

# DIGITAL CURRENCY AS A TOOL FOR REDUCING INFORMATION ASYMMETRY (START-UPS' FINANCING EXAMPLE)

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## ABSTRACT

*Support for technology startups is a strategically important issue of economic development. One of the most relevant areas is a fintech startup. In this regard, it is interesting to consider the possibilities of new digital tools in the context of startup financing processes. The paper considers the problem of low efficiency of investing in startups, and makes an assumption about the possibilities of reducing the existing inefficiency of venture investments associated with information asymmetry through the usage of digital currency and digital platform.*

**Keywords:** *fintech startup, investment, digital currency, information asymmetry.*

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## INTRODUCTION

The use of innovations is one of the most important mechanisms for creating a sustainable competitive advantage and resilience in today's dynamic environment. Impressive achievements in the field of digital technologies contribute to the intensive growth of entrepreneurship and its manifestation in the form of startups. Digital innovations are widely used in all spheres of activity, including finance, and create new business models. This digital breakthrough has challenged the traditional way of providing financial services in more flexible, transparent and cost-effective ways. The fintech phenomenon comes from combining the English words finance and technology and refers to startups that use the latest technologies to provide innovative financial services. The fintech sector makes a significant contribution to the financial system by reducing costs, providing higher quality services and increasing customer satisfaction.

However, there are many uncertainties on the way to the development of technology startups [23] [25][2] [4] [5][6]: Due to the complexity of the solutions used and competitive environmental conditions, when studying the process of financing startups, we encounter the concept of information asymmetry. Distrust and uncertainty strongly affect the startup market.

The problem of information asymmetry in the used car market was raised in the 1970s by the Nobel Prize laureate G. A. Akerlof in his famous work "The Lemon Market: uncertainty of quality and the market mechanism" offered an understanding of why the used car market is characterized by mass distrust [1]. Solving the problem of information asymmetry between startups and investors is the key to successful fundraising for startups, which was considered in the research of Mollick, 2014; Ribeiro-Navarrete et al., 2021, Santoso et al., 2023. Sookram, 2023, Welter et al., 2023.

A startup is a developing technology company, the main problem of which throughout its development may be a lack of funding, since startups are also a "cat in the bag" with uncertain quality. This is due to the fact that, unlike more traditional business models, companies of this type operate in new markets, which is associated with a high risk of non-return on investment. Startups are forced to financially cover any technological developments and market entry until they are able to generate their own resources. Such companies do not find support in banks and are forced to look for other types of financing, both public and private. The startup market is characterized by high information asymmetry [3][20][31]. Startups always know more about a project than investors. To reduce information asymmetry, investors analyze a variety of information, project details, updates, and various market signals.

Within the framework of this study, an attempt is made to analyze the possibilities of new digital tools in the context of facilitating investment decisions in the process of financing startups. The article deals with the problem of inefficiency of venture investment in connection with the asymmetry of information. An assumption is made regarding the possibilities of reducing the existing inefficiency of venture investments associated with information asymmetry through the use of digital currency [37][36] and digital platform [38].

Research question 1. What is the state of the startup market in the Russian Federation?

Research question 2. How to reduce the information asymmetry in the financing of startups in the Russian Federation?

Research hypothesis: the use of digital currency and a specialized digital platform in financing startups can reduce information asymmetry and increase the effectiveness of financing.

## METHODOLOGY

Within the framework of this study, an analysis of the literature on startup financing, as well as on information asymmetry and digital currencies, an analysis of new digital tools based on blockchain technology was carried out. For this purpose, the search tools Elibrary, Google Scholar, and Scopus were used. The search strings included various combinations of the following terms: startups, startup financing, information asymmetry, digital currency.

