

UNITY OF DIGITAL AND VIRTUAL ECONOMIES WITHIN CONCEPT OF DATAISM*Oleksandr Vyshnevskiy*

Abstract. The article outlines the development of the digital and virtual economies and related concepts. In the introduction, the emphasis is put on the increasing role of the digital and virtual (intangible) economies. The literature review shows the diversity and similarity of the category apparatus of the digital and virtual economies. The methodological foundations of the study are based on descriptive, historical and logical approaches. The main results of the study are connected with the analysis of the concepts of digital economy, virtual economy and their relationship. The final part of the work shows how the concept of dataism allows to unite the concepts of virtual, digital and real economy. The article is concluded with a summary.

Keywords: virtual economy, digital economy, Dataism

JEL Classification: A10, B00, D8

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1. Introduction

The beginning of the 21st century was marked by a further amplification of the processes of digitalization and virtualization of the economy. The share of the industrial capital in economically developed countries is declining, while digital and intangible shares are growing. As of early May 2019, the three most capitalized companies in the world (Apple - \$ 971.5 billion, Amazon - \$ 965.5 billion, Google - \$ 822.3 billion) represent the technology sector. Their shares in the aggregate are estimated at more than \$ 2.5 trillion. At the same time, the question remains: which part of their shares' value is determined by using digital technologies, and which part is determined by speculative interests. In any case, ten years ago they could not get into the TOP-30 of the most expensive companies in the world, where dominated financial conglomerates (HSBC Holdings, Bank of America, JPMorgan Chase, ING Group,

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Berkshire Hathaway) and widespread industrial corporations (General Electric, ExxonMobil, Royal Dutch Shell, BP, Toyota Motor, etc.) dominated.

New market leaders do not simply digitize traditional business processes, but use digital platforms and digital technologies as the basis of their business model. Their main assets are information (databases), algorithms of working with them, and employees' skills of working with data. Moreover, the products and services produced are digital and are often provided online, 24 hours a day, 7 days a week. Although information has always played an important role for society and business, the extent of its use and its role for the successful development of companies are increasing. Considering the intangible nature of information, it becomes possible to regard this process as the main factor in expanding the volume of the entire economy.

At the same time, the explosive interest in digital technology creates high expectations of shareholders and investors. As a result, the shares of technology companies, and afterwards the entire stock market are growing steadily. The S&P 500 index has grown more than 4 times over the 10 years from spring 2009 to spring 2019, during the same time, the growth of the US economy and the global economy was 10 times less.

Alongside these processes, there is a transition from the dominance of intangible assets over tangible assets. It is shown in Fig. 1.

