The logistics approach to perspectives for the digital technologies in Russia

S Barykin¹, L Shamina²

¹Peter the Great St. Petersburg Polytechnic University, 29, Polytechnicheskaya, 195251, St. Petersburg, Russian Federation
²Baltic State Technical University "VOENMEH", 1, Krasnoarmeyskaya, 190005, St. Petersburg, Russian Federation

E-mail: sbe@list.ru

Abstract. Financial technologies (fintech mechanism), along with regulatory technologies (RegTech mechanism), being innovative socio-economic phenomena dynamically developing both abroad and in domestic conditions, can be considered as financial and information categories arising from the formation of needs of the financial market in adaptation mechanisms to the conditions of the new technological order of Industry 4.0. The purpose of the study is to identify the role of digital finance in the domestic financial system in the context of the digitalization of the economy and the directions of development of legal regulation of modern financial technologies. As a result of the study, prospects for the further development of the FinTech and RegTech mechanisms in the Russian economy were identified, taking into account the features and prospects of the development of the FinTech and RegTech mechanisms in Russia. It was shown that the digital financial cube can be expanded by including a new characteristic of digital assets, reflecting the degree of openness of industrial enterprises in the new technological structure of Industry 4.0. As a result, it could be predicted the interpenetration of both technologies of the financial sector of the Finnet direction and BIM technologies of the Technet direction with those technologies being different in their nature. Fintech mechanism could be treated as an effective instrument for managing the financial resources from the point of view of the logistics methodology. With the purpose of the logistics theory being the development of methods and models of effective distributing the financial flows, the logistics approach to managing the financial resources considers the calculation of expenditures caused by financial decisions regarding the investments, debts, deposits and especially operational activities. The main problem of logistics approach relates to the assessment of interconnection between the material resources flow and cashflow. However, the digital financial technologies enable to make various appraisals being immanent part of logistics models.

1. Introduction
The logistics approach consists of the development of both methods and models of effective distributing the financial flows considering the calculation of expenditures caused by financial decisions regarding the investments, debts, deposits and especially operational activities. The main problem of logistics approach relates to the assessment of interconnection between the material resources flow and cashflow. However, the digital financial technologies enable to make various appraisals being immanent part of logistics models.
The high importance of digital technologies and the development trends of the financial market caused by their development determines the relevance of the research topic. A wide range of digital technologies implementation differ from energy market [1] to personnel management [2, 3]. The processes of changes in the financial industry under the influence of digitalization necessitate the development of regulation of new aspects of the functioning of the financial market. Transformation of the financial market inspires the processes of transformation of state regulatory mechanisms. Financial technologies (fintech mechanism) along with regulatory technologies (regtech mechanism) are new socio-economic phenomena that are developing dynamically and use modern information and communication technologies to provide various financial services. This general characteristic gives rise to a point of view, which boils down to the fact that “RegTech” is a special kind of “FinTech” [4]. In our opinion, both concepts “FinTech” and “RegTech” are close, since they are based on the use of one technological basis - modern information and communication technologies - and are used in the same field - on the modern financial market. Thus, FinTech and RegTech can be considered financial and information categories that arose as a result of the development of information technologies and the formation of the needs of the financial market in adaptation mechanisms to the conditions of the new technological structure of Industry 4.0.