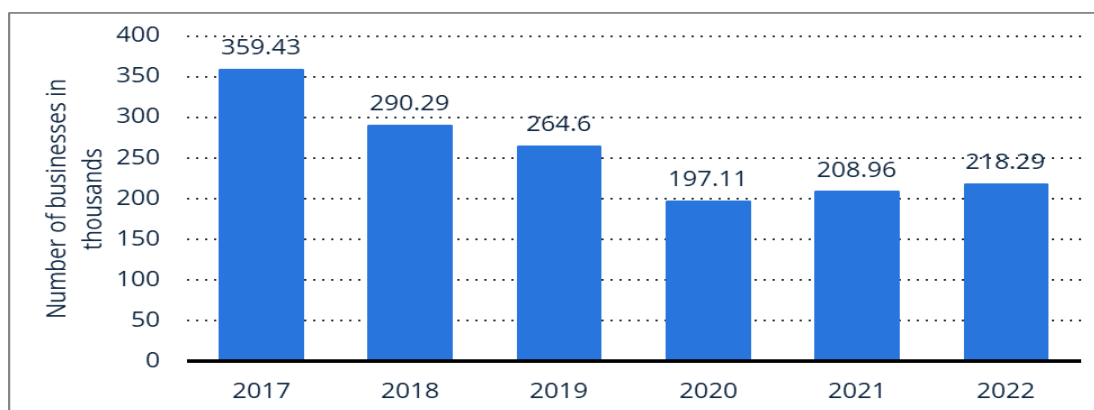
The result of the search was a list of primary sources from 263 articles posted on the Internet, conference materials that either directly related to the concepts under study, or indirectly provided relevant information. If several articles covered similar or identical topics, articles were filtered: the journals with the highest rating were selected, had the largest number of citations and/or were written by authors with a solid track record of publications and reputation. This contributed to the ordering of the links used to the appropriate level for further analysis.

A consistent analysis of Statistical statistics on startups in Russia was also carried out, including characteristics of startups, industries, sources and amounts of funding to determine the problems and prospects of the Russian startup market.

## RESULTS

### ANALYSIS OF STARTUP FINANCING IN RUSSIA

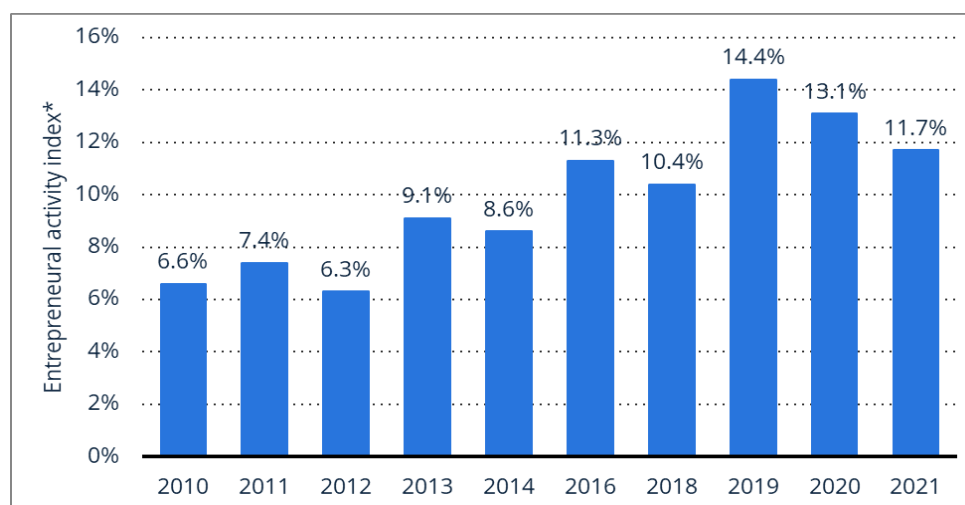
In 2022, more than 218 thousand new enterprises were created in Russia. In the period from 2017 to 2020, the number of new enterprises registered annually in the country gradually decreased. The number of new enterprises was lower than the number of closed enterprises, which in 2022 amounted to about 268 thousand. (fig. 1). This suggests the need to find new effective tools to support entrepreneurial activity to overcome this downturn.



**Fig. 1.** Number of new business registrations in Russia from 2017 to 2022 (in 1,000s)

Source: Number of new business registrations in Russia from 2017 to 2022. Data provided by the Federal State Statistics Service of Russia. <https://www.statista.com/statistics/1255142/russia-new-business-registrations/>

In 2021, less than 12 percent of Russians were engaged in entrepreneurial activity. In recent years, this indicator has decreased. For comparison, in 2019 it exceeded 14 percent. The index of entrepreneurial activity in Russia grew steadily from 2014 to 2019, but after 2019 it began to decline, which was associated with the pandemic (Figure 2).

