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Valuation of Digital Intellectual Assets: Principles, Factors, Approaches and Methods

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ABSTRACT

The **object of the study** is digital assets and digital intellectual assets as objects of valuation. The **subject of the research** are the principles, factors, approaches and methods of assessing the value of digital assets, including digital intellectual assets, in order to involve them in civil turnover in modern realities. The **relevance** of the problem is caused, on the one hand, by the formation of new types of assets — digital, including intellectual — in the context of digitalization of the economy and public relations, on the other — by the uncertainties arising during their identification, as well as the need to substantiate the applicability of valuation principles, approaches and methods to determine the value of such assets for further involvement in civil turnover. The **purpose** of the study is to substantiate the principles, factors, approaches and methods applicable to the valuation of digital intellectual assets, their approbation on specific examples (domain names). **Methods** of statistical and comparative analysis, generalization, classification, and valuation were used. The essential characteristics of digital intellectual assets have been defined: intangible nature, creation with the help of digital technology; manifestation of value in the information system; the ability to civil (property) turnover as objects of intellectual rights. The applicability of valuation principles, income and comparative approaches to the valuation of digital intellectual assets is substantiated. The factors influencing the value of digital intellectual assets, as well as specific factors characteristic of one of the types of digital intellectual assets — domain names are identified. An example of using the analogs method to estimate the cost of a second-level domain name in the framework of a comparative approach is shown. It is **concluded** that digital intellectual assets satisfying all essential characteristics can be put on the balance sheet as intangible assets, and their market value is determined on the basis of income or comparative approaches using the principles of evaluation and identified factors.

Keywords: digital assets; digital intellectual assets; value; valuation approaches and methods

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INTRODUCTION

The relevance of the study of digital intellectual assets as objects of valuation is due to a number of recent socio-economic trends and factors.

First, there is the demand of the State and society for the formation of a new digital economy, encompassing all sides of economic processes and social relations. According to the Decree of the President of the Russian Federation No. 474 of 23 July 2020 "On the national development goals of the Russian Federation for the period up to 2030", the digital transformation is in the national interests of Russia. The digital economy is defined as "economic activity, where digital data are the key to production, processing of large volumes and the use of the results of analysis which, in comparison with traditional forms of economic management, allow to significantly increase the efficiency of various types of production, technologies, equipment, storage, sale, delivery of goods and services".[1]

The basis directions of the development of digital technologies in Russia are defined in the program "Digital Economy of the Russian Federation", approved by the Decree of the Government of the Russian Federation No.1632 of 28 July 2017.[2] The implementation of this programme involves State support for a number of federal projects aimed at digital development, including the regulatory framework, human resources, infrastructure, information security, and digital management (*Fig. 1*).

The necessity for early implementation of these projects is determined by Russia's lag from the world's leading economies in terms of digital transformation of socio-economic processes. The International Digital Economy and Society Index (*I –DESI*) 2018 showed that of 27 EU countries and 18 other foreign countries, Denmark, Finland, the Netherlands, the USA, and the UK are in the top five. Russia with an index of 0.43 is inferior to the average value of the EU Index (0.52), however, it is comparable to China (0.46) and exceeds Turkey (0.34), Brazil (0.37), Serbia (0.38), with significant growth potential (39%) of the sub–index components: broadband infrastructure (connectivity), human capital, use of Internet, integration of digital technology and digital public services. The highest is the sub–index of human capital (0.64) and the smallest is the sub–index of business integration of digital technologies (0.28).[3]

According to the Business Digitization Index (compiled by HSE University),[4] which characterizes the speed of adaptation to the digital transformation of business sector organizations in Russia, European countries, the Republic of Korea, Turkey, and Japan, our country is only in the 28th place, that comparable to the Central and Eastern European countries of Bulgaria, Hungary, Poland, and Romania. The leading position is occupied by Finland (50), followed by Belgium (47), Denmark (46), Republic of Korea (45). The Business Digitization Index is determined by indicators of the level of use of broadband Internet, cloud services, RFID–technologies, ERP–systems, the inclusion of organizations in electronic commerce.

The percentage of cloud services distribution in Russian organizations can be compared with the average by EU countries — 21%. But Russia is ahead of France and Austria (17%) and Germany (16%).

In 2021, Russia ranked 42nd in the World Digital Competitiveness Ranking — IMD Business School.[5] The leaders are the USA, Hong Kong, and Sweden. Among the evaluated criteria, Russia has the highest result in the

[1] Decree of the President of the Russian Federation from 09 May 2017 No.203 "On the Strategy of development of the information society in the Russian Federation for 2017–2030".

[2] Program "Digital Economy of the Russian Federation". Decree of the Government of the Russian Federation from 28 July 2017 No.1632. URL: http://static.government.ru/media/files/9gFM4FHj4PsB 79I5v7yLVuPgu4bvR 7M0.pdf. (accessed on 21.05.2022).

[3] International Digital Economy and Society Index (I-DESI). URL: https://digital-strategy.ec.europa.eu/en/library/i-desi-2020-how-digital-europe-compared-other-major-world-economies (accessed on 20.05.2022).

[4] Business Digitization Index. HSE University. URL: https://www.tadviser.ru/index.php. Article: Russia_in_IT-ratings (accessed on 20.05.2022).

[5] URL: https://www.tadviser.ru/images/f/f6/Digital_2021.pdf (accessed on 20.04.2022).

