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Article

Paths for the development of financial intermediation in industry 5.0: Opportunities for developing economies (On the example of former USSR republics)

Karen Turyan[1,2]

[1] National Polytechnic University of Armenia, Yerevan 0009, Armenia; karen_turyan@hotmail.com
[2] Russian-Armenian University, Yerevan 0051, Armenia

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Abstract: Currently, there is a unique situation in the global economy, industrial eras coexist together, there is interaction and transformation of financial systems simultaneously within the framework of Industry 4.0 and Industry 5.0. New, digital resources are entering the economy, intellectual capital is becoming virtual, artificial intelligence is increasingly finding its application in the structure of financial support. Financial intermediation in developing countries is also subject to global trends, the active development of new instruments for developing economies is especially important. The aim of the study is to identify effective ways to develop financial intermediation in Industry 5.0 for the economies of developing countries. Based on the results of the study on the development of financial institutions mediation revealed a problem related to the lack of reasonable tools that could be used to improving the efficiency of the financial intermediaries market, proposed the main directions of such a process: mobilization of savings, distribution financial assets, payment system, risk management and control over market agents involved in financial operations.

Keywords: industry 5.0; financial intermediation; digitalization; human-centrism; cyber-social approach; business ecosystem

1. Introduction

Industry 5.0 is associated with an information breakthrough, with the transformation of relations, a change in the structure of the financial system, including affecting financial intermediation. Financial intermediation has a stimulating effect on the entire economy, since its development affects the level of well-being of the population, economic growth, and the country's development prospects (Turyan, 2023b; Turyan, 2024).

Industry 5.0 involves considering the human factor, behavioral characteristics, and the orientation of production resources towards human capabilities (Singh and Verma, 2023).

Industry 5.0 represents an evolution in technological and industrial development, emphasizing the integration of human capabilities with digital advancements. It transforms financial intermediation by incorporating a human-centric approach, aiming to balance efficiency, technological innovation, and individual well-being. Key to this transformation are the concepts of decentralized finance (DeFi) and the cyber—social approach, which serve as foundational pillars in reshaping financial services and economic integration.

Decentralized Finance (DeFi) refers to a financial ecosystem that operates on decentralized blockchain networks, utilizing smart contracts to automate financial

transactions without the need for traditional intermediaries like banks. By enabling peer-to-peer interactions and removing centralized control, DeFi promotes financial inclusion, reduces transaction costs, and enhances transparency in the financial system. However, it also presents challenges, such as regulatory uncertainty, security vulnerabilities, and market volatility (Mikhaylov, 2023; Turyan, 2023a; Turyan, 2024).

A notable case is Ethereum's decentralized applications (dApps), which enable users to lend, borrow, or trade assets without traditional banks. For example, platforms like Compound or Aave allow individuals to earn interest on their cryptocurrency holdings or take loans by providing collateral. This bypasses conventional financial intermediaries and democratizes access to financial services.

Another example is the use of blockchain in developing economies, such as Kenya, where decentralized financial systems like BitPesa facilitate cross-border transactions. BitPesa's integration of blockchain lowers transaction costs for remittances and increases financial inclusion by providing services in areas lacking banking infrastructure.

The cyber-social approach integrates digital technology with human-centric values to create a financial system that prioritizes personalized solutions, social connectivity, and the optimization of interactions among households, businesses, and governments. It leverages big data, artificial intelligence, and blockchain to enhance the efficiency of financial transactions while addressing the evolving needs of individuals and society. The approach not only increases access to financial services, but also seeks to humanize technological development by focusing on social significance and sustainable growth.

One real-world application is the Chinese platform Ant Financial, which uses AI and big data to provide tailored financial products. Ant Financial's Sesame Credit system utilizes social data to determine credit scores, which can define or influence loan terms. This system embodies the cyber-social approach by combining digital data analysis with traditional financial services, providing a personalized experience.

Georgia's land registry system is an interesting example of using blockchain. This system reduces transaction times and costs, significantly increasing transparency and trust in property rights management.