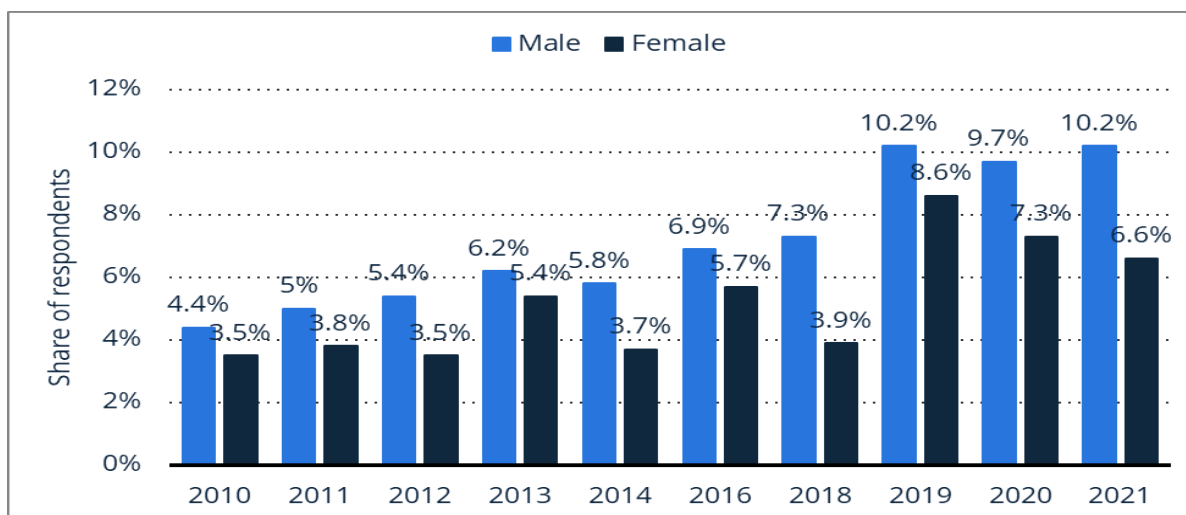


**Fig. 2.** Share of population engaged in entrepreneurial activity in Russia from 2010 to 2021

Source: Statista (2023).

The trend towards a decrease in entrepreneurial activity indicates a number of problems in this area: a high level of uncertainty in the market makes it necessary to reduce the level of risks, existing support tools do not work effectively enough.

Interestingly, in 2021, approximately 10 percent of Russian men aged 18 to 64 were aspiring entrepreneurs, compared to less than seven percent of women. The share of men engaged in early entrepreneurship prevailed over the share of women in all the observed periods (Fig. 3). This may be due to the difference in risk appetite between men and women. In conditions of information asymmetry and uncertainty, men are more prone to risk [22]. Reducing information asymmetry in venture financing processes can contribute to the gender alignment of the business community.



**Fig. 3.** Share of population engaged in early-stage entrepreneurial activity in Russia from 2010 to 2021, by gender

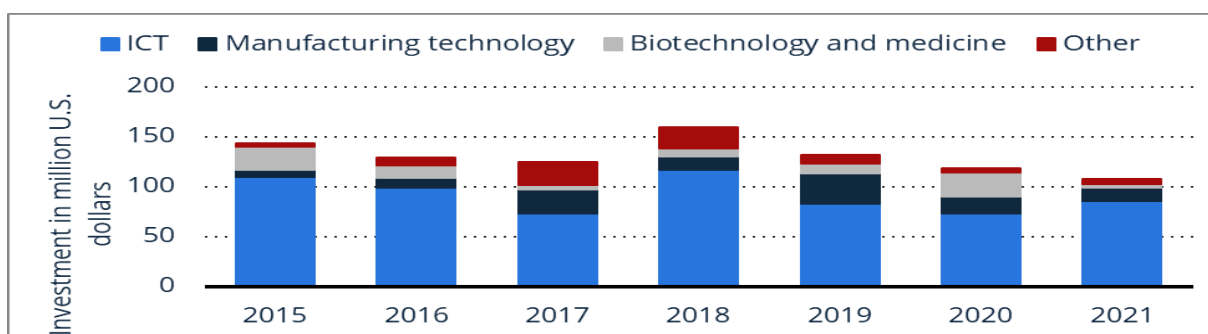
Note(s): Russia; from 2010 to 2021; at least 2000 respondents; 18-64 years