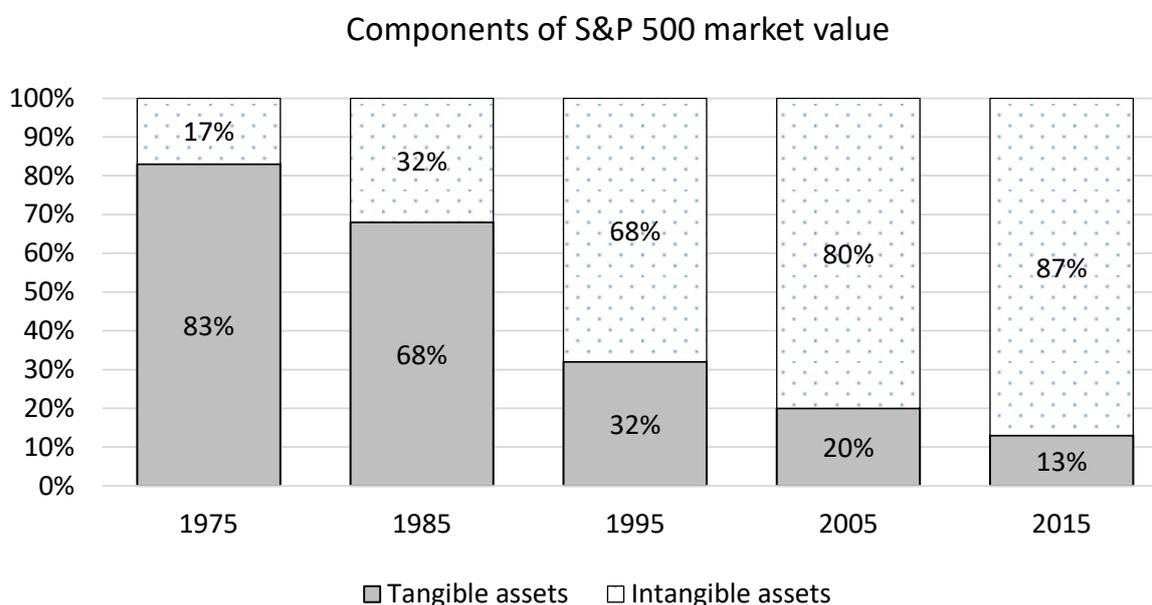


Figure 1. Tangible and intangible assets in components of S&P 500 market value

Source: (Ocean Tomo, 2015).

From 1975 till 2015 the structure of companies' assets included in the S&P 500 turned upside down. In 2015 intangible (virtual) assets began to completely dominate, accounting for 87% of assets for companies that are included in this stock index.

The border between the digital (virtual) and the real economy is blurred, and the conversion ratio has appeared in the economy in the form of transformation of virtual processes (for example, visiting sites and social networks) into real actions (purchases or orders).

Thus, the study of the essence of digitalization and virtualization processes of the economy is a relevant scientific and practical issue, although the concepts of digital and virtual economy have not yet become generally accepted and have not been uniquely defined.

2. Literature review

As a rule, the concepts of virtual and digital economy are used either separately from each other or in the context of each other, but are never opposed to each other. Topics related to the “digital economy” have become more and more popular in recent years compared to the “virtual economy”. The query “virtual economy” in the Google search engine gives 215 million results, the query “digital economy” in the Google search engine gives 863 million (as of September 4, 2019).

Issues related to the digital economy are studied not only by individual scientists, but also by many international organizations (World Bank, World Economic Forum, The Boston Consulting Group and others), consulting firms (McKinsey, PwC, etc.), and companies (AT&T, Cisco, Citi, SAP, etc.). The direct impact of digitalization is experienced by both business and society. It is not by chance that experts at The Boston Consulting Group say that “digitization creates value for individuals, corporations, and society as a whole” (Alm et al., 2016). And the digitalization process itself influences different aspects. Various researchers study digital goods (Atasoy & Morewedge, 2017), digital services (Williams et al., 2008), digital consumption (World Economic Forum, 2016), digital currency (Chuen, 2015), digital labor (Fuchs & Seignani, 2013), digital divide (Corrocher, 2002; Lupac, 2018), digital dividends (World Development Report, 2016), digital platforms (Parker et al., 2016).

Simultaneously, similar categories are explored in the context of virtuality: “virtual economy” (Lehdonvirta & Ernkvist, 2011), “virtual inequality” (Mossberger et al., 2003), “virtual currency” (European Central Bank, 2012), “virtual labor” (Webster et al., 2016), “virtual consumption” (Lehdonvirta, 2009), “virtual property” (Fairfield, 2005).

Consequently, there is an interweaving in the use of concepts related to digital and virtual economies, which requires further research for their more specific definition and differentiation or identification between them. Whereas, the field of concepts related to the digital economy is larger than the field of concepts related to the virtual economy.

In addition, it is also noteworthy that the following scholars research the problem of information economy in the various aspects of its functioning: Biswas, 2004; Dalevska et al., 2019; Innocenti, 2017; Kwilinski, 2018; Kwilinski, 2019; Kwilinski et al., 2019a; 2019b; Lakhno et al., 2018; Lamberton, 1998; Lippman & McCall 2015; Mol, 2019; Pająk et al., 2016; Sun et al., 2017; Tkachenko et al., 2019; and others.