Managing artificial intelligence requires flexible thinking, data management, innovative development, and digitalization of activities (Akundi et al., 2022).

At the same time, the current stage is associated with certain problems related to the use of financial intermediary institutions: the possibility of corruption, the presence of information asymmetry, and the low level of public trust in certain types of intermediaries. All this indicates certain limits to the use of financial intermediaries and the need to create new types based on modern digital technologies. Cyber-social systems can become such tools.

Several publications have shown the impact of financial intermediation on economic growth in developing economies such as Pakistan (Akhtar et al., 2024), countries of South-Eastern Europe (Trpeski and Cvetanoska, 2019), Zimbabwe (Bara abd Mudzingiri, 2016), in the post-Soviet countries (Turyan, 2023c).

It is safe to say that financial intermediation is an incentive for the development of the service sector and a key factor influencing the innovation processes of the tertiary sector, which are an integral feature of Industry 5.0.

2. Materials and methods

The study uses theoretical concepts and methodological tools of institutional theory, systems approach, information concept, human-centric approach and other modern theories. Considering some gaps in the existing theoretical base and the realities of financial intermediation development in developing countries, our own interdisciplinary, cyber-social approach is proposed.

The theoretical basis for the development of financial intermediation in Industry 5.0 is associated with the information approach (Bethune et al., 2019).

In 1985, Boyd and Prescott proposed a model of financial intermediation in which a financial intermediary was in contact with many depositors and investors at the same time (Green and Yeong-Yuh, 2001).

In 1996, Vickrey and Mirrlees received the Nobel Prize in Economics for developing the theory of the behavior of economic agents in a situation of information asymmetry (Sandmo, 1999).

The theory of transaction costs expands the informational approach by incorporating not only information costs but also the costs of finding transaction partners, concluding transactions, post-contract monitoring, protecting rights, dealing with opportunistic behavior, measuring and assessing asset quality, and other related expenses. The first researchers to combine the transaction approach and theories of intermediation can be considered Benston and Smith (1976).

The role of financial intermediaries in this approach is to reduce transaction costs, provide investors with financial assets on acceptable terms and with minimal transaction costs. In this case, financial intermediaries produce and then sell special financial products that provide investors with high liquidity of assets, and borrowers with the necessary amount of financial resources with minimal transaction costs. Benston and Smith found the answer to the question of why financial intermediation is highly effective in the financial market: in the activities of financial intermediaries, there is a combined effect, that is, simultaneous savings on costs when issuing their own securities and transaction costs of their clients. The effect is achieved in a combination of advantages.

Information asymmetry and transaction costs lead to suboptimal resource allocation, creating a need for intermediaries.

With the development of the financial market, digital economy, transformation of corporate debt securities, active expansion of the secondary market of financial resources, the theory of transaction costs did not provide an explanation for all the features in the activities of financial intermediaries. New theoretical concepts arise:

- A theoretical approach based on the Diamond-Dybvig model, called the liquidity concept (Diamond and Dybvig, 1983);
- A risk management concept proposed by scientists from the Wharton School of the University of Pennsylvania (Allen and Gale, 1997).

According to the concept of liquidity, the function of banks extends beyond the simple movement of monetary resources. Banks provide the borrowers and depositors with the opportunity to acquire funds of the required degree of liquidity, thus, both credit and deposit activities are included in the general task of financial intermediaries—providing liquidity. This theoretical approach emphasizes the role of

banks among other financial institutions, since, according to the researchers, only banks can provide their clients with guarantees of receiving funds on the terms specified in the agreement. Banks transfer short-term deposits into long-term investment assets. The Diamond-Diving concept differs from previous theoretical models in the way that it pays attention to the passive operations of intermediaries. The existence of intermediaries is explained within the framework of the considered model by information asymmetry, which arises because only the investor has access to key information about the project's main characteristics.