Source(s): GEM; Higher School of Management St. Petersburg; Sberbank of Russia

<https://www.statista.com/topics/7574/startups-in-russia/#topicOverview>

Analyzing the distribution of startups by industry, it can be noted that the cost of venture investments in projects in the field of information and communication technologies (ICT) in Russia was higher than in biotechnology and manufacturing technologies. All further data on financing will be given in US dollars, since the data of the service was used Statista.com.

In 2021, the total value of IT transactions was estimated at about 86 million US dollars, which is more than in the previous year (Fig. 4).

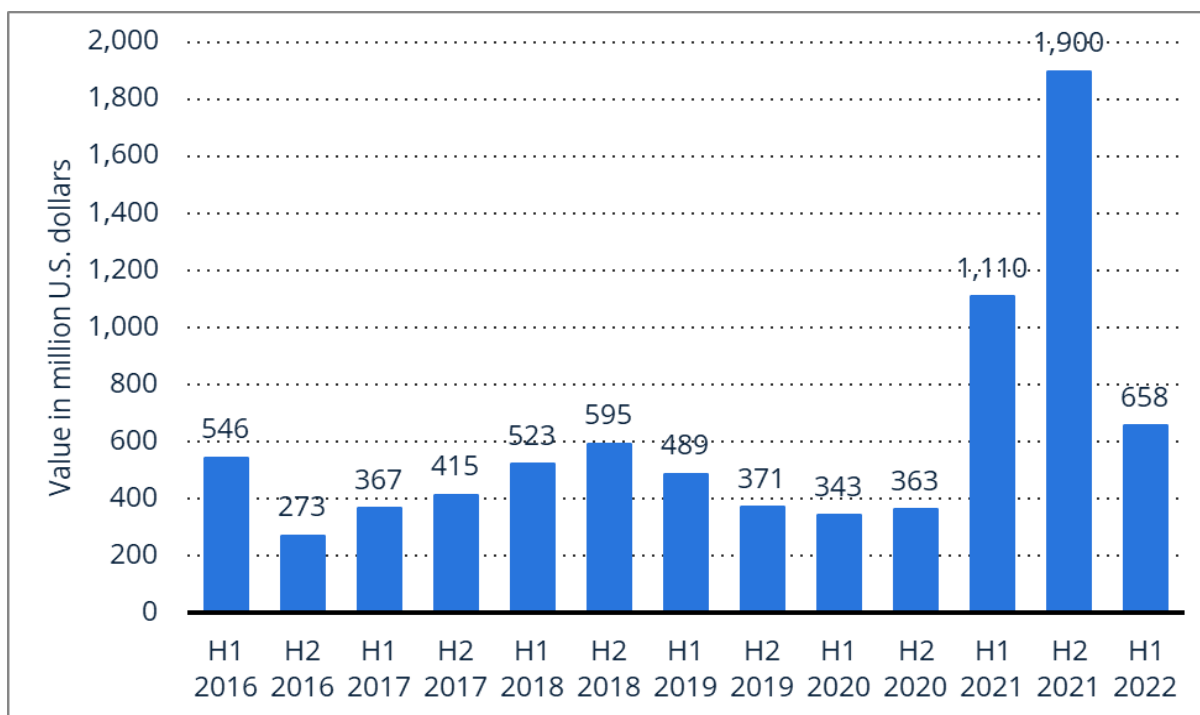


**Fig. 4.** Value of venture capital investment in Russia from 2015 to 2021, by sector (in million U.S. dollars)

Note(s): Russia; from 2015 to 2021

Source(s): Russian Venture Investment Association. Statista (2023).

The value of venture investments in information and communication technology (ICT) projects in Russia reached 86 million US dollars in 2021, compared with 73 million US dollars in the previous year.

