to globally consolidate, generating other important socioeconomic changes. This implies changes in both the objects of property, ways of implementing property functions, increasing the number of forms of property and their interdependence (Dunayev et al., 2022; Del Giudice et al., 2019), and the structure of property subjects (Krausa, 2022), as it is known that the form, objects and subjects of property are connected by the structure of economic relations regarding property. The ongoing transition to the information economy is characterized by the fact that due to significant qualitative changes in productive forces (especially in technology and the resulting change in factors of production) (IDC, 2020), both the objective and

subjective composition of existing property relations are significantly changed. This refers to two key areas of circulation of two objects of existing economic relations:

- 1) information and modern area of information circulation, and
- 2) separation of financial and monetary capital as well as modern areas of its circulation.

Below there is a brief description of the main transformations in them, the generalized presentation of which is of great importance for further research.

Thus, with regard to such a key object of existing economic relations as *information and the modern area of its circulation*, it should be noted that modern economic relations are objectively aimed at consolidating the post-industrial, and later — the information economy. In them, information is not only the main resource and result of the production, but it also becomes the dominant type of goods and the object of new economic relations, in particular — forms of ownership. Today, the role of ownership of information can be compared with the role of ownership of the personality of the worker in the slave system, to the land in the feudal system, to the machine tools of production in the industrial era. According to the experience of the world economy and existing economic relations, in the last ten years (up to 2022 inclusive) financial information has become crucial. Together with common negative behavioral patterns (greed, gullibility, laziness, information manipulation of consciousness...), financial information helped create new giant speculative “bubbles” in various financial markets (Girdzijauskas, 2009), especially in cryptocurrency and other unsecured virtual asset segments. When the global trade in numerous financial derivatives (swaps, futures, options, warrants...) and cryptocurrencies is far exceeding trade in real goods, information is gaining ground as a new asset and a new form of wealth. Generation and legal protection of various types and different quality of information have already become independent types of business and an integral part of almost any modern economic activity. Information is also becoming a very important factor in competition, acting as a desirable object of sale. Finally, information in society of the 21st century is already a basic element of the market mechanism, which, along with

price and utility, determines the optimal and equilibrium state of the economic system.

However, currently information can only be owned if it belongs to a limited number of people. If information is an object of ownership for an unlimited number of persons, then each of its owners owns it in full and basically can use and dispose of it in full, regardless of interests of others. In this case, potential conflicts of interest between owners are almost guaranteed: having a natural temptation to get rich, someone will try to be the first to use information with impunity for their own benefit or to the detriment of others, knowingly or unknowingly violating ethics and/or legal intellectual property protection. Together, this summarizes a number of key characteristics of information (Arrow, 1985) as an object of property rights, a modern instrument of wealth accumulation, and even a form of wealth that together distinguishes information from other prior dominant goods in the past. Thus:

1. Information may not be destroyed during consumption, and may be reproduced indefinitely at zero or minimum labour, time and financial costs. Both theoretically and practically, this feature of information makes it possible to radically update the existing property relations and interactions between market entities, using information resource accounting systems in a fundamentally different way, technologically protecting intellectual property rights, access rights to various resources, etc.

2. The above feature of information as an object of property causes inconsistency of its subjective embodiment. The economic implementation of property is always associated with the appropriation of the income that arises from the economic movement of a particular object of property by someone specific, because otherwise, there will be almost no economic motive (demand) for the movement of information in exchange for other useful goods.

3. Information as an object of property manifests itself in different ways (a) in production of new knowledge and (b) in transfer of new knowledge. In the first case, the object of appropriation is the knowledge itself (idea, know-how, invention, work of art...), and in the second — technological and tangible carriers of knowledge on which relevant

information is recorded and which provide easy copying of this knowledge are the main objects. Therefore, taking into account these features, the key roles of those involved, who will directly ensure the implementation of one or another feature of information will be very different. In the first case, it is an employee as a producer and/or owner of new knowledge, and in the second case, it is the owner of a special technological infrastructure (information carriers) as means of storage and authorized transfer of information.

4. Up-to-date information can be updated as quickly as it can become obsolete. There are whole cross-border markets in the world, built around operations (sales, analysis) only with the latest information, including analytical, financial, shadowy confidential information, etc., and the main object of purchase and sale is fresh structured and processed information, not other related business services from the seller.

5. Information affects the efficiency of production without the physical increase in other traditional resources, i.e. without additional and simultaneous involvement of other resources. This fundamentally distinguishes it from other factors of production. In this case, the predominant object of influence is the subjective factor of production, i.e. a person with his/her unique combination of abilities, character, accepted values and aspirations. A valuable economic consequence of this is that information speeds up the process of reproduction by, firstly, reducing the periods of circulation and production (Emami, 2021; Schumpeter, 1961 : 212) and, secondly, reducing transaction costs in finding and verifying data and intentions, which was unthinkable even 30 years ago, in the industrial era.

Together, this means that changes in existing economic relations under the influence of informatization and digitalization cover several stages: from simple communication technologies aimed at improving the efficiency of communication between stakeholders, to the latest information technologies that have transformed and are now transforming information resources into production factor with its subsequent virtualization. In the latter case, market practice is far ahead of economic or cybernetic theory.

A bright practical proof of this is that it is not the transfer of data on the properties of goods or services, but the creation of their image brings more profit in today's economy. It should be noted that the ambitious thesis spread in the last 3–4 years that “the big data is the new oil of the 21st century” (European Parliamentary, 2020) in its pure form neither fall under the transfer of information about the product, nor the creation of its new image. These are useful opportunities from big data analysis, which are not yet fully understood and which, in our opinion, become a new separate phenomenon in the digital economy, but are currently controversial in terms of their premature idealization as “the new oil”.