3. Methods

The following methods were used as the main research methods:

- 1) a descriptive method for describing the concepts of digital and virtual economies;
- 2) a historical and logical approach for considering the genesis of a real, virtual and digital economy;
- 3) a systematic approach when considering the virtual, digital and real economy as a single system;
- 4) the dialectical method for the analysis of the interaction of digital, virtual and real economies.

4. Results and Discussion

4.1. Digital Economy

If we consider digitalization process from the perspective of three sectors' economy (primary - agriculture and mining, secondary – industrial production, tertiary - services), then the fundamental difference is found not in increasing the tertiary sector share or the emergence and expansion of a new (digital) economy, but in an outstanding transformation of all the three existing sectors. Taking into account current technological capabilities and tendencies of their further development, the classic distinction between these sectors may disappear. For example, it is now technologically possible to remotely manage (in an intelligent mode/online) agricultural land, harvesting, growing crops, providing various services and even conducting medical operations. Consequently, digitalization does not occur in separate sectors of the economy, but in the entire economic system.

The processes of production, distribution, exchange and consumption, formulated by the classics of political economy more than 150 years ago in order to describe the economic system, completely in accord with the digital economy are shown in *Table 1*. An analysis of the approaches to the definition of the concept “digital economy” shows that the majority of scientists agree on the connection of this phenomenon, on the one hand, with the Internet, smart and computing machines, information and communication technologies, e-commerce, and digital technologies that are associated with the production stages, and, on the other hand, with production, distribution, exchange and consumption. This allows to review such concepts as digital production, digital distribution, digital exchange and digital consumption.

The possibilities for *digital production* are expanding significantly based on the Internet of things logic and Industry 4.0 development. At the same time, a special sector is already emerging in the form of production of digital products and services. The key difference between digital and material products is the potentially endless possibility of replicating the former, and the fundamental limitation of the latter from the standpoint of supply.

Table 1a. Retrospective definition of digital economy (part 1)

Year / Author	Definition	Production	Distribution/ Ex-change	Consumption
1996, Tapscott	No direct definition but called it the “Age of Networked Intelligence” where it is “not only about the networking of technology... smart machines... but about the networking of humans through technology” that “combine intelligence, knowledge, and creativity for breakthroughs in the creation of wealth and social development”	+	+	
1999, Lane	“...the convergence of computing and communication technologies in the Internet and the resulting flow of information and technology that is stimulating all of electronic commerce and vast organizational changes”		+	
1999, Margherio	No explicit definition but identified four drivers: “Building out the Internet ... Electronic commerce among businesses ... Digital delivery of goods and services ... Retail sale of tangible goods”.		+	
2000, Kling and Lamb	“...includes goods or services whose development, production, sale, or provision is critically dependent upon digital technologies”.	+	+	
2001, Mesenbourg	Defined the digital economy as “having three primary components”: - “E-business infrastructure is the share of total economic infrastructure used to support electronic business processes and conduct electronic commerce” - “Electronic business (e-business) is any process that a business organization conducts over computer-mediated networks” - “Electronic commerce (e-commerce) is the value of goods and services sold over computer-mediated networks”.	+	+	
2002, Corrocher	Factors of the digital economy: “1) The communication infrastructures, which identify the availability of the physical resources that allow access to the digital economy and stimulate its development. This factor includes aspects related to the expansion of the Internet and of WWW access devices as well as indicators concerning the penetration and degree of technological advancement of other infrastructures that account for the levels of connectivity in the system, such as broadband cables and satellites. 2) The human resources, which account for the absorptive capacity of the system towards technological innovations on the basis of available knowledge and education. In this context, policies and programmes of formal education and training play a central role, as well as the employment conditions in the communications sector. 3) The competitiveness of the information and communication providers and the degree of competition among different operators, which have a well-defined role in fostering the provision of new services and in determining the pace of adoption of new platforms and applications.”	+	+	+

Source: (Bukht & Heeks, 2017; Keshelava et al., 2017; Corrocher, 2002; Mesenbourg, 2001) and own research.