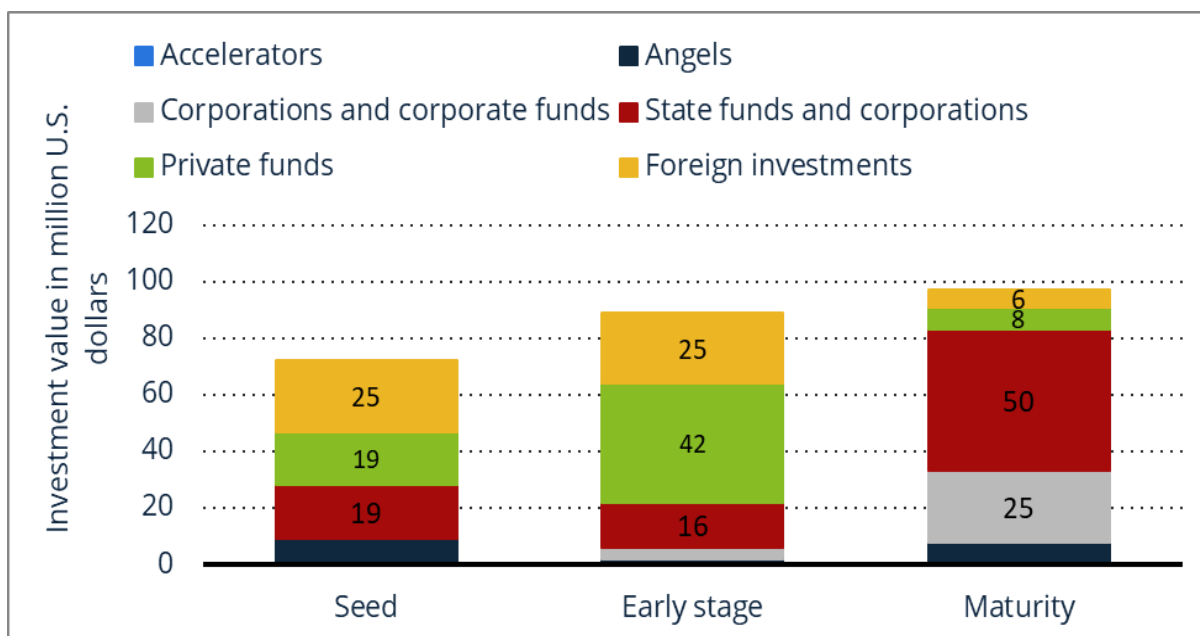


**Fig. 7.** Value of venture capital investment in startups in Russia from 1st half of 2016 to 1st half of 2022 (in million U.S. dollars)

Notes: Russia; from the 1st half of 2016 to the 1st half of 2022.

Sources: Statista (2023).

Let's analyze the sources of financing and at what stages of the project life cycle, which sources are more actively used (Figure 8).



**Fig. 8.** Venture capital investment in startups in Russia in 1st half 2022, by funding rounds stage and type of investor (in million U.S. dollars)

Notes: Russia; 1st half of 2022

Sources: Moscow Innovation Agency, Statista (2023).

Despite the fact that the volume of venture capital transactions was the largest at the initial stage, the cost of investments was the highest at the maturity stage for the specified period. Namely, startups at this stage of development collected about \$50 million from government funds and corporations in the

first half of 2022. At the seed stage, access to financing is difficult, financing from state funds and corporations is more actively involved at the maturity stage of the project. Startups received 25% of the volume of investments at the seed and early stages from foreign investors. At the moment, obtaining financing from foreign investors is difficult and 25% of the investment volume needs to be replaced with investments from other sources.

Based on a survey of more than 630 startup respondents in 2021 in the Russian Federation, the main sources of financing for startups at early stages were identified (Figure 9). As of 2021, about three-quarters of startups in Russia were funded by the equity of their founder at the launch stage. About eight percent of new companies received grants to start operations.