In modern conditions, there is a rapid increase in the number of startups in the fintech industry, so it is difficult to name the exact number of fintech projects currently existing. According to the Moody’s agency, back in 2015, the number of fintech startups exceeded 4000, and the volume of investments in fintech startups in 2015 amounted to more than $ 19 billion [5]. A year later, in 2016, the volume of investments in the fintech industry increased five-fold and exceeded $ 100 billion [4]. From 2014 to 2018, the volume of venture investments in fintech companies increased almost 3 times - from $ 7.7 billion to $ 19.4 billion. The number of venture investment deals in fintech companies for the study period increased from 725 to 1083 [6]. In 2016, there was a slight decline in venture capital investments in fintech companies: the number of transactions decreased by 1.5% and amounted to 836, while the total volume of venture investments in fintech companies decreased by 13% and amounted to $ 12.8 billion. According to experts, the decline in investment in fintech companies in 2016 was due to investors' concerns caused by the fast growth of the fintech industry and the likelihood of a bubble in the market [7]. Over the study period, the total value of venture investment deals in US fintech companies increased from $ 5.2 billion to $ 7.1 billion. The peak in investment was reached in 2015, when it amounted to $ 7.7 billion. In 2016, the total volume of venture investment in fintech companies in the United States fell to $ 5.5 billion. Over the study period, the number of transactions is growing at a faster rate than the total investment. This indicates a decrease in the average value of a venture investment transaction in a US fintech company. In the EU, there is also a tendency to increase the number of investment transactions - from 122 transactions in 2014 to 201 transactions in 2018 with a significant reduction in the average value of an investment transaction 2016 with a further increase in the value of one investment transaction [6]. In the Asia-Pacific region, during the study period, there has been a steady increase in the volume of venture investments in fintech companies and the average cost of an investment transaction in venture financing.

Traditional financial market players have formed effective systems to comply with dynamically changing and ever-increasing demands from financial market regulators. Nevertheless, FinTech startups are striving to occupy the most profitable links in value chains in the financial services sector, attracting millennial consumers through a predominantly online service delivery model.

2. Materials and methods
The financial industry is actively using new technologies and as quickly as possible adapts the achievements of scientific and technological progress to its own needs, while undergoing transformation in the new technological structure of Industry 4.0. It should be noted the work of foreign researchers on the development of the fintech mechanism, such as Arner D., Barberis J., Buckley R. [8], Kocianski S. [7], Schueffel P. [9]. Modern studies of the “RegTech” mechanism are devoted to the problems of the development of state regulation of the financial sector, directions of
development of regulatory technologies. In particular, Cornell A. [10] considers the development of the RegTech mechanism abroad in the context of the development of the financial market. Meola A. [11] studies the possible directions of the future development of the RegTech mechanism in Asian financial markets using China as an example. Shaw W. [12] discusses the opportunities and threats posed by the development of regulatory technologies in the new technology industry of Industry 4.0. Eyers J. [13] discusses the possibilities of using modern digital technologies for the development of regulatory mechanisms of the financial market. Povetkina N.A. and Ledneva Yu.V. [14] consider the relationship between the FinTech and RegTech mechanisms and the direction of development of regulatory technologies in Russia.

The FinTech and RegTech mechanisms are rapidly penetrating many sectors of the economy and the areas of its state regulation. In the domestic scientific literature, there is currently no single understanding of the contents of the terms “FinTech” and “RegTech”. The etymology of the word “FinTech” in the Russian language implies that it is a complex abbreviation, which is formed from the English phrase Financial technology. The spelling “financial technology” as a rule is replaced by the English abbreviation FinTech, and such spelling is currently quite legitimate. In Russian and international practice, there are three approaches to the definition of fintech. First, fintech is a new sector of the global economy, which is formed by enterprises specializing in improving the technical and economic efficiency of financial products. In the framework of this approach, another definition is used: Fintech is a segment of the financial market that specializes in providing digital financial products for various categories of consumers.

Secondly, the term “FinTech” is used to refer to technology companies that integrate new information technologies into traditional activities within the financial market.

Thirdly, the term “FinTech” is used to refer to practical activities that are aimed at the efficient use of modern software to satisfy consumer demand for various products of the financial market.

Finally, “RegTech” actually represents “a market of information and legal technologies designed to help financial companies comply with the requirements of audit bodies (regulators) or, in other words, provide assistance in the field of regulatory compliance” [14].