Thus, the creation of an image is a creative manipulation of signs, symbols and meanings, and communication is, by definition, a flow of symbols and meanings. What looks like an information flow is a process of creating an image. This approach provides the key to understanding the nature of modern technological and social trends that objectively affect modern economic relations, strengthening new information markets through thousands and millions of new offers and contracts in digital form. Today, a society is being formed where images are often more important in human behavior than actual actions, things, and previously proven facts. A branded product, i.e. a product with a specially improved image is sold better than a non-branded product. In mass production, the object of economic property relations is a sign and image with its own social status, which, of course, is intended to influence the consumer behavior of others without mentioning the real properties of the relevant product or service.

This highlights the fact that over the last five or six years, not only information technologies for processing and transmitting information (big data, distributed ledger technology, artificial intelligence, digital duplicates, etc.), but also simulation technologies have accelerated significantly. These are virtual reality and augmented reality technologies based on interactivity and human subjective perception and algorithmic processing of certain sensory data in real time. Despite the fact that these two technologies have already formed several rapidly growing markets (in 2021 the potential for their cumulative annual growth was estimated at over 50%) (Hi-Tech UA, 2021) and

have already exceeded \$50 billion (Technavio, 2022), they easily transform social and economic relations within the virtual and social communities formed in them, and the “architects” of these economic transformations are certainly not scientists or politicians, but developers of relevant software and relevant social communities of participants and moderators. Apart from futuristic hypotheses, even in the field of the newest “branches” of behavioral (neuroeconomics and computer simulation) and empirical economics, there are currently no scientific explanations for the further development of such economic relations with daily coverage of several million solvent people.

Regarding the second of the key objects of the existing economic relations — *financial and monetary capital as well as modern spheres of its circulation* — it should be noted that there is an increase in separation of such capital as an object of property, which globally affects modern economic relations. This has been made possible only by large financial capital, the deployment of information technologies and the emergence of global corporate networking markets, especially within the largest Chinese and American online marketplaces and mobile platforms. This is manifested in several ways.

1. Due to globalization and the spread of the Internet, several non-bank high-tech corporations have developed large financial capital in international trade for more than 20 years, and post-industrialism has given rise to unprecedented information and organizational and management technologies. This allows such corporations not only to effectively achieve their financial profits, but also to create large economic spaces and even be the “architect” of changes in cross-border and national economic relations, parameters and institutions. As a result, there can be a fairly comprehensive control over economic processes within such large economic spaces.

2. Virtualization of financial capital through its transfer to online trading platforms and communities to create “virtual money” — cryptocurrencies and other unbacked virtual assets — which together form fictitious (unofficial, unrecognized) and purely speculative sectors of financial transactions, but they are all together remotely resemble the ancestral functions of money (Sokhatska, 2020). Taking into account the very

significant pace of development of these sectors, it can already be said about the transformation of real financial capital into a qualitatively new essence. What and how is transformed in economic relations?

The content of capital as an object of property is transformed:

1) capital becomes more mobile than other types of capital, especially in the form of precious metals and any securities. The holder can be changed almost instantly, bypassing the requirements of official financial regulators;

2) capital almost loses touch with a particular person as the holder, retaining only the form of ownership — private. The question of the exact correlation between the asset and the owner is left to the holder of the technological infrastructure and chosen (developed) software solution for identification;

3) as a result, the contradictions between the new properties of capital and the available information about it and its holder lead to the fact that invariably preserved private property of such capital becomes dependent on formal and virtual rules that may differ significantly from national and international law. In the global virtual environment of “virtual money” and especially cryptocurrencies, any material and personal ties of holders with real objects — both tangible assets and ordinary intangible assets — disappear. Such connections are gradually being replaced by ratings and processes that happen exclusively in computer networks. In addition, virtual capital is becoming increasingly dependent on the quality of the information network and service information and technological infrastructure;

4) this already leads to significant global distortions in the existing economic relations of property and, more importantly, in the motives for productive labour and in the norm of evaluation of human labour. A rhetorical question arises: why should I work better and more? However, this question goes much further than this paper and our understanding of “economic relations” in the narrow sense.

Conclusions. Based on the above research, the following conclusions can be drawn.

1. Under the influence of digital technologies, the current transformations of

economic relations regarding property are characterized by qualitative changes in the material composition of the objects of property appropriation, namely in the subject-object relations. The state of the system of productive forces and the necessary methods of assigning the results and factors of production in this system determine the structure and content of property relations, and this is an objective interrelation.

2. In addition, functioning of one particular object is ensured by the activities of an increasing number of surrounding subjects, which forms a variety of economic and technological causal links between them. Conversely, such a complication causes the economic interests of one subject to depend on the availability and condition of different production facilities. This means that the object characteristics of property are gradually weakened, and its functional designation is strengthened, i.e. property gradually denotes not so much an object as a certain organizational infrastructure (digital platform) with unified behaviors in which holders have certain rights, obligations and opportunities.

3. In the process of deployment of the post-industrial and information economy and significant clarification of the regulatory framework, the content of property relations is changing. The structure of the institution of property in the digital and virtual economy is formed as a complex multilevel system that is constantly updated by legal, institutional and economic norms. One of the consequences of this is that virtual assets (as digital property) are gradually becoming a new factor in social development.

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