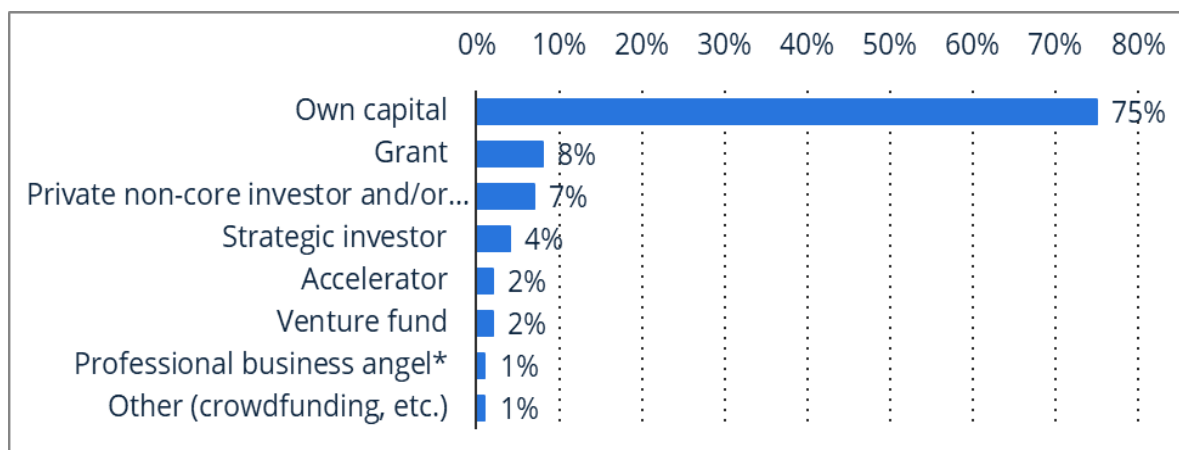


Fig. 9. Most common funding sources at the time of launching the startup in Russia in 2021

Notes: Russia; 2021; more than 630 respondents; Founders of startups in Russia; \* Private investor with more than 10 investments in the portfolio.

Source(s): Internet Initiatives Development Fund; Rostelecom PJSC; VK Barometer. Statista (2023).

Thus, there is an obvious need to expand the possibilities of venture financing. The process of obtaining financing continues to disappoint both venture capital firms and startups. Although uncertainty and risk are integral attributes of venture activity, there is inefficiency associated with information asymmetry in the process of venture investment. It is important to formulate this inefficiency both from the perspective of a startup and from the perspective of venture capital, and suggest some ways to reduce this inefficiency in order to achieve better results for startups, venture capitalists and society as a whole. The reduction of information asymmetry can contribute to the gender alignment of the business community, as well as increase the level of attracted financing at the seed stage of the project.

## THE PROBLEM OF INFORMATION ASYMMETRY IN VENTURE FINANCING

An imperfect competitive financial market has several fundamental problems, such as unfavorable selection and the problem of information asymmetry, which is especially relevant in the case of an investment transaction with venture capital [10][11]. The evaluation of a startup idea is based on information received from a variety of stakeholders, such as markets, governments, business owners and research and development activities. Information asymmetry may exist due to information privately held by external stakeholders and/or information that is not easy to track. Eliminating/minimizing information asymmetry can help investors make informed decisions about venture investment, increasing business efficiency in the long term.

Reducing information asymmetry in the process of choosing a project for investment clearly benefits startups and venture capital companies, but these benefits extend to broader aspects. The result has a great impact on society as a whole [18]. Entrepreneurship stimulates job growth, innovation and economic development. Therefore, a more effective fundraising process is in the interests of startups, venture capital companies, as well as the communities and countries in which they operate. Firstly, reducing the time and costs associated with the financing process will lead to investors financing more businesses. Less capital wasted on incorrect investment decisions caused by information asymmetry

frees up this capital for more suitable investments. Secondly, the reduction of information asymmetry will reduce search costs and free up startups to work on their project, and not to find funding. Moreover, investors spend most of their time evaluating startups [19][14], and not to increase the value of startups, accelerate the commercialization of products, which brings real benefits. Thirdly, the venture capital model is based on the assumption that a significant amount of venture capital investments in the early stages falls to zero value [34] Improving the process of information interaction between a venture investor and a startup will reduce information asymmetry and reduce transaction costs for information retrieval. It can also increase the effectiveness of agency relationships when the principal instructs the agent to invest in promising startups in the interests of the principal [15][16].