There is also a downside to this process: financial intermediaries are in most cases vulnerable to panic in the markets, which occurs in crisis situations or under the influence of any emergency circumstances or is deliberately incited by unscrupulous entities, "bank runs". Financial intermediaries in such a situation can suffer significantly, go bankrupt and liquidate, which will have a significant impact on economic development. The solution in this case involves several measures: restrictions on fund withdrawals in deposit agreements during such situations, and a state deposit insurance system.

For their concept and other works in the field of crises, Diamond and Dybvig, together with Bernanke, received the Nobel Prize in Economics in 2022. The point of view of Bernanke is interesting, who believes that the banking crisis during the recession of 1929 in the United States is not the cause, but the consequence of the general economic crisis. The banking crisis spurred a wave of a sharp decline in economic development, and it subsequently took years to restore the banking system. Bernanke emphasizes the importance of the formed pool of knowledge of banking organizations about their creditors and borrowers; such data cannot be transferred to someone or quickly collected when forming a new structure (Bernanke, 2004).

The concept of risk management expands the scope of bank activities, including financial innovations, underwriting, risk hedging, asset management, etc. In the context of increasing risks of financial transactions, banks are currently taking on the role of agents for their clients. Closer interaction between financial intermediaries and their clients has led to a high degree of dependence and convergence of interests, a situation that Merton and Bodie called the "financial innovation spiral" (Merton and Bodie, 1995).

Calomiris, Heider and Hoerova (2015) proposed the concept of integrated activity in providing liquidity, explaining the functioning of intermediaries in the market. According to the researchers, intermediaries, or more precisely banking structures, perform two types of activity within the framework of one task—they provide liquidity on demand for both demand deposits and for borrowers under loan agreements. Intermediaries optimize the amount of liquid and illiquid assets in the portfolio.

Currently, most of the interactions between financial intermediaries and their clients have moved into the digital economy, which is not only the automation of transactions, but a deeper transformation of relations. The digital approach to financial intermediation provides for increased efficiency of interactions based on a large amount of reliable data. Financial intermediaries offer clients innovations, new ideas, develop the staff of investors and creditors, involving them in the knowledge economy, expanding the exchange of ideas.

The main theoretical concepts of financial intermediation consider financial intermediaries as players in the financial market that transform capital, terms and risks, and the so-called "triple transformation" occurs. The activities of financial intermediaries are associated with institutional effects-transaction costs, adverse selection, information asymmetry in financial markets. Financial intermediaries increase the efficiency of the financial market and improve the position of all its participants (Onuchic, 2022).

The author substantiates the need to use a modern digital approach based on the economic integration of households, businesses and the state through decentralized finance (Turyan, 2023a).

The digital or cyber-social approach proposed by the author involves the use of innovations in the financial market. The digital economy allows for a significant increase in the economic efficiency of financial intermediation.

The specificity of the cyber-social approach to the development of financial intermediaries is the inclusion of decentralized mechanisms based on blockchain technology in the infrastructure of financial markets, which will ensure the economic integration of households, businesses and the state.

3. Results and discussion

The growth of labor productivity has historically played a central role in the development of society, acting as a driving force for change both at the level of the economy and at the level of social structures. In this process, society and an individual have always been in symbiosis: individuals shape the society, and the society, in turn, influences the formation of the individual. However, with the acceleration of scientific and technological progress, which reached its peak in the era of Industry 4.0, new challenges have emerged, such as the "atomization" of individuals—a process in which a person becomes increasingly isolated from the surrounding social environment, relying on technology as the main source of interaction and self-identification. On the one hand, this change is caused by mass digitalization and automation, in which individuals no longer occupy a central place in production processes. However, the development of Industry 5.0, which is gradually replacing Industry 4.0, puts a person at the center of attention, seeking to rethink the role of technology and automation in a more human way.

Industry 5.0 focuses on the collaboration of humans and machines to create more personalized and individualized products and services. This is in line with our assertion that scientific and technological progress has focused on the needs of specific people. However, the key difference of Industry 5.0 is the desire to restore human subjectivity and eliminate the consequences of "atomization". Here, technology serves not only to increase efficiency, but also to improve the quality of life of everyone through personalized solutions.