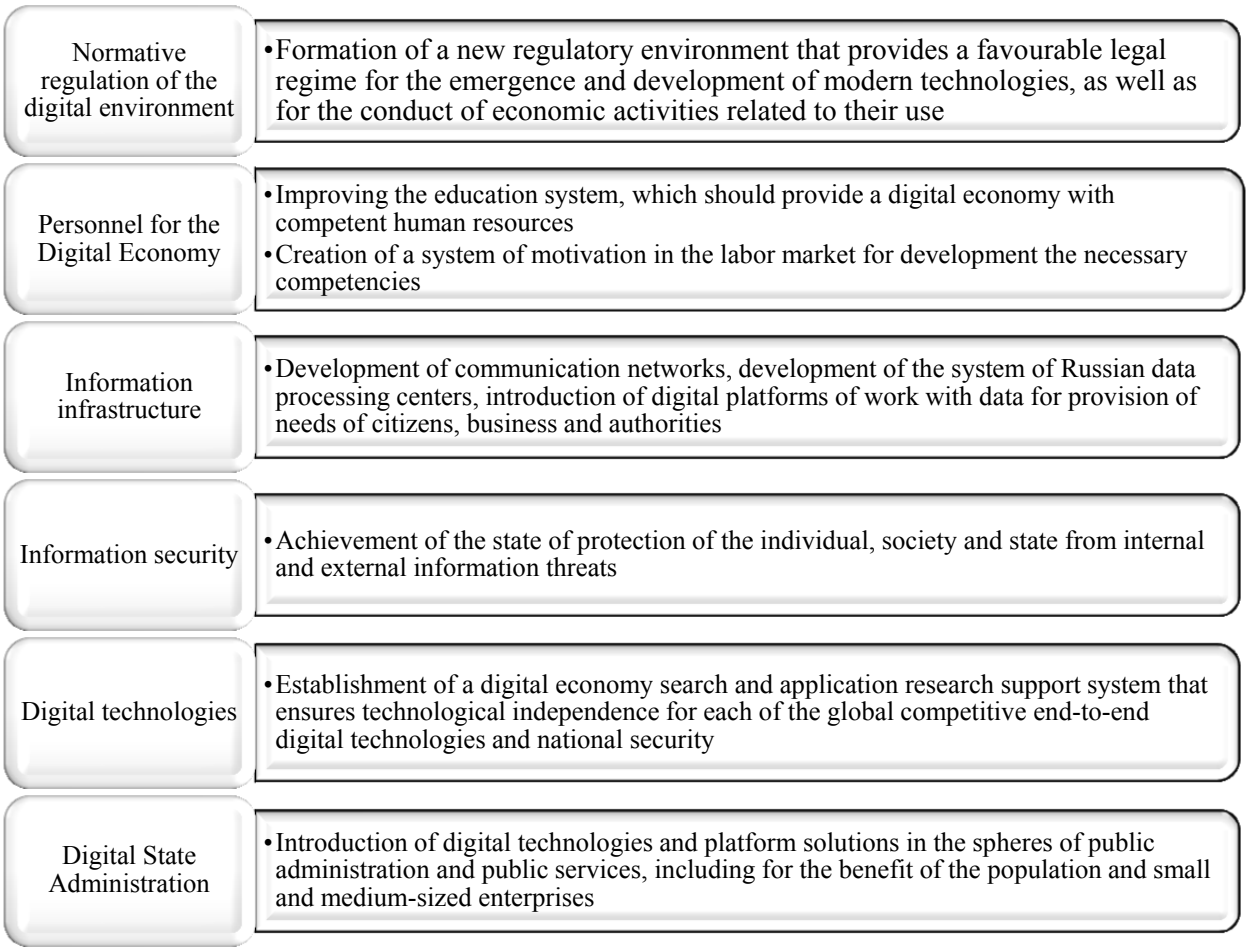

Fig. 1. **Federal projects of the Digital Economy of the Russian Federation Program**

Source: compiled by the authors on the basis of the national project Passport. URL: https://digital.gov.ru/uploaded/files/natsionalnaya-programma-tsifrovaya-ekonomika-rossijskoj-federatsii_NcN 2nOO.pdf (accessed on 21.05.2022).

"knowledge" block (24th place). The Russian Federation ranked 48th according to the "technology" block, which consists of the following components: regulation (39), including intellectual property (56); research legislation (46); capital (58), including venture capital (60); banking services (53); financing technology development (49); technological infrastructure (45).

Another trend that stimulates the digital transformation of the business is related to the difficult epidemiological situation caused by coronavirus infection, which led to explosive growth in online trading, the volume of which at the end of 2021 amounted to about 4.1 trillion rubles (3.4% of GDP).[6]

According to the same source (*DataInsight*), the Russian e-commerce market in 2020 with a growth rate of 58% became the fastest growing market compared to other countries and demonstrated the ability to accelerate digital transformation.

According to *Fig. 2*, the share of online sales in retail trade in 2017–2021 years has grown steadily against the backdrop of pandemic restrictions and inability to make purchases in the traditional way and reached 12% in 2021. The share of organizations that received orders for goods (works, services) on the Internet also grew (*Fig. 3*).

At the same time, according to the data of the Federal State Statistics Service, which monitors the development of the information society in Russia since 2010, it can be concluded that the pandemic as a whole has

[6] Inline trading in Russia 2021. Data Insight. URL: https://datainsight.ru/sites/default/files/DI_eCommerce2021.pdf (accessed on 20.04.2022).

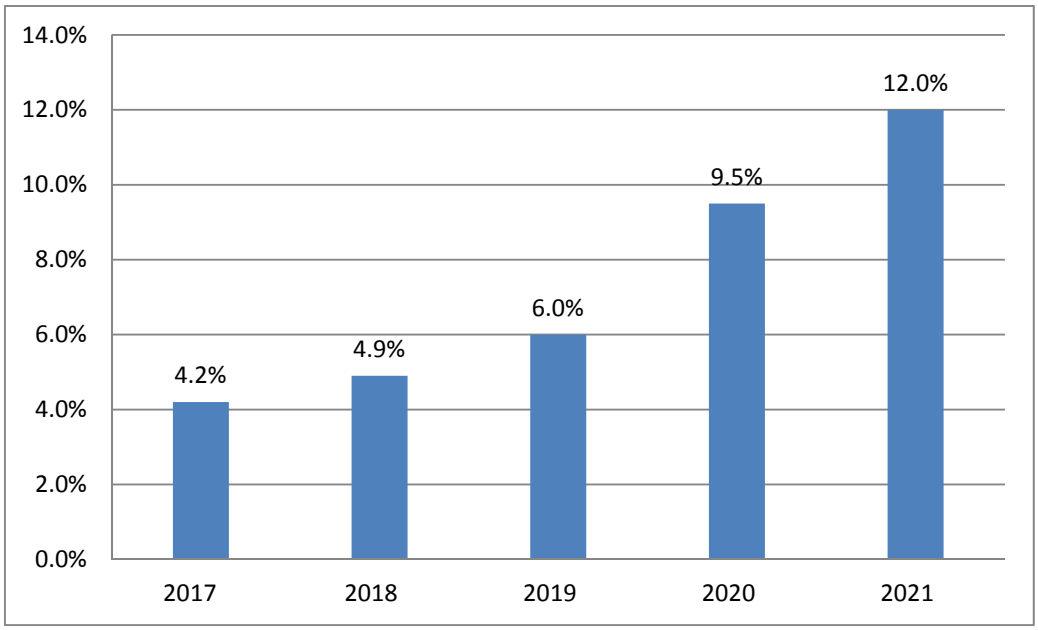

Fig. 2. **The share of e-commerce in the Russian retail market in 2017–2021, %**

Source: compiled by the authors based on data from Data Insight.

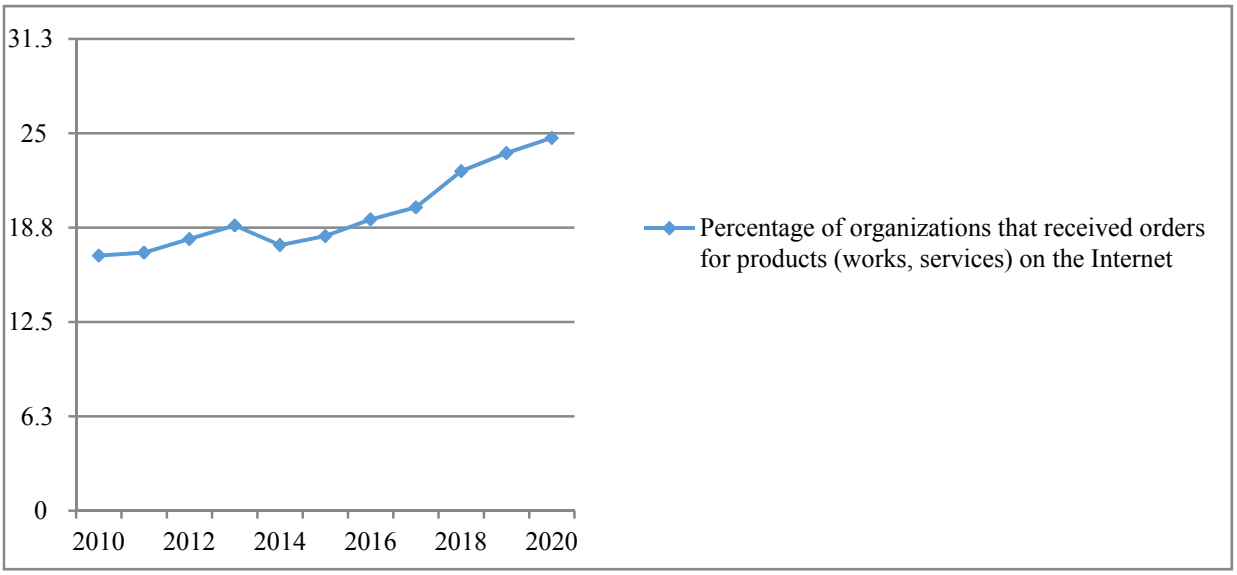

Fig. 3. **The share of organizations that received orders for manufactured goods (works, services) via the Internet, %**

Source: compiled by the authors on the basis of Rosstat data.

had a negative impact on the development of the innovative capacity of the country, on a number of indicators of the use of information and communication technologies (ICT), above all in e-business, the share of fundamentally new technologies (*Fig. 6*). It should be noted the growth of interest in education in the direction of training "Computer Science and Engineering" (*Fig. 4*). Thus, half of the indicators (50%) that was presented to the *Fig. 5 and 6* has a negative trend in 2019–2021 compared to the pre-production period.