Let's consider the problems arising in connection with the current procedures of venture financing. Despite the general coordination of the goals of various stakeholders (i.e. startups, venture companies, society), there is inefficiency in the system, primarily due to information asymmetry. Various factors influence information asymmetry for both founders and venture capitalists. Information asymmetry can limit management's ability to make informed decisions. Despite the fact that information asymmetry is a multidimensional construct, the previous literature focused only on the asymmetry of financial information when making such decisions. In this regard, it is interesting to study the data of the World Bank Group from 1,250 observations in 11 emerging markets and interviews with eight owners and managers of small and medium-sized businesses [21]. The results of the study indicate that the asymmetry of financial information, business regulation and judicial information hinders effective decision-making on venture financing [17].

## **THE CENTRAL BANK'S DIGITAL CURRENCY AND DIGITAL PLATFORM AS A TOOL TO REDUCE INFORMATION ASYMMETRY IN VENTURE FINANCING**

Banking regulation addresses several issues: information asymmetry; bank failures; depositors' ability to recover their funds; unfair, discriminatory or fraudulent practices; and systemic risk. The financial system is one of the key elements of the functioning of the economy. State influence has always occupied and continues to play a serious role here. Amid the growing number of initiatives to issue private currencies, alternative systems for exchanging value (for example, using cryptocurrencies) and other challenges, central banks in most countries are beginning to explore the possibilities of digital transformation of one of the oldest elements of the economy — money. Digital currencies of central banks are one of the most important trends of the late 2010s, which can radically change the role of financial regulators in the financial services industry [12]. By the end of 2020, central banks around the world began to massively announce their interest in the development of the Central Securities Market, and from point initiatives of individual countries, digital currencies have become a general trend in the development of the industry [13].

The digital ruble (CR) is the third form of the national currency, which will be used on a par with cash and non-cash rubles [8].

The digital ruble is a digital form of the Russian national currency that the Bank of Russia plans to issue in addition to existing forms of money [8].

The digital ruble will have a number of unique properties and differences from fiat money. To finance startups, it is recommended to use a specialized platform based on blockchain technology, which will work with the digital ruble. As part of the study, the potential properties of the digital ruble were analyzed and an evaluation matrix was compiled (Table 1).

**Table 1.** Digital Ruble valuation matrix

	<b>STRENGTHS</b>	<b>WEAKNESSES</b>	<b>OPPORTUNITIES</b>	<b>THREATS</b>
Finance	<p>Increased competition within the financial system</p> <p>Increasing the stability of the financial system due to the possibility of improving monetary policy, as well as reducing the likelihood of panic cash withdrawals. This is of particular importance for anticipating crisis periods: by observing the flow of funds into its digital currency in real time, the Central Bank can make a conclusion about the financial condition of banks, as well as about the mood in society and respond more effectively to events and shocking (Carapella and Flemming, 2020) Opportunities to reduce information asymmetry for participants of the financial system</p>	<p>A radically innovative solution has more unexplored consequences for the existing financial services industry, which require a more careful approach and analysis, especially at the first stages of project development.</p>	<p>Improving national security in relation to financial services.</p> <p>Involvement in the creation of an international digital currency settlement system.</p> <p>Increase in GDP by reducing “distorting” taxes and other market imperfections.</p> <p>Increasing the average check, largely due to all the advantages of using financial innovations and non-cash payment methods for customers (Van Hove, 2021).</p> <p>Reducing the share of the shadow economy.</p>	<p>The design of the digital ruble implies the likelihood of an outflow of funds from the current financial services industry.</p>
Clients	<p>Providing products for target groups</p> <p>Creating products that do not have direct commercial benefits for existing financial intermediaries, while having tangible benefits for the end user</p> <p>Increasing mutual trust of participants in the financial system by reducing information asymmetry.</p>	<p>Offering a Digital Ruble to a target audience that is satisfied with current solutions may be a suboptimal waste of resources</p> <p>Heterogeneity of participants and the presence of vulnerable groups that have a low level of digital and financial literacy, low income, or, if we are talking about enterprises and financial intermediaries, with low business margins.</p>	<p>Increasing consumer welfare by increasing financial accessibility and minimizing risks (e.g. cash theft).</p> <p>Financial inclusion opportunities.</p>	<p>A low level of financial literacy among people can negatively affect the desire to try new things, as well as the understanding of the tool, the perception of its safety and necessity.</p>
Internal business processes	<p>If the role of distributed registries is strengthened, and the platform is based on the principles of organization unique to the market, it is possible to switch to a radical transformation of the current financial infrastructure, including industry platforms, for example, for financing startups.</p>	<p>The level of innovation of the Central Bank in relation to the current financial services industry</p>	<p>Changing the current business models of financial intermediaries affects not only the unique value proposition, but also the forms of monetization, the internal organization of intermediaries and other aspects of value creation.</p>	<p>The direct involvement of the Central Bank may undermine confidence in terms of performing the regulatory function.</p> <p>Compatibility with other industries.</p>