One can single out a wide range of scientific papers devoted to the problems of developing the FinTech and RegTech mechanisms. In the works of such domestic researchers as Maslennikov V.V., Fedotova M.A. and Sorokin A.N. [15] highlights the dynamics of the development of the fintech mechanism on a global scale and in Russia. In the work of Nikitina T.V., Nikitina M.A. and Halper M. A. [16] a study is being conducted of the importance of the fintech mechanism for the development of the modern financial market. The interconnection of the fintech mechanism and innovations in the banking sector is considered in the work of Bakhareva A.A. [17]. Prospects for the development of the fintech segment in Russia are considered in the work of Pertseva S.Yu. [18]. Currently, the attention of Russian researchers is paid mainly to the problems of developing the fintech mechanism, in contrast to foreign researchers devoting much less attention to the RegTech mechanism. Fintech startups initially focus on customizing their services, and the active use of digital technologies allows them to reduce the cost of services and, accordingly, use a more flexible pricing policy - from lending to capital management. A special ecosystem of the fintech sector is being formed (Figure 1).
The advent of online platforms in the field of consumer and commercial lending has enabled individuals and legal entities to quickly and conveniently borrow. Thus, the development of financial technologies leads to the transformation of the structure of the financial market, changing the algorithm of its functioning and contributing to the development of the dynamically developing sector of the fintech financial market at the intersection of the digital technology and financial services sectors.

3. Results. **Spreading the concept of digital financial cube on BIM technology**

The concept of a financial cube was proposed by Gomber, Koch, and Siring [19] to systematize concepts united by the concept of digital finance as a set of new financial products, financial enterprises, finance-related software, and new forms of communication and customer interaction provided by FinTech companies and innovative financial services providers. The concept of a digital financial cube is considered in three dimensions: digital financial business functions, applied technologies (and technological concepts), as well as relevant financial institutions. In this formulation of the problem of systematizing digital finance, a traditional digital financial cube should be considered.

4. **Traditional digital financial cube**

The traditional digital cube is characterized by a systematization of the concepts of digital finance in three dimensions (Figure 2).
Figure 2. Digital Finance Cube [19].

We can agree with the researchers of this extensive topic in a general methodological approach applied to the solution of the problem of systematizing the conceptual apparatus of digital finance in the form of a cube in three dimensions (business functions, technologies and institutions). The idea by itself of such a scientific search was borrowed from a scientific work devoted to research in the field of recognition of financial fraud (Financial fraud detection, Figure 3, [20]).

In general, this logic of scientific research can be taken as the basis for further research in the field of a broader object of research - the transformation of economic relations in the new technological structure of Industry 4.0. However, from the perspective of further improving the tools of digital finance, the approach of the traditional cube may cause difficulties in terms of visualization of 3 dimensions of each of the 5 main elements of the Fintech ecosystem (discussed in detail in [21]):

1. FinTech startups (e.g. payments, asset management, lending, crowdfunding, capital markets and FinTech insurance companies);
2. Technology developers (e.g. big data analytics, cloud computing, cryptocurrency and social media developers);
3. Government (e.g. financial regulators and legislators);
4. Financial clients (e.g. individuals and organizations);
5. Traditional financial institutions (e.g. traditional banks, insurance companies, stock brokers and venture capitalists).

Figure 3. The logic of the scientific study of the digital financial cube (based on [20]).

In addition, it is very difficult to use this model to consider the possible consequences of the introduction and development of digital technologies in the industrial production sector. What new financial instruments and technologies will be required to service transforming business processes in industry? For analysis, we consider in more detail the development of the direction of new production technologies of Technet. A roadmap for the development of “end-to-end” digital technology “New Manufacturing Technologies” (SC SCT NPT), which involves achieving industrial leadership in high-tech industries based on a list of activities until 2024 and classifies the following subtechnologies as new manufacturing digital technologies: 1) digital design, mathematical modeling and product or product life cycle management (Smart Design); 2) technologies of "smart" production (Smart Manufacturing) [22]. Consider how these technologies will affect the development of Fintech.