Table 1b. Retrospective definition of digital economy (part 2)

Year / Author	Definition	Production	Distribution/ Ex-change	Consumption
2013, OECD	"The digital economy enables and executes the trade of goods and services through electronic commerce on the Internet".		+	+
2013, European Commission	"...an economy based on digital technologies (sometimes called the internet economy)".		+	+
2014, British Computer Society	"The digital economy refers to an economy based on digital technologies, although we increasingly perceive this as conducting business through markets based on the internet and the World Wide Web"		+	
2015, European Parliament	"A complex structure of several levels/layers connected with each other by an almost endless and always growing number of nodes. Platforms are stacked on each other allowing for multiple routes to reach end-users and making it difficult to exclude certain players, i.e. competitors".		+	+
2016, House of Commons	"The digital economy refers to both the digital access of goods and services, and the use of digital technology to help businesses"	+	+	+
2016, G20 DETF	"...a broad range of economic activities that include using digitized information and knowledge as the key factor of production, modern information networks as an important activity space, and the effective use of information and communication technology (ICT) as an important driver of productivity growth and economic structural optimization"	+		
2016, Knickrehm et al.	"The digital economy is the share of total economic output derived from a number of broad "digital" inputs. These digital inputs include digital skills, digital equipment (hardware, software and communications equipment) and the intermediate digital goods and services used in production. Such broad measures reflect the foundations of the digital economy"	+		
2016, Rouse	"The digital economy is the worldwide network of economic activities enabled by information and communication technologies (ICT). It can also be defined more simply as an economy based on digital technologies"	+	+	+
2016, Dahlman et al.	"The digital economy is the amalgamation of several general purpose technologies (GPTs) and the range of economic and social activities carried out by people over the Internet and related technologies. It encompasses the physical infrastructure that digital technologies are based on (broadband lines, routers), the devices that are used for access (computers, smartphones), the applications they power (Google, Salesforce) and the functionality they provide (IoT, data analytics, cloud computing)".	+	+	

Source: (Bukht & Heeks, 2017; Keshelava et al., 2017; Corrocher, 2002; Mesenbourg, 2001) and own research.

Table 1c. Retrospective definition of digital economy (part 3)

Year / Author	Definition	Production	Distribution/ Ex-change	Consumption
2017, OUP	"An economy which functions primarily by means of digital technology, especially electronic transactions made using the Internet".		+	
2017, Keshelava et al.	"A "digital" (electronic) economy is an economy that exists in a hybrid world. The hybrid world is the result of the merger of the real and virtual worlds, characterized by the ability to perform all the "vital" actions in the real world through the virtual."	+	+	+

Source: (Bukht & Heeks, 2017; Keshelava et al., 2017; Corrocher, 2002; Mesenbourg, 2001) and own research.

For example, the number of cars will always be limited in advance by a given number (for example, based on the limited natural resources on Earth and the available production capacities). The number of copies of the electronic book, as well as monetary symbols characterizing its value is not limited.

Digital production is driven by a combination of digital capital and digital labor. Digital capital is based on the use of Big Data, in addition, digital labor is alienated from the person "playfully". "The wealth of Facebook's owners and the profits of the company are grounded in the exploitation of users' labour that is unpaid and part of a collective global ICT worker. Digital labour is alienated from itself, the instruments and objects of labour and the products of labour. It is exploited, although exploitation does not tend to feel like exploitation because digital labour is play labour that hides the reality of exploitation behind the fun of connecting with and meeting other users" ... "The social media economy's financialization may result in the next big bubble. The only alternative to exit the Internet crisis and exploitation economy is to exit from digital labour, to overcome alienation, to substitute the logic of capital by the logic of the commons and to transform digital labour into playful digital work" (Fuchs & Seignani, 2013).