<p>Development</p>	<p>The technological reserve available, thanks to the initiatives of the Bank of Russia, can make it possible to create a Digital currency with minimal changes in the infrastructure.</p>	<p>Competition with commercial offers in those markets where existing financial services lead to a high level of well-being, and the market is saturated, can only stop the innovative development of the industry, putting unnecessary pressure on commercial players</p>	<p>Readiness of participants in the Russian financial services industry.  It is possible to involve partner solutions from other countries (e.g., together with the Chinese central bank or banks of the BRICS/CIS countries).</p>	<p>Due to the availability of a wide range of solutions from commercial market participants, Digital currency is likely to remain a niche product, especially if it is offered as a voluntary initiative for users.</p>
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The digital ruble can become a unique instrument of venture financing that can reduce information asymmetry, and if the role of distributed registries is strengthened and the digital ruble platform is based on organization principles unique to the market, a transition to a radical transformation of the current venture financing infrastructure is possible.

### CONCLUSION

Research question 1. What is the state of the startup market in the Russian Federation?

As part of the study, it was revealed that the startup market of the Russian Federation is currently limited to the domestic market, as for financing, there are not enough effective tools at the startup launch stage (as of 2021, about three quarters of startups in Russia were funded from the equity of their founder), there are gender inequalities in the business community. It is necessary to increase the efficiency of financing and its volumes, to increase the competence to present their projects, it is necessary to develop a culture of supporting innovation with verified experience.

Research question 2. How to reduce the information asymmetry in the financing of startups in the Russian Federation?

Investment decisions are made based on several important factors. But often there is no information necessary for business management to make informed decisions. Information asymmetry in a transaction refers to an imbalance of information available to the parties involved, as a result of which one party has more information than the others. A lower level of information can increase the level of uncertainty that business management faces when carefully analyzing investment options. Consequently, enterprises with less information are likely to make suboptimal investment decisions, which can undermine the viability of their projects and, ultimately, the effectiveness of their business. Therefore, the key issue is to reduce the information asymmetry of the parties to the venture financing process.

However, new tools are emerging that can significantly reduce information asymmetry in venture financing. Thus, blockchain technology can reduce information asymmetry with the help of a system that stores data on the expenditure of funds as part of the implementation of a startup, such data is available if a digital currency is used to finance a startup. However, despite the fact that blockchain technology is strong in preserving information, understanding this information is still necessary to increase the value of the system for end users. The digital Ruble, the Central Bank's digital currency, is one of the promising tools based on blockchain technology. Ample opportunities to reduce information asymmetry for participants in the financial system will increase the level of mutual trust of participants. If the role of distributed registries is strengthened, and the digital ruble platform is based on organization principles unique to the market, it is possible to switch to a radical transformation of the current financial infrastructure, including industry platforms, for example, for financing startups.

The technological reserve available, thanks to the initiatives of the Bank of Russia, can allow the creation of a Central Bank with minimal changes in infrastructure.

Thus, the hypothesis of the study "the use of digital currency in financing startups can reduce information asymmetry and increase the effectiveness of financing" is confirmed.

Future research could focus on a more holistic understanding of the potential for digital currency to address information asymmetries. Also, one of the directions for future research is the design of a venture financing

platform based on blockchain technology with a multi-level verification process, the purpose of which is to assess the “quality” of the transaction flow on the platform. The first level algorithmically evaluates each trade using a variety of criteria that are combined to indicate its overall “quality.” The second level uses discrete deal flow channels. It is run by trusted organizations in the industry who use their experience and reputation to validate the deal. The third tier uses pre-approved agents on the platform to review and “qualify” specific deals. Ultimately, all organizations on the platform will have the same rating. Such a venture financing system could significantly reduce the level of information asymmetry and increase the efficiency of venture financing nationwide.

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