Of course, there is still work to be done in terms of investment and stimulation of

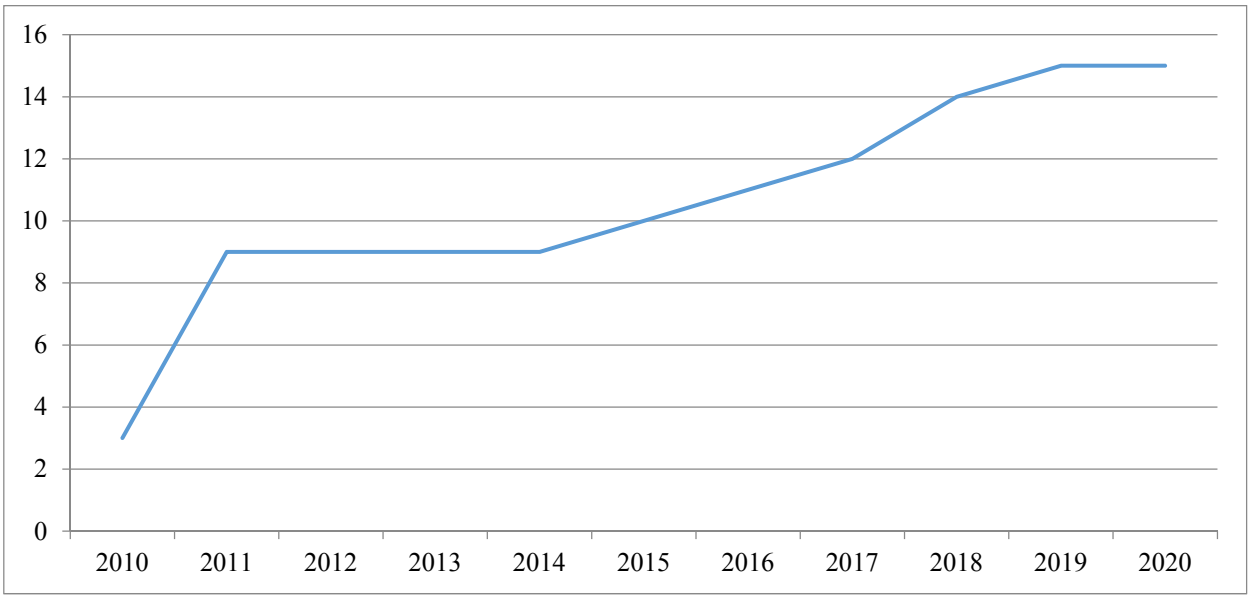

Fig. 4. **The number of students admitted to state educational organizations of higher education in the field of Computer Science and computer Engineering per 10 000 population, 2010–2020, %**

Source: compiled by the authors on the basis of Rosstat data.

the digital economy, but the digitalization process cannot be stopped, it is one of the priorities of the national economy, which is based primarily on intellectual capital, which includes human capital, organizational capital, including intellectual property, and market capital (relationship capital).

At the same time, the needs of economic entities in the digital economy are somehow connected with new (digital) objects of ownership, which necessitates the formation of the appropriate legislative framework, which should lead to the introduction of new objects of property in civil law, the development of approaches and methods of valuation of digital assets, including intellectual.

Thus, the purpose of the study is to determine the identification characteristics of digital intellectual assets, principles, factors, approaches, and methods of their valuation for further use by economic entities in the process of digital business transformation.

To achieve the purpose the following objectives were established:

- disclose the identity of digital assets and digital intellectual assets, and suggest their classification and valuation principles;
- define cost factors, approaches and methods of valuation of digital intellectual assets;
- calculate the value of digital intellectual assets using a specific approach (method) using domain names.

MATERIALS AND METHODS

The research was based on the work of domestic and foreign scientists involved in the research of scientific and practical aspects of identification and valuation of digital assets (financial and non-financial) as objects of civil rights, legal and regulatory acts, including Russian and international standards in the field of evaluation activity, data of Rosstat.

The COVID-19 pandemic, with all its negative effects on the population and the global economy, has been a powerful catalyst for the digitalization of society, and also caused the active development of the cryptocurrency market, setting the objectives of providing a legal basis for the market turnover of digital assets and the development of a financial mechanism for their monitoring and evaluation.

The study was based on the analysis of the problems of the development of digital

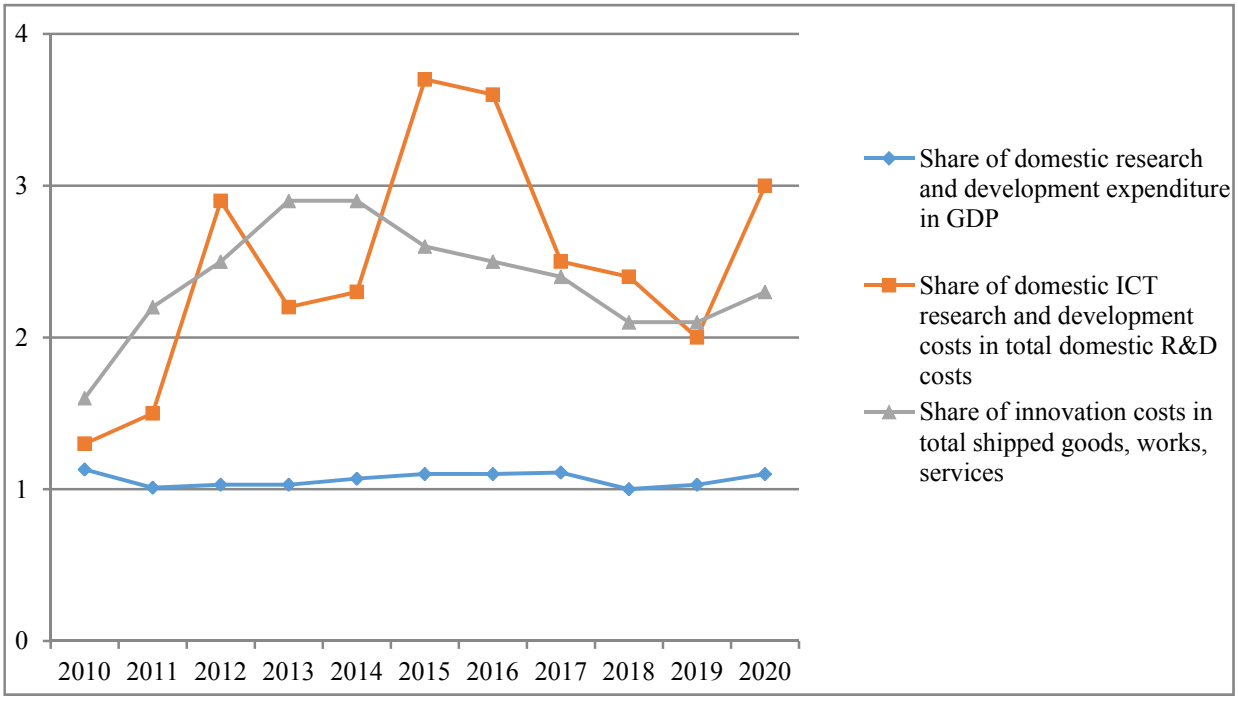

Fig. 5. **Dynamics of indicators of innovation potential in Russia in 2010–2020, %**

Source: compiled by the authors on the basis of Rosstat data.