Digital consumption is constantly increasing through the use of mobile applications for smartphones running the Android or iOS operating system.

E-commerce, coordinating the interests of the seller and the buyer, leads to the *digitization of exchange and distribution*. At the same time, the product can be exclusively digital and consumed in virtual space. However, more often with the use of digital technologies, the creation of a physical "non-digital" product takes place, as well as its order or delivery. *Digital distribution and exchange* of goods and services take place in the Internet, and particularly on the special digital platforms.

Digitalization of production, distribution, exchange and consumption manifests itself in the transition from a linear model of creating value to a network model of creating value based on digital platforms. This process has been studied carefully by various researchers. Some of them

talk about the “platform revolution” (Parker et al., 2016), which creates digital ecosystems around digital platforms. The platform model affects all elements of the economic process. For example, on the Facebook platform, content is created (by the users themselves), content is exchanged between users and further it is consumed during reading or viewing. Meanwhile the platform software is digital and virtual (intangible), the users of the platform are quite real.

The above real economic phenomena are directly related to the digital economy. At the same time, the digital context provides a new understanding of the “virtual” economy, not just as an interaction of signs that reflects the measure of value and proprietary rights, but as a creation of real value for society based on digital technologies.

4.2. Virtual economy

Traditionally, the study of the virtual economy is developed, on the one hand, through its opposition to the real economy and, on the other hand, taking into consideration the development of digital technologies. So, there are three approaches to the definition of the virtual economy (one from the side of unreal economy and two from the side of digital economy). The first approach considers the virtual economy as a speculative activity based on the use of money capital. The second approach considers the virtual economy as a higher level of digital economy. The third approach considers the virtual economy as part of the digital economy in the form of virtual online worlds.

The discussion on the division of the economy into real (that creates user value) and "virtual" (non-material, intangible, that uses symbols, signs or exchange values) has a long history. Aristotle separately singled out economics and chrematistics. Economics involves real household management, i.e. the creation of an immediate good (use value), while chrematistics is focused on “money-making”, the process of which is described as “the birth of money from money”. Regarding the real household, the philosopher wrote “Of the art of acquisition then there is one kind which is natural and is a part of the management of household. Either we must suppose the necessaries of life to exist previously, or the art of household management must provide a store of them for the common use of the family or state. They are the elements of true wealth; for the amount of property which is needed for a good life is not unlimited...”. And regarding the financial (virtual) sector, he said as follows “There is another variety of the art of acquisition which is commonly and rightly called the art of making money, and has in fact suggested the notion that wealth and property have no limit” (Aristotle, 1985).

Similarly, K. Marx spoke out regarding money capital as non-existent, artificial, which operates only with virtual titles of value. “Titles of ownership ... come to nominally represent non-existent capital. For the real capital exists side by side with them and does not change hands as a result of the transfer of these duplicates from one person to another. They assume the form of interest-bearing capital, not only because they guarantee a certain income, but also because, through their sale, their repayment as capital-values can be obtained. But as duplicates which are themselves objects of transactions as commodities, and thus able to

circulate as capital-values, they are illusory, and their value may fall or rise quite independently of the movement of value of the real capital for which they are titles. (Marx, 2010).

Modern neo-Marxists show that “the transformation of a quantitative separation of the fictitious capital price from the real assets evaluation (that presented it), into qualitative (separation)” and designate this transition “as the transformation of fictitious capital into virtual” (Buzgalin & Kolganov, 2018). As a result, the digitalization of fictitious capital determines its further virtualization. At the same time, the digital revolution has created many specific intangible assets (for example, websites, software), the use of which in economic activity makes it necessary to study the corpus of phenomena associated with the concept of “virtual property” (Fairfield, 2005).