While technological progress inevitably changes social structures, Industry 5.0 offers a vision in which technology, instead of increasing isolation, stimulates new forms of social interconnectedness. In the era of Industry 5.0, there is an emphasis on human-centricity: the development of industrial and social relations is based on the return of the human dimension to the center of technological progress.

Key features of changes in social and industrial relations in Industry 5.0:

1) Human-robot cooperation: Instead of completely replacing humans with robots, Industry 5.0 strives for their close cooperation, which allows for the consideration of unique human skills such as creativity, emotional intelligence and intuition.
2) Personalization of services and products: While Industry 4.0 focused on mass automation and unification, Industry 5.0 focuses on the needs and desires of specific people. This desire to satisfy individual requests leads to an improvement in overall well-being.
3) Sustainable development and social responsibility: New technological changes must consider not only economic, but also social and environmental aspects. Growing prosperity should not lead to a rupture in society, but on the contrary, promote its cohesion.
4) Reorganization of social relations: As technologies change, social relations also undergo changes. Industry 5.0 can stimulate a rethinking of collective identity, creating new forms of social interaction based on cooperation and mutual support.

Thus, Industry 5.0 proposes an evolution of social and industrial relations, where the key elements are not only economic benefits, but also social significance and humanization of the technological development process. It solves the problems associated with the "atomization" of the individual, creating a new social space for the integration of a person into the digital reality, where his well-being and unique needs come first.

3.1. Types of financial intermediaries in industry 5.0

The above is reflected in financial intermediaries. Currently, new forms of financial intermediation are actively developing, related to the integration of activities and the use of electronic systems for interaction. Each type of financial institution has a specific impact on economic development, based on the goals, range of operations, clients. However, all financial intermediaries ensure the development of the financial market, stimulate investment and innovative development of business entities, which is a factor of economic growth.

As a result of the consideration of the existing classifications of financial intermediation institutions, it was concluded that the structure of financial intermediation is heterogeneous, uniting various types of financial institutions that differ in scale, organization of work, types of services provided and customer segment. The structure of the financial services market will evolve as the economy undergoes transformations. The author identified the problem of the lack of unified approach to their differentiation. It is proposed to include in the classification of financial intermediaries a differentiation based on management structures: centralized, decentralized and/or cyber-social. This will allow more clearly to form the modern structure of the financial market and the direction of management of financial intermediaries.

All financial intermediaries, according to the well-founded opinion of Ulybina, can be divided into three types according to the type of operations they perform: investment, contract-savings and deposit-credit (Ulybina, 2020).

Deposit and credit intermediaries facilitate the accumulation and allocation of funds and organize the movement of financial resources through money transfers. The goal of such intermediaries is to reduce transaction costs of clients, provide them with funds on acceptable terms, and optimize risks.

Contractual savings financial intermediaries focus on attracting contributions through contracts established between them and clients.

Investment financial intermediaries provide services for placing clients' funds in various financial instruments. In this case, investment instruments are assessed by experts, which increases the likelihood of receiving income from investments. Investment intermediaries are convenient for clients because, by investing even a small amount, you can receive income and diversify your investments. There is a significant saving in transaction costs, since there is no need to analyze stock market reports and charts and calculate trends.

In modern conditions, a relatively new form of financial intermediation is microfinance. Microfinance organizations are a specialized form of financial intermediation that offers small loan issuance (Bongomin et al., 2021). Microfinance organizations are becoming widespread in the countries of the former USSR: Armenia, Belarus, Kazakhstan, Kyrgyzstan (Djeentaeva, 2022), Azerbaijan (Khanakhmedov, 2017).