A radical change in the paradigm of technology application in the 2010s. due to the shift of the “center of gravity” in global competition to the design stage, the rapid development of computer and supercomputer engineering technologies, computer optimization technologies, new materials development technologies, additive manufacturing technologies, the Internet of things / industrial Internet, machine learning, big data and cloud computing, artificial intelligence for a key role in the new technology industry of Industry 4.0. digital twins began to claim [23, p. 10]. A new type of business process system has emerged with the following characteristics:

1) creation of digital platforms, unique ecosystems of advanced digital technologies;
2) development of a system of digital models of both newly designed products and production processes;
3) digitalization of the entire product life cycle from a concept idea, design, production, operation, maintenance to disposal [24, p. 6].

The concept of digital twins (according to A.I. Borovkov) is defined as a clusters of complex multidisciplinary mathematics models with a high level of relevance to real materials, real objects / structures / machines / devices ... / technical and cyberphysical systems, physical and mechanical processes including technological and production processes. These models are described by 3D non-stationary non-linear partial differential equations [25, Pp. 234 - 245].

The widespread introduction of digital counterparts of products and objects leads to the emergence of such a thing as a “digital asset”, which in turn requires the development of mechanisms for
calculating the value of a digital asset (DA), its accounting, etc. DA involves the involvement of
digital models in the financial management process, the formation of a portfolio of debt obligations,
investment management, digital finance. At the same time, the concept of DA clearly does not fit into
any of the faces of the cube, it is rather a digital financial and production technology. In addition, the
question arises of the legal regulation of such an asset, and as a result, a change in the prevailing
pricing models in the development of DT, as the basis of DA. These issues need to be addressed both
in legal and in the production plane.

It is possible to propose the expansion of the traditional digital financial cube by including digital
assets in the research object (for example, in relation to the provision of capital construction objects as
a mortgage to a credit institution). Then, the very concept of a cube can be transformed from a
trihedron to a tetrahedron, with the addition of a “facet”, in terms of the digital finance.

The fundamental basis of a scientific study of the prospects for the development of digital finance
may be the new paradigm of digital design and modeling of globally competitive products of a new
generation (developed by Borovkov) [26]. Guided by the approach of conducting basic research based
on the world scientific and technological frontier, the tetrahedron can be expanded, adding new faces.
The resulting digital financial pentahedron is obtained by adding an additional facet to the regulatory
face that reflects the previously mentioned new digital manufacturing technologies Smart Design and
Smart Manufacturing, which allows us to consider the pentahedron and draw a fundamental
conclusion. Introduction to the financial terminology of the concept of a digital asset will expand the
conceptual framework of financial technologies FinTech and proceed to the development of new
models and methods of financial asset management based on new terminology.

The thesis about the possibility of interpenetration of FinTech technologies and Technet
technologies is based on the prevailing distribution of investments in startups and on the forecast of
revolutionary changes in the financial market. The maximum share of investments falls on fintech
startups in the field of payments and electronic commerce - 38%.

In second place is investment in fintech startups in banking and lending - 26%. 13% of investments
in 2018 came from fintech startups in the field of investment and money management. Investments in
fintech startups aimed at creating aggregators of financial solutions amounted to 12%. In fintech
startups in the field of healthcare in 2018, 6% of the total amount of funds was invested. 4% of
investments come from fintech startups in the insurance industry and only 1% from startups
developing software for managing financial business processes (Figure 5).