Monetarists (the Chicago School), being opponents of neo-Marxists, also actively use extremely generalized abstract concepts. Monetarism involves shifting of the emphasis from analyzing physical production, demand and supply volumes, to analyzing and regulating the money supply and interest rates, which have intangible characteristics. In many aspects, this logic has been adhered for many years by the United States, where the Federal Reserve System is the main regulator of the economy, which balances economic development by changing the key rate and money supply. Thus, the management of real economic processes occurs through the influence on the virtual (intangible) financial system.

Thus, within the framework of this approach, the definition of a virtual economy is closely related to the monetary form of capital.

According to the second approach, the virtual economy is one of three interconnected levels: ICT infrastructure, Virtual Economy and Digital Economy. It is shown in *Fig. 2*. In this hierarchy, the virtual economy is a higher level, which is based on the digital economy and ICT infrastructure.

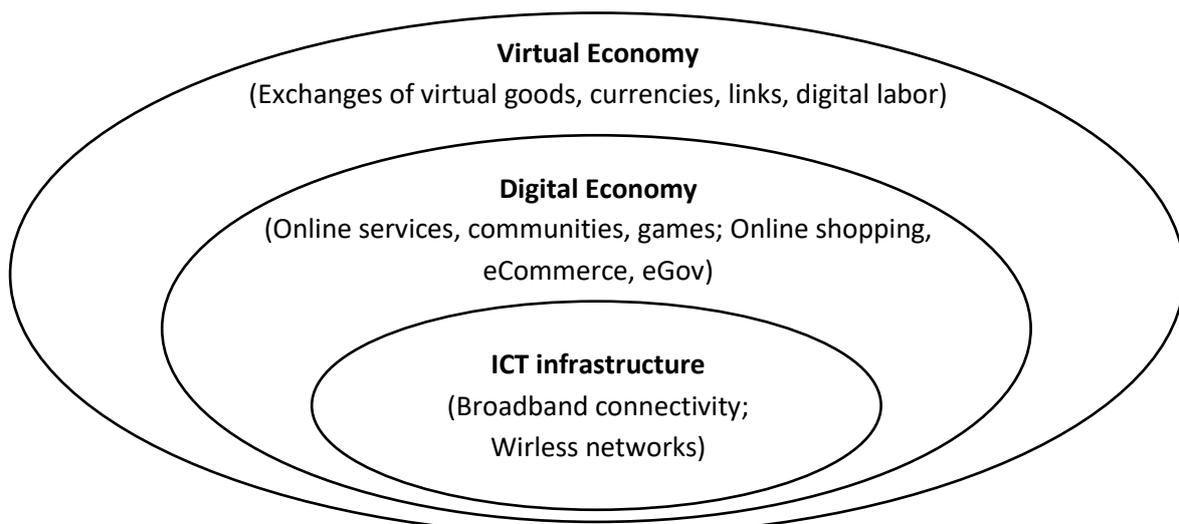


Figure 2. Connection of 3 levels: ICT infrastructure, digital and virtual economy
Source: (Lehdonvirta & Ernkvist, 2011).

Within this approach “The proliferation of digital services from e-commerce to social networking services in developed as well as developing countries has given rise to new digital needs and problems. This demand, the supply that has arisen to meet it, and the markets where this demand and supply meet, together comprise the virtual economy” (Lehdonvirta & Ernkvist, 2011).

Typical characteristics of the virtual economy are the following:

- 1) centers around commodities that are digital yet scarce;
- 2) demand arises from the increasing use of digital services in business and leisure;
- 3) supply is created through the expenditure of human effort, and doing so requires relatively few specialized skills or resources (Lehdonvirta & Ernkvist, 2011).

A fundamentally different approach to the consideration of the virtual economy appeared with the development of virtual online worlds (Second Life, World of Warcraft, Entropia Universe). According to this approach «The term ‘virtual economy’ (VE) refers to the process of exchanging virtual items and services with virtual currency within a virtual world. A virtual world (VW) is an avatar-based 3D platform, in which avatars represent real-world users. An “avatar” – in the context of virtual world – is a graphical representation of the user, in a three dimensional (3D) form, through which the user can interact with his/her surrounding virtual environment, participate in virtual events and activities, and communicate with other avatars» (Nazir & Lui, 2016).