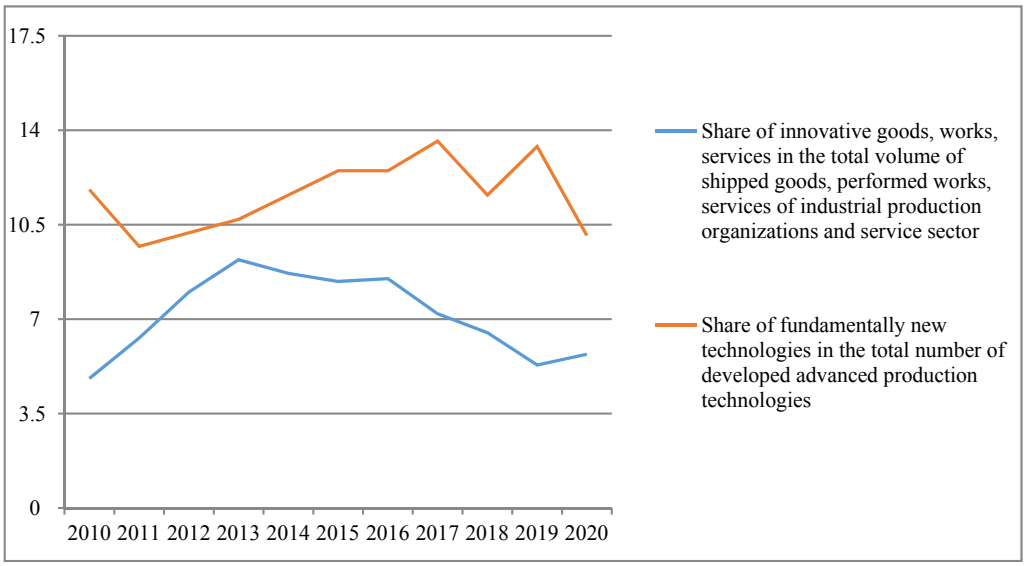

Fig. 6. **Dynamics of indicators of the institutional and infrastructural environment of the information society in Russia in 2010–2020, %**

Source: compiled by the authors on the basis of Rosstat data.

property in modern economic conditions. As part of the solution to the problem of valuation of digital intellectual assets, it is necessary at the first stage to define the essence of digital assets as objects of civil rights capable of circulation, because it is precisely this characteristic that allows them to be classified as objects of assessment, based on the existing legislation in the field of assessment activities. This problem is covered in Russian [1–5] and foreign studies [6], including discussions of the inappropriate identification of digital and digitized assets.

In the next stage of the research, it is necessary to determine the essence and characteristics of digital intellectual assets, and separate them from other types of digital assets. Such research related to the classification of digital assets is quite often discussed in the choice between financial and intangible (intellectual) digital assets [5, 7–14]. The work [11, 12, 14] identifies various specific characteristics of digital financial assets, and work [10] focuses on disclosure of the nature and characteristics of digital intellectual assets. The authors of [5, 7–9] lead their judgment on the classification of digital assets for valuation and accounting purposes. However, analysis has shown that the sources lack an integrated vision of all characteristics and their integration into a single identity — a digital intellectual asset.

The central issues in the development of the methodology of estimation of the value of digital intellectual assets are the identification of factors of pricing, principles, approaches, and methods of formation of their value. In addition, the relationship between the value of digital intellectual assets and the value of the business is an essential issue for understanding the importance of developing such a methodology and the valuation methodology itself. Analysis of existing research proves that intangible assets in modern conditions have a significant impact on the welfare of all stakeholders of operating business [15, 16] and, in turn, the cost of business significantly affects the cost of individual digital intellectual assets.

The composition of the pricing factors of digital assets and digital intellectual assets and their analysis are given in the works [17–20, 21]. The conducted analysis of sources showed significant importance of studying the market of sales of the analyzed assets and features of income generation from each type of digital intellectual assets.

The study of factors of pricing of digital assets and digital intellectual assets allowed us to determine the applicability of methods and approaches to the formation of their value. An analysis of the literature on the valuation methodology applied to the valuation of digital assets [18, 20, 21] led to a study of the applicability of traditional valuation approaches and methods. For example, the valuation of a domain name is presented in [18], and the analysis of the applicability of approaches and valuation methods to digital assets is given in the works [20, 21]. Based on such analysis, as well as its own interpretations and theoretical provisions, the article discloses the stages of formation of the value of digital intellectual assets on the basis of the use of profitable and comparative approaches to evaluation and their application in practice, taking into account the allocated specificity of a specific digital intellectual asset — domain name.

RESULTS OF THE STUDY

Classification, valuation principles and valuation factors of digital intellectual assets as objects of civil rights

Digital assets can be attributed to objects of civil rights on the basis of the action of art. 128 of the Civil Code of the Russian Federation, where the list of such objects indicates digital rights. Article 141.1 of the Civil Code of the Russian Federation defines the essence of digital rights as follows: "obligatory and other rights, the content and conditions of which are determined in accordance with the rules of the information system, meeting the criteria established by law".

By digital asset we will understand the kind of property (economic asset, a revolving object of civil rights) having an intangible nature and digital form, created with the help of digital technologies, showing its value (cost) in the information system and capable of civil (property) turnover. The digital asset combines economic (value), judicial (legal) and technological essence.

The work [7] presents a detailed classification of digital assets for management and valuation purposes on the basis of *Table 1*.

It should be noted that certain types of digital assets have a multifunctional nature and may overlap, which creates some difficulties in classifying them. The list of

Table 1

Classification of digital assets

No.	Classification feature (base)	Classification and examples
1	In the form of functioning	– Financial (payment tokens); – Non-financial (NFT-tokens)
2	In relation to objects of civil rights	– Assets with explicitly of legal regulation (domain names); – Assets with implicitly of legal regulation (3D-models); – Assets with uncertain of legal regulation (virtual property)
3	In relation to the objects of assessment	– Property, including digital and intellectual rights to digital assets; – Digital assets relating to other property
4	In the turnover rate	Noncurrent and current
5	In terms of liquidity	Highly liquid, medium liquid and low liquid

Source: compiled by the authors.

grounds is not complete and will need to be further developed in the development of the legislative framework and expansion of the practice of using digital assets in economic turnover.

Under a digital intellectual asset (further — DIA) in this paper is understood the economic asset in the form of intellectual property combined with intellectual rights to it, having a digital form, created with the help of digital technology, demonstrating its value (cost) in the information system and capable of civil (property) turnover. The digital intellectual asset, like any digital asset, integrates the economic (value), judicial (legal), and technological essence.

Since the digital intellectual asset is of an intangible nature and is created through digital technology, it is immediately implied that all digital assets are the result of intellectual activity (intellectual property). This view is most often expressed in the legal literature [2]. However, if they are assessed against the organization's intangible asset accounting criteria, not all digital assets meet these criteria. In particular, not all digital assets are intended for long-term use (more than 12 months), and for them, the organization may expect to sell the facility within 12 months or the normal operating cycle, so most researchers on this issue classify digital assets as financial investments [8]. That is, those digital assets that cannot be attributed to intangible assets will be accounted for as financial investments.

We consider the classification of digital assets by the form of operation (*Fig. 7*).

Obviously, most non-financial digital assets are digital intellectual assets. In this case, it is controversial to attribute to digital intellectual assets the content of social networks or any sites, certain questions arise and in relation to the bases of the Big Data. The content of networks or sites is a digitized version of texts or drawings that may or may not exist digitally. This is where the object of copyright arises, i.e. intellectual property takes place, but such an asset is not digitally created. According to some authors, here the *digital* and *electronic* form of an asset is mistakenly identified [2]. In the case of BigData as a database, i.e. an intellectual property object, the question arises as to whether there are exclusive rights to such objects, given that the compilers of such databases compile data that are freely available on the Internet.