Currently, various measures are being implemented at the state level to implement “soft” regulation
of the FinTech sector and RegTech sector, and the boundaries of legal regulation of the FinTech and
RegTech sectors are gradually being formed. In 2018, the Bank of Russia introduced “The Main
Directions for the Development of Financial Technologies for the Period 2018–2020” [27]. Bank of
Russia proposals provide for the implementation of a number of infrastructure initiatives aimed at
developing the fintech sector. In particular, it is proposed to create a platform for digital registration of
transactions, to create a marketplace platform for providing financial services to various consumer
groups, to create a system for transmitting interbank financial messages, as well as to create an end-to-
end identifier of a financial services consumer. In addition, the “Guidelines for the Development of
Financial Technologies for the period 2018–2020” focuses on applied developments on the
introduction of digital technologies in supervisory and regulatory activities in order to increase their
effectiveness. Several fintech accelerators operate in the Russian Federation, functioning as special
centers that offer the necessary resources to the founders of fintech startups. The fintech accelerator of
the “Startup Academy of Skolkovo” provides training and financing to the founders of fintech startups
[28]. Fintech-accelerator GenerationS is aimed at the implementation of technological startups of
federal significance and solves the tasks of three interested parties: potentially successful fintech
startups get support, corporations get the opportunity to optimize business processes as a result of the
introduction of new technologies, investors get the opportunity to invest in potentially successful
fintech projects [28]. In addition, it should be noted such Russian fintech accelerators as Future
Fintech and QIWI Universe. The Future FinTech program gives the founders of fintech startups the opportunity to test created products and services in the fintech industry in the process of cooperation with real domestic companies and banks. QIWI Universe FinTech Accelerator was created by QIWI Group to support three segments of the fintech market: young FinTech startups, medium-sized businesses in the fintech sector, and large-scale businesses in the FinTech sector [28].

The results of the study prove that the financial market could be identified as sector transforming for revolutionary changes which was mentioned while launching an association for the development of FinTech in Russia [29]. We assume that it could refer to the consumer banking, payments and transfers, investment management, brokerage services, insurance. Among the innovations in the field of lending, the emergence of alternative lending models, the development of credit risk assessment through the use of non-traditional data sources and big data analysis, the acceleration of credit operations with a parallel reduction in operating costs of credit organizations.

Thus, we can consider the development of FinTech technologies taking into account the developing technologies for creating digital doubles, smart and virtual factories, etc.

5. Conclusion
In the context of the digitalization of the economy, new participants, new products and algorithms appear in the financial market both globally and locally, which forces traditional participants in financial markets to adapt to changing conditions and modernize their own products. Accordingly, in the future, with the further development of information technologies, further changes in the financial industry can be expected both globally and nationally. The Russian fintech sector is behind the world both quantitatively and qualitatively. FinTech and Regtech are special financial and informational categories that describe dynamic mechanisms at the junction of the digital technology and financial services sectors in the modern financial market. The FinTech and RegTech mechanisms are closely interlinked - the development of the fintech sector inspires the need for regulation of new financial technologies and, accordingly, the development of the RegTech sector.

New entrants to the financial market — FinTech startups — are integrating digital technology with traditional financial services. This provides the fintech sector with important competitive advantages over traditional financial market participants. The rapid development of the FinTech sector in quantitative terms leads to qualitative changes in the financial market due to the transformation of the traditional value chain in the financial market.

However, the inclusion of working with digital assets in the financial technology sector, the involvement of BIM-technologies in assessing the value of a business in the process of forming a loan portfolio, and also by increasing the transparency of the borrowing enterprise by analogy with the openness of the economic behavior of physical faces. The question of the mechanisms of technology interpenetration between Technet and FinTech remains open despite a common understanding that innovations in the fintech sector are based on the rapid development of information and communication technologies and include the emergence of new digital applications that significantly facilitate the implementation of various transactions, the emergence of alternative processing networks, and the intensification of the use of mobile devices for financial transactions. It could be proved that Fintech mechanism becomes an effective instrument for managing the financial resources from the point of view of the logistics methodology. The logistics approach considers the calculation of expenditures caused by financial decisions regarding the investments, debts, deposits and especially operational activities. The main problem of logistics approach relates to the assessment of interconnection between the material resources flow and cashflow. As far as the development of the models of the financial flows is concerned, the digital financial technologies enable to make various appraisals being immanent part of logistics models.

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