Meanwhile, the real people, who spend their real time, are behind activities in virtual worlds. And if to consider such real time socially efficient, then this is quite real labor that is realized through virtual space and the following sequence takes place: real labor - virtual world (virtual space) - real consumption (use) of labor of other people.

Thus, the virtual economy is a more ambiguous and multifaceted concept than the digital economy. It has a longer history of development and is closely intertwined with digital technology.

4.3. Dataism as a synthesis of real, digital and virtual economies

The above approaches to the definition of digital and virtual economies can be combined in the framework of the concept of dataism discussed in the last few years in the scientific community (Brooks, 2013; Harari, 2016). “Dataism says that the universe consists of data flows, and the value of any phenomenon or entity is determined by its contribution to data processing. This may strike you as some eccentric fringe notion, but in fact it has already conquered most of the scientific establishment. Dataism was born from the explosive confluence of two scientific tidal waves. In the 150 years after Charles Darwin published *On the Origin of Species*, the life sciences have come to see organisms as biochemical algorithms. Simultaneously, in the eight decades after Alan Turing formulated the idea of a Turing Machine, computer scientists have learned to engineer increasingly sophisticated electronic algorithms. Dataism puts the two together, pointing out that exactly the same mathematical

laws apply to both biochemical and electronic algorithms. Dataism thereby collapses the barrier between animals and machines, and expects electronic algorithms to eventually decipher and outperform biochemical algorithms. According to Dataism, King Lear and the flu virus are just two patterns of data flow that can be analyzed using the same basic concepts and tools. This idea is extremely attractive. It gives all scientists a common language, builds bridges over academic rifts and easily exports insights across disciplinary borders. Musicologists, political scientists and cell biologists can finally understand each other” (Harari, 2016).

If to build a general contrasting scheme of virtual (intangible, financial) and material economies starting from antiquity, we can see that these two directions, after more than two thousand years of transformation and development, merge together in the framework of a data-based economy concept (Fig. 3).