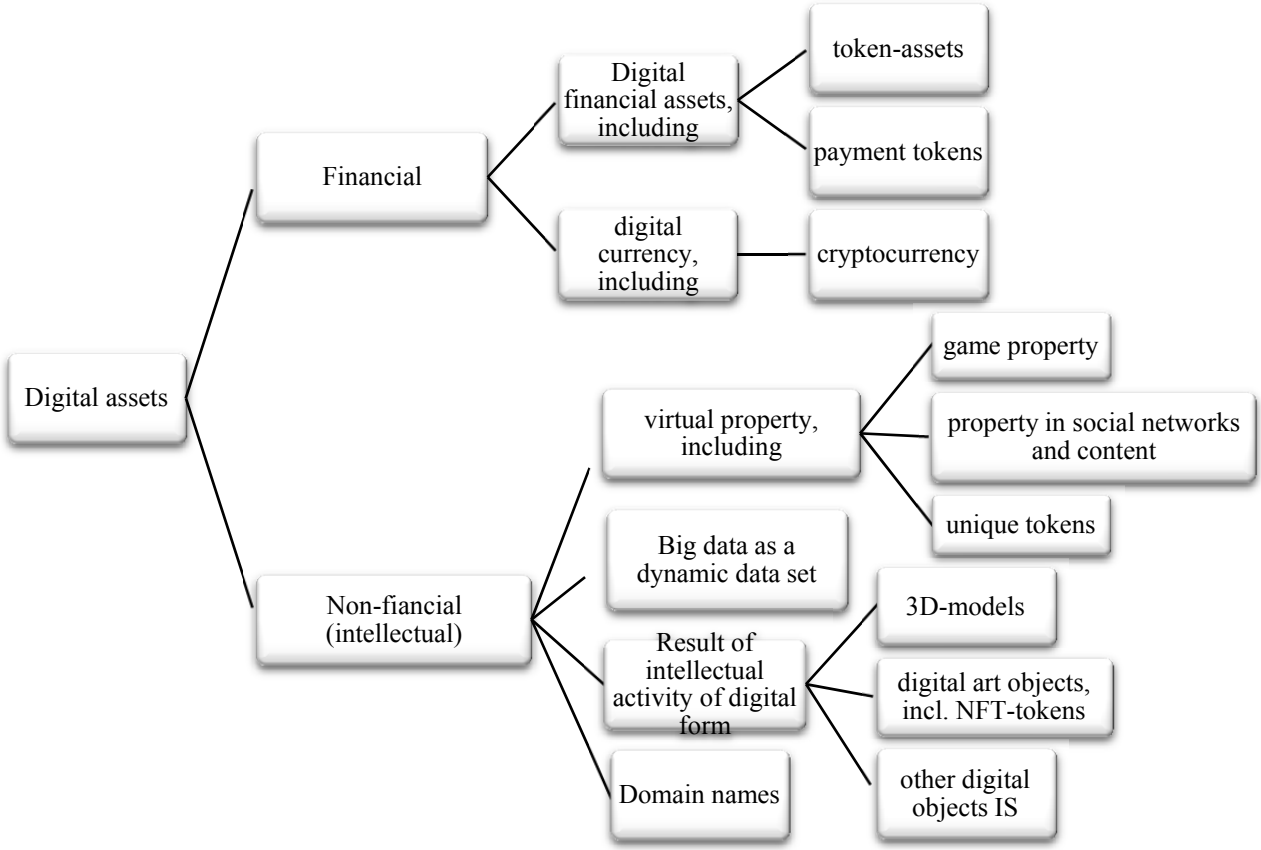

Fig. 7. **Classification of digital assets by form of functioning**

Source: compiled by the authors.

The classification of domain names as Internet business or individual identifiers as digital assets is supported by the following considerations. In accordance with art. 1484 of the Civil Code of the Russian Federation domain name is a way of addressing the Internet and is intended to provide access to the information posted on the site. Domain name can be the object of transactions, have economic value as marketing intangible asset of the company. However, domain names do not belong to the list of intellectual property objects specified in art. 1225 of the Civil Code of the Russian Federation. As a subject of civil law, a domain name is a proprietary right that can be realized by the domain name administrator and, as a result, the domain name is a participant of civil circulation and has a value. The fact that domain name exclusivity is within the purview of the World Intellectual Property Organization (WIPO) indicates that it can be valued using valuation techniques for intellectual property objects.

Thus, domain names have the economic and legal essence of the digital asset. As for technological nature, it is defined in art. 2 of the Federal Act from 27 July 2006 No. 149 (ed. from 06 July 2016) "On information, information technology and information security", "domain name — identify by symbols", i.e. not digital in itself, but can be converted to a digital IP–address via network protocols. In this regard, domain names can be referred to as digital assets in our understanding.

There are still many unresolved issues related to the identification of DIA, and further clarification of the attribution of assets to digital assets and individual digital assets to intellectual property is required.

The next question to consider in more detail is the definition of the principles of valuation of DIA. The set of principles of assessment is a systematic tool of analysis of the

value of the object of assessment, a methodological basis for the application of approaches and methods to estimate the value of objects of assessment. Evaluation principles allow us to conduct a comprehensive analysis of the value of the object of assessment and determine the factors that influence the value of the object.

Consider the features of the application of valuation principles to the formation of DIA. There are several groups of evaluation principles[7]:

- based on user perceptions (principles of utility, substitution, and expectation);
- related to the exploitation of property (principles of residual productivity, contribution, balance, increasing and decreasing incomes (or marginal productivity), economic size, economic division);
- the external (market) environment (principles of competition, supply and demand, conformity, dependencies, changes in value);
- principle of the most efficient use (MEU).

It should be noted that the list of groups of principles and their composition vary from source to source. The MEU principle is often included in the third group of principles, and the composition of the second and third group principles is also changing.

For digital intellectual assets, the first set of principles is fully operational without any significant change. The second group of principles proposes the use of the principle of optimality, analogous to the principle of balance, which can be interpreted as follows: maximization of DIA value is due to optimum characteristics of each element of the system of such an asset.

The third group of principles can also be applied to DIA in full.

The authors would like to dwell separately on the principle of MEU. This principle is realized as a result of the analysis of various options for using DIA and choosing from them the best option in the assumption that with this use of the asset the maximum value of the market value will be formed. This analyses:

- the ability of the digital market to accept this use, assessed by DIA;
- the legal basis for the formation and functioning of DIA and the presence of restrictions imposed by the regulator;
- technical characteristics of the evaluated DIA, for example, for an NFT–token it is primarily the cryptographic characteristics, legal security, which determine a particular use and the corresponding value of the digital asset;
- financial soundness of use of a variant of DIA (value of cash flows, efficiency of use). Particular attention should be paid to sources of income from the use of a digital asset, its size and timing, and the material and intangible costs of creating and operating assets. All this is directly related to the commercialization of DIA.

Thus, the obvious factors that affect the value of DIA are the amount and period of income that an asset generates; the cost of creating and operating a digital asset; the technical characteristics of the asset; the market prices of the equivalent asset.

In addition, factors of the environment will certainly play a significant role in the formation of the cost of DIA, as well as for any other objects of assessment: macroeconomic condition, political stability, legislative framework, price dynamics in the market of the subject of the assessment.

However, when determining the value of DIA, it is necessary to take into account the specific factors of their formation of value, which affect the value of only such assets: level of development of information technologies, qualification and professional level of manufacturers, sellers, and buyers of DIA and a number of other factors that relate to specific types of digital intellectual assets (*Table 2*).

Thus, summarizing the list of factors that affect the cost of DIA, it is possible to group them in terms of two characteristics: external and internal relative to the asset; and

[7] See more: Eskindarov M.A., Fedotova M.A., ed. Business valuation. Textbook. Moscow: KnoRus; 2015. 320 p.; Katzman V.E., Kosorukova I.V., Rodin A. Yu., Kharitonov S.V. Fundamentals of assessment activities. Textbook. 3rd ed. Moscow: Synergy University; 2012. 267 p.; Kosorukova I.V., ed. Assessment activities. Textbook. Moscow: KnoRus; 2021. 334 p.

Table 2

Special factors in the formation of the value of certain types of digital intellectual assets

The name of the type of digital intellectual asset or the right to it	Cost formation factors
Neurotechnology and artificial intelligence	Opportunity for learning Learning limit
Distributed registry systems	Quotes (prices) in the market of certain transactions Investment potential of the asset
Innovative technologies for the production of goods and services, including those based on quantum physics	1. Savings on measuring industries 2. Optimization of communication and information logistics 3. Information processing optimization, cost benefit 4. Competitive advantages in the market 5. Costs of the digitalization process 6. Increasing the investment attractiveness of the consumer due to the prospects of innovative development
Robotics and sensor equipment	1. Level of innovation of the object 2. Share of elements in total object 3. Positive and negative externalities as a result of the use of the object 4. Direct and indirect costs of the facility 5. Additional profit of the user taking the object
Wireless communication	1. Positive and negative price externalities 2. Speed of information transfer and investment decisions 3. Level of wireless infrastructure development
Virtual and augmented reality	1. Optimization of business process modeling 2. Completeness and accuracy of the restructuring of the facility revealed by these technologies 3. Creating competitive advantages due to the intrinsic nature of the model to the environment
Neurotechnology and artificial intelligence	Opportunity for learning Learning limit

Source: compiled by the authors.

traditional (analyzed against any objects of assessment) and special (analyzed against DIA only) factors. Of course, this classification of factors is not new, as there are special factors for any object of valuation that influence the valuation of the asset in question. However, this is the first time we have systematized special factors of digital intellectual assets.

Problems, approaches and methods of valuation of digital intellectual assets

In valuing digital intellectual assets, the value first needs to understand what value should be determined. There may be a problem related to the essential interpretation of the value in connection with the Order of the Ministry of Economic Development of Russia from 14 April 2022 No. 200 "On approval of federal evaluation standards and on amendments to some orders of the Ministry of Economic Development of Russia on federal evaluation standards" (further — Order No. 200), correspond from 07 November 2022. FSA (Federal Standard Assessment) II determines the value as a measure of the value of the facility to market participants or individuals,

expressed as a monetary amount determined at a specific date according to a specific type of value established by federal valuation standards. However, the Order of the Ministry of Economic Development of Russia does not define the essence of the measure of the value of the object.

The current Federal Standard Assessment, cost is interpreted in the same way as in International Standard Assessment: the most likely estimated value determined at the valuation date according to the selected value according to the requirements of the Federal Standard Assessment "Purpose of valuation and types of value (FSA No. 2)".[8] In our opinion, the definition of value in the current national valuation standards is more correct than the newly introduced standards, since the term "value" is mentioned in International Standard Assessment (further — ISA) 2007 only in the context of investment value (value in use), value for a particular user: "The investment value or value of a property asset may be higher or lower than the market value of that asset. The terms "investment value" or "value" should not be confused with the notion of market value of investment property. The term "investment value" is used in North America, the term "value" as its synonym — in the countries of the British Commonwealth".[9]

New national standards indicate three possible values: market, investment, and equilibrium. This list is still in conflict with the current version of the Federal Law from 29 July 1998 No. 135 (ed. from 02 July 2021) "Evaluation activities in the Russian Federation" (further — FL No. 135).

Consider the nature and types of values in existing and coming into force normative documents (*Table 3*).

The analysis presented in *Table 3* indicates that the original intention of preparing new FSA to bring national standards closer to international ones on the use of types of value has not materialized, the goal is not achieved, because the proposed list of value types in the FSA II is much longer listed in the ISA.

At the same time in the new FSA II, there is a para. 22, the essence of which is difficult to unequivocally interpret: "If the legislation, normative legal acts or other documents according to which the evaluator operates, there is a value assessment, the type of which is not defined or absent in para. 12 of this federal valuation standard... in this case, the assessment assignment and the evaluation report must contain the background, the basis for their determination and the selected type of value. In doing so, account must be taken of the provisions of article 7 of the Federal Law on the presumption of the market value of the object of valuation". It is not clear what the developers had in mind, but it seems that if no type of value from the list can be applied to para. 12, the market value will be applied. Or the appraiser can determine what kind of value he finds.

It is possible to note that the list of types of value removed the types of value presented in the ISA. That is, fair value, which is defined for the purpose of reporting on IFRS and for the presentation of the revaluation results of Federal Standards of Accounting 6/2020,[10] as also provided for in the project Federal Standards of Accounting 14/2021 "Intangible assets",[11] and Russian appraiser can now form as part of the assessment report only using the provisions of the above ambiguous para. 22 of FSA II.

That is, with respect to digital intellectual assets that will be placed on the balance sheet as intangible assets, the ability to determine the revalued value as fair value is questionable. However, according to current legislation, this problem does not arise

[8] URL: https://docs.cntd.ru/document/420276012 (accessed on 26.05.2022).

[9] International Standard Assessment. 2007. 8th edition. Translation from English. Moscow: Russian society of appraisers; 2008. 422 p.

[10] Order of the Russian Ministry of Finance from 17 September 2020 No. 204 "On adoption of Federal Accounting Standards FAS 6/2020 "Fixed assets" and FSA 26/2020 "Capital investments", para. 15. Consultant plus.

[11] Project of Order of the Russian Ministry of Finance "On adoption of Federal Accounting Standards FAS 14/2021 "Intangible assets" (as at 28 September 2021) (prepared by the Russian Ministry of Finance, ID project 04/15/09–21/00120843). Consultant plus.

Table 3

Comparative analysis of types of value in national and international valuation standards and Federal Law No. 135

Type of cost	Current FVS and Federal Law No. 135	Accepted FVS (Order No. 200)	MCO / IVS
Market	Most probable price at which the subject of the valuation may be excluded from the open market under competitive conditions, when the parties do reasonably well, reasonably with all the necessary information, and the transaction price is not affected by any extraordinary circumstances	Coincides with the existing FSA and FL No. 135	Estimated amount of money for which an asset or liability would be exchanged at the valuation date between the interested buyer and the interested seller as a result of a commercial transaction after proper marketing, in which each party would act informed, prudently and without coercion
Investment	Value of the object of valuation for a specific person or group of persons when the person(s) have established the investment purposes of the object of valuation	Coincides with the existing FSA and FL No. 135	The value of an asset to a particular owner or potential owner, taking into account their individual investment or operational objectives
Liquidation	Estimated value of the most probable price, according to which this object of assessment may be alienated for the period of exposure of the object of assessment, less than the typical period of exposure of the object of assessment for market conditions, under conditions, when the seller is forced to make a disposition transaction	None. Consideration of the application of market value in the pre-liquidation of the object of valuation in a voluntary sale. And when determining the value in the assumption of a forced sale, the liquidation value is determined in the interpretation in art. 3 FL No. 135	The amount of money that could have been recovered when the asset or group of assets sold in instalments. The liquidation value should take into account the cost of pre-sale preparation of the assets as well as the cost of their disposal activities. The liquidation value can be determined on the basis of two different assumptions: 1. Orderly deal with normal marketing period. 2. Forced transaction with a short marketing period
Cadastral	Value established as a result of the State cadastral assessment or as a result of a dispute over the results of the determination of the cadastral value or as determined in cases provided by art. 24.19 FL No. 135	None. However, other types of value may apply, as provided by FL No. 135. And the cadastral value is provided by FL No. 135	There is no

Table 3 (continued)

Type of cost	Current FVS and Federal Law No. 135	Accepted FVS (Order No. 200)	MCO / IVS
Equilibrium	None	Represents the amount of money for which the facility would presumably be exchanged between specific, knowledgeable and ready to deal parties at the valuation date, reflecting the interests of those parties	Equitable Value — estimated sale price of an asset or obligation between specifically identified, knowledgeable and interested parties, which reflects the respective interests of the parties
Other types of value	This list of types of value is not exhaustive. The appraiser is entitled to use other types of value in accordance with the current legislation of the Russian Federation, and international assessment standards	Other types of cost may apply provided by FL No. 135	Market rent, synergistic, fair value, fair market value, fair market value

Source: compiled by the authors.