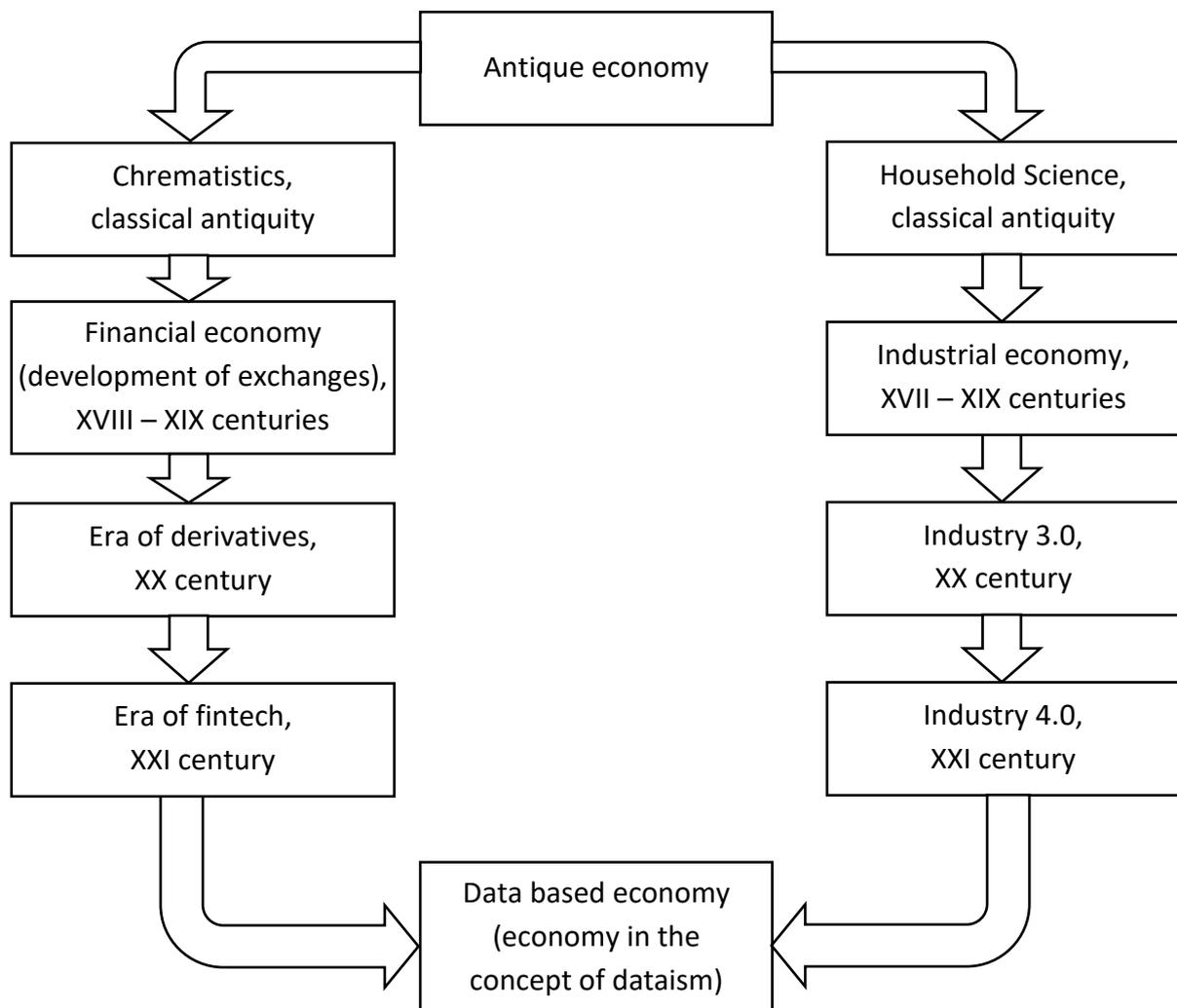


Figure 3. Genesis of development and integration of tangible and intangible economies in dataism concept

Source: own research.

One way is from antique chrematistics (the science of money and wealth accumulation according to Aristotle), through the formation of the securities and derivatives market to the massive use of financial technology and electronic money.

The second way is from the ancient science of household, through the industrial revolution and Industry 3.0. to Industry 4.0.

As a result, both ways are comprehended and defined as flows of big data that equally fully describe the real, virtual and digital economies.

5. Conclusions

1. There is a transition from the real (material) economy to the virtual (digital) economy. Digital capital is becoming the main source of economic growth. Without virtual and digital components, it is already impossible to think of the economy in general. At the same time, the boundaries of these concepts are blurred and a hybrid world will develop further, where the virtual, digital and real economies will deeply determine each other. There is a two-side movement: (1) virtualization and digitalization of the material economy and (2) materialization of the virtual economy. Moreover, the reality of the virtual and digital economy manifests itself when the final consumers of economic goods (digital and material goods and services) are either people or organizations.

2. As a result of the objective processes, the scientific community has not developed an unambiguous definition of a digital and virtual economy. There are only separate groups of approaches to the definition of these concepts, which are not clearly distinguished from each other, but concern all elements of the economic system.

3. Information and communications technology is recognized to be the basis of the digital economy. The basis of a virtual economy is either (1) speculative (artificial) capital (in the classical sense), or (2) digital economy (including as an online space where virtual worlds exist, where virtual economic relations between avatars take place).

4. As a result, the classical formula for the movement of financial capital "Money → Commodity → Production → Commodity + → Money + " turns into another: "Digital capital → Digital commodity → Digital production → Digital commodity + → Digital capital +". The spread of this model to all economic activity allows us to move on to the concept of dataism, in the framework of which the conceptual apparatus of the virtual, digital and real economies merges, because even the latter is easily described as Big data streams.

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