Turning to the use of existing valuation approaches and techniques for digital, including intellectual assets. In evaluation activities, three approaches are used to assess the value of an object of assessment: comparative, profitable, and cost-effective. The essence of these approaches is presented in the federal and international standards assessment.

The applicability of approaches and methods to the valuation of digital assets depends on the nature of the asset and its utility[12] to the owner/user (*Table 4*).

Data in *Table 5* indicate that the main approach to valuing digital assets is the income approach, since the utility, and therefore the value, of such assets is determined by the income that the asset generates.

Each of the assessment approaches uses a combination of methods to implement the concept, principles, conditions, assumptions, limitations, and prerequisites of the assessment approach. The development of estimation methods may be conditioned by a change in the nature of the approach itself and the assumptions, assumptions, and relationships between the basic metrics. Recommended methodological tools for the valuation of digital assets are presented in *Table 5*.

Consider the application of approaches and estimation methods on the example of a specific type of DIA — domain name.

Valuation of digital intellectual assets based on domain names

It has already been shown above that a domain name can be attributed to digital intellectual assets because it is a means of individualization (intellectual property object) with a market value, is subject to civil rights (digital property), which can be traded, has a digital form of representation in the form of a network IP-address.

In 2020, the Coordination Center of National Domains.RU and.RF based on the analysis of the prices of sales transactions of 20 thousand second-level domain names has developed and published the Methodology of estimation of market value of domain names of the

[12] The utility of a thing is the ability of a thing to satisfy a user's needs in a certain place and at a certain time.

Table 4

Applicability of approaches to valuation of various digital assets

No.	The name of a digital asset	The essence and characteristics of the utility of a digital asset	Cost approaches		
			Income	Comparative	Costly
1	Rights digital and realized in the information sphere	1. System of rights of claim of things, intellectual rights, performance of works and rendering of services functioning in the information system. 2. Utility consists in the notion of financial and legal types of benefits. 3. Amount of services received. 4. Performance (real and potential) transmitted by RID	Applied in DCF part in EVA part in ROV	In case of mass nature of the object of assessment	Not advisable to apply
2	Digital property complex and its elements	1. Similar to tangible property and non-digital IA. 2. Virtual needs satisfaction. 3. Profits	Apply	With enough analogs available	Not appropriate
3	Digital intellectual rights	1. Allows you to register ownership. 2. Opportunity to make a profit while observing established rules and regulations. 3. Opportunity to combine profitable transactions	Applied to specific methods	Not advisable	Does not apply
4	Big Data	1. Collection, systematization and storage of large databases. 2. Expands the amplitude of information retrieval. 3. Optimizes model construction and prediction	The object of the evaluation is the right of access, it is possible to apply the adjusted DCF	Not advisable	Not in use
5	Artificial intelligence, machinery, training, etc. innovative technologies	1. Each technology performs unique functions that optimize management and production costs. 2. Saving time. 3. Increasing the enterprise speed of management investment, cost decisions	The valuation methodology is similar to that of technology assessments	In rare cases	Does not apply

Source: compiled by the authors.

second level in the top-level domains.RU and. Russian Federation in the secondary market of domain names[13] (further — Methodology), which has had a positive impact on business efficiency with digital assets. The main cost factors in determining the economic value of the domain name according to this Methodology are:

1) the semantic content of the domain name content, understandable to a wide audience (for example, "apteka", "Russia");

[13] URL: https://app.cctld.ru/KC_buklet_2020.pdf (accessed on 12.05.2022).

Table 5

Approaches and methodological tools for assessing the market value of digital assets

The name of a digital asset	Income approach (discounted cash flow method)	Comparative approach (method of analogues)
Digital rights (utilitarian digital rights)	+	+
Digital property	+	+
Digital assets as part of digital property	+	+
Digital rights as objects of civil rights	+	+
Big data	+	–
Neurotechnology and artificial intelligence	+	–
Distributed register systems	+	+
Quantum technologies	+	–
New production technologies	+	–
Industrial Intelligence	+	–
Components of robotics	+	–
Wireless technology	+	+
Virtual and augmented reality technologies	+	–

Source: compiled by the authors.

2) domain name creation method;

3) domain name match to trademark or brand;

4) number and level of income of the population of the territory indicated in the domain name (geographical meaning);

5) technical characteristics: domain extension, domain name exposure period, number of characters, number of search queries corresponding to the second-level domain name in English and Russian.

Most of the models in the Methodology allow the estimation of the domain name price on the basis of the proposed formulas that take into account mainly the above parameters, rather than market characteristics.

We are interested in applying the approaches and methods discussed above to the valuation of the market value of the right to a domain name as a digital intellectual asset. Domain names with semantic content (existing and modified words, word combinations, well-known abbreviations) or associated with trademarks, geography, or temporary objects are therefore the most appropriate for valuation purposes. In this case, the domain name can be widely recognizable and have a clear link to a specific product, trademark, or brand, for example, sberbank.ru, youtube.com, sportmaster.ru. In this case, domain names are essentially unique DIA, their value will be comparable to the value of trademarks and depend on the amount of cash flows gener-

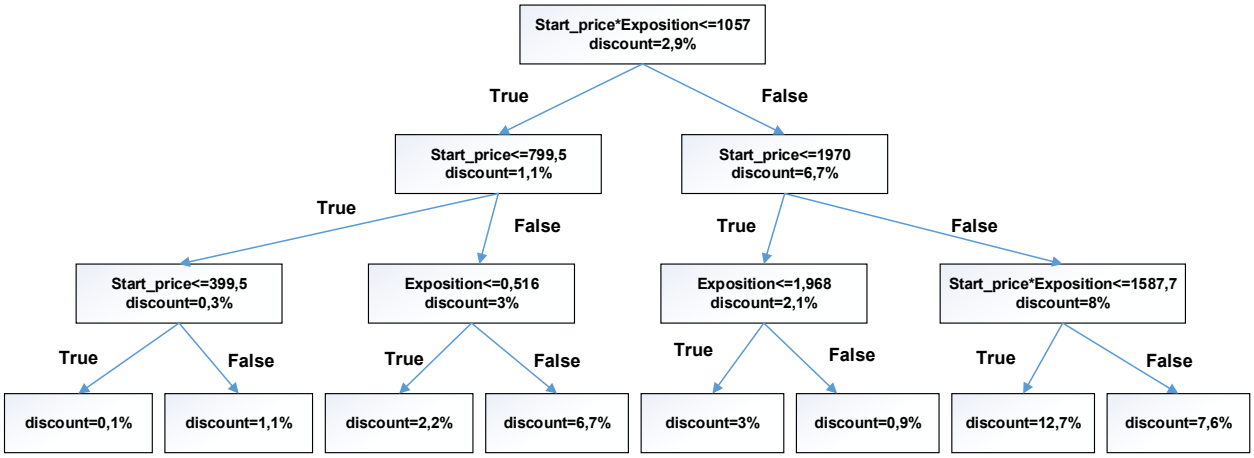

Fig. 8. **Algorithm for determining the value of the discount on the auction**

Source: compiled on the basis of the Methodology.

Note: Start_price — initial sale price (before discount); Exposition — term of the domain name exposure on the open market. Determined according to the date of advertisement of the evaluated domain name on the online platforms.

ated through the use of domain name companies. Only a profitable approach and the DCF method, which is widely known and used by professional appraisers when assessing IA, is acceptable, so there is no need to dwell on it.

Consider domain names that have semantic content suitable for a potential owner due to the specificity of his professional activities, which will allow consumers to associate the domain name with his company or his product. Examples of such domains are apteka.ru, dostavka.ru, taxi.rf and etc. According to the MEU principle, the owner will choose to use the domain name in the most efficient way, based on the content, and the most suitable subject matter. In this case, domains with the same meaning are actually substitutes (analogues) for each other. But, since each domain can be registered in a single copy, the analogues will differ in "technical" characteristics (constructs that do not make sense but allow to distinguish domain names), for example, apteka12.ru, dostavka+.ru. Or there will be "complexity" of the domain name due to the addition of new semantic constructions or word modifications, in particular dostavka-vip.ru, do$tavka.ru. The more popular domain content, the problem of the lack of necessary domains is more acute and the higher, respectively, their cost. Thus, the market price of the domain name will be formed by estimating the market value of the main semantic component and adjustments related to technical characteristics. In this case, the preferred approach to the estimation of the market value of semantic domain names, not associated with a well-known trademark (brand), is a comparative approach and method of analogues. Consider their use on the example of domain name evaluation "dostavka5".

The domain name "dostavka5" has a semantic component, understandable to a wide audience, as well as additional elements ("5") that do not complicate the perception of the main meaning. In addition, "dostavka5" is not associated with any known trademark (brand). The assessment of the market value of a given domain name is the following sequence of actions.

1. The selection of domain-like names with similar semantic content to the evaluated domain name, for which transaction prices are known, or (if data on market transactions are unknown) open offers of sale. In the latter case, use the adjustment for bidding, which we will define according to the rules given in the Methodology, taking into account, in addition to the price of the offer, the period of exposure of domain names-analogues (*Fig. 8*).

2. The cost of analogues is adjusted for the way the domain name is formed from the original semantic component according to the rules of the Methodology (*Fig. 6, 7*).

Table 6

List of ways to form domain names formed from an existing word

Method of forming	Example	Description
Clear	example.ru, examples.ru	Full compliance with the original semantic component or its multiple form
Error	eczample.ru, exam-ple.ru	Semantic component with a spelling error or including the inappropriate hyphen. The meaning of the original word is saved
Good Addition	theexample.ru, example24.ru	Semantic component with more symbols that fit well with the main word. The meaning of the original word is saved. For more information see below
Addition	examplea.ru, 6-example.ru	Semantic component with any extra symbol at the beginning or end, including a hyphen. The meaning of the original word is saved
2Addition	examplefk.ru, dfexample.ru	Semantic component with two extra characters at the beginning or at the end. The meaning of the original word is saved
3Addition	examplefkn.ru, 67l-example.ru	Semantic component with three extra characters at the beginning or at the end, including a hyphen. The meaning of the original word is saved
2Num	34example.ru	Semantic component with two extra numeric characters at the beginning or at the end. The meaning of the original word is saved
2Dash	3r-example.ru, 67-example.ru	Semantic component with any two extra characters at the beginning or at the end via a hyphen. The meaning of the original word is saved

Source: compiled on the basis of the Methodology.

Table 7

Adjusting the market value of domain names for the method of formation

Numerator / Denominator	Clear	Error	Good Addition	Addition	2Addition	3Addition	2Num	2Dash
Clear	1	2.53	1.87	2.35	2.62	2.66	5.78	4.23
Error	0.40	1	0.74	0.93	1.04	1.05	2.28	1.67
Good Addition	0.53	1.35	1	1.26	1.40	1.42	3.08	2.26
Addition	0.42	1.08	0.80	1	1.11	1.13	2.46	1.80
2Addition	0.38	0.96	0.71	0.90	1	1.02	2.20	1.61
3Addition	0.38	0.95	0.70	0.88	0.99	1	2.17	1.59
2Num	0.17	0.44	0.32	0.41	0.45	0.46	1	0.73
2Dash	0.24	0.60	0.44	0.56	0.62	0.63	1.36	1

Source: compiled on the basis of the Methodology.

Table 8

Adjusting the market value of domain names for the method of formation

Indicator name	Object of evaluation	Analog object No. 1	Analog object No. 2	Analog object No. 3
Domain name	dostavka5.ru	dostavka12.ru	dostavka+.ru	Rosdostavka.rf
Sale price, rub.		18 000	21 000	10 300
Kind of value	Market value	Offer price	Offer price	Offer price
Exposure period, years		1.28	3.12	0.81
Sale price, rub.		18 000	21 000	10 300
Exposure period × sale price		23 040	65 520	8343
Trade adjustment		–7.60%	–7.60%	–7.60%
Adjusted price, rub		21 289	60 540	8335
Domain name category	One semantic components	One semantic components	One semantic components	One semantic components
Method of formation of the initial semantic component (Table 7)	Addition	2Num	GoodAddition	GoodAddition
Adjustment for the method of formation from the original semantic component (Table 8)		2.46	0.8	0.8
Adjusted price, rub.		52 371	48 432	6668
First-level domain name	ru	ru	ru	rf
Adjustment to a first level domain name		0%	0%	56%
Adjusted price, rub.		52 371	48 432	10 402
Market value calculation*, rub.	52371 × 0.4 + 48 432 × 0.4 +10 402 × 0.2 = 42 401.6 rub.			

Source: compiled by the authors.

Note: weighting factors were determined based on the proximity of the analogue to the object being evaluated, the number and magnitude of adjustments made.

3. Adjusts the cost of analogues to the domain area (.ru or.rf) assuming that the domain extension.rf reduces the cost of the domain name by 56% (as calculated by the Consultant).[14]

4. The average value of adjusted prices of selected analogue objects is determined.

Calculations are presented in *Table 8*.

Thus, the market value of domain name "dostavka5" will be 42 400 rubles with rounding.

CONCLUSION

The following conclusions can be drawn from the research:

1. An analysis of trends in the development of the information society in Russia for 2010–2021 showed that the sanctions of 2014 and the coronavirus pandemic in 2019–2021 were significant negative factors for the digitalization of the economy. Russia still lags behind the EU, USA, Korea, and China in terms of digitalization of society and business, as evidenced by the international ratings given in the article, but has significant growth potential on components of human capital and digital infrastructure.

2. The key characteristics of digital assets and digital intellectual assets that define them are: intangible nature and digital form; creation by digital technology; display of value (cost) in the information system; capacity for civil (property) turnover. For digital intellectual assets, there is an additional characteristic — the asset is represented as intellectual property in conjunction with intellectual rights on it.

3. Digital assets can be classified on different bases: in the form of functioning, in relation to objects of civil rights, in relation to objects of valuation, in terms of turnover rate, and degree of liquidity. This classification allows to determine the characteristics of digital assets that form the price–forming and cost-creating factors. The most common accounting treatment of digital intellectual assets is intangible assets.

4. Specific factors affecting the value of digital assets include the level of information technology development, qualification and professional level of manufacturers, sellers and buyers of digital assets, quotes (prices) in the market of certain transactions, the investment potential of the asset, change in costs due to use of the asset in operational activities, etc. For each type of digital intellectual asset, specific characteristics that affect value may be considered, in particular for domain names, these characteristics are the following: semantic content; method of formation; conformity to trademark (brand); number and level of income of the population of the territory (if the domain name has a geographical meaning); technical characteristics (domain zone, number of search queries, etc.).

5. Analysis of the applicability of traditional valuation approaches and techniques to the valuation of digital assets showed that it is possible to apply income and comparative approaches to their valuation. In the income approach it is recommended to use the method of discounted cash flows, and in comparative — the method of analogues. The application of the comparative approach and analogue method is shown by the example of domain names for which it is substantiated that they are one of the types of DIA.

6. To the directions of development of instruments of valuation can be attributed to the: development of IT-oriented tools; development of control and protection of information and ownership rights; development and improvement of the legal and regulatory framework for valuation, development of FSA for digital assets valuation; enable the integration of tools and techniques in which they are applied into existing or newly established ecosystems.

Further directions of research in relation to digital intellectual assets should include the development of methodological tools that take into account the specifics of specific types of assets.

[14] URL: https://app.cctld.ru/KC_buklet_2020.pdf (accessed on 12.05.2022).

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