Fintech companies are also considered as new financial institutions (Burlachkov et al., 2018). This type of financial institution involves the use of innovative developments in the field of payment systems, online microcredits, crowdsourcing platforms and peer-to-peer credit systems. Fintech companies specialize exclusively in online services. Peer-to-peer lending systems, which provide for direct lending "from person to person", are particularly popular at present. In this case, there is a "P2P" loan or "peer-to-peer loan", which is made without the participation of intermediaries, such a loan is made on specialized online platforms. The pioneer of this type of service was the UK company Zopa in 2005, which currently has more than half a million members. The United States continued this idea in 2006, when the Prosper company was organized, then similar organizations were created in India, Australia and in other countries. In Russia, the experience of creating such intermediary platforms was unsuccessful; the first peer-to-peer loan service Vdolg.ru suspended operations due to the large number of non-payments, reaching 21% (Tashenova et al., 2018). In 2016, a similar service was launched in Kazakhstan.

Credit cooperatives are non-banking financial intermediaries. Vasilyeva notes that credit cooperatives are organizations that are founded as unions, and work for the benefit of their members not prioritizing profitability (Vasilieva, 2005). Credit cooperatives can have various organizational forms: mutual exchange society, cooperative bank, credit and savings cooperative. The following features of their activities distinguish credit cooperatives from other financial intermediaries:

- The purpose of the activity is to satisfy the needs of participants in financial resources:
- The allied nature of management, the goal of management structures is to optimize results;
- Capital is built from the bottom up;
- Limitation of capital by means of participants;

- Participation in the organization is possible upon making contributions, observing the rules of operation, and ensuring high credit discipline.

One of the forms of financial intermediation at present is the securitization of assets, i.e. their transfer from the balance sheets of commercial banks to the balance sheets of other financial institutions through a specialized structure. This procedure allows banks to reduce their credit risks and acquire other financial assets.

When considering various types of financial intermediation, it is worth including global models in the analysis. The functioning of the global financial market structure has led to the identification of several models of financial intermediation development: North American, European, and the model of countries with developing economies (**Table 1**).

These models differ in the institutional conditions of intermediaries' activities and the structure of the financial market.

Table 1. Features of financial intermediation models.

Model name	North American	European	Emerging
Countries where the model operates	USA, Canada	Germany	Poland, Czech Republic, Slovakia
Specificity	Developed stock market, segmentation of banking activities, banks are prohibited from selling and placing securities. Banks are specialized; loan and savings partnerships and mutual savings banks are actively developing.	The money market and banking sector are developed, banks provide a range of services, there are no restrictions on types of banking activities, and control over borrowing companies has been increased	Financial intermediation is carried out by monopolized banking structures, of which there are 4–5 in the financial market

The US financial system is a market-oriented model that has greater opportunities for risk transfer and exchange among market participants compared to the banking-oriented system of Germany.

3.2. Cyber-social approach as a basis for the development of financial intermediation in developing countries

The fundamental approach that can be used to develop financial intermediation is digital or cyber-social. The digital economy involves the use of innovations in the financial market, expansion of the accumulated pool of knowledge and increase in the intellectual capital of financial intermediaries, active use of information and communication networks to perform various financial transactions and provide financial services. The digital economy allows for a significant increase in the economic efficiency of financial intermediation.

The digital economy involves three components that also exist in the financial market:

- Hardware, including computers, software, telecommunications and mobile networks, etc.;
- Transactions on the financial market carried out remotely;
- E-commerce, including e-banking, e-insurance services, e-marketing, etc.

Nowadays, the digital economy has already become firmly established in the activities of many financial intermediaries: banks use cloud computing and neural

networks to process information in the process of making decisions on providing credit funds.

The use of digital economy tools is necessary at the current level of development of financial intermediation, since competition in the market is increasing both from banking structures and from quasi-banking companies created based on P2P, B2B, B2C platforms.

Financial intermediaries must consider changes in consumer behavior that occur in the following areas: individualization, diversity of requests, situational nature. In the conditions of the cyber-social approach, wealth management services (wealth management) become available to the mass consumption using various remote services and platforms.

The prospects for the development of financial intermediaries are associated with the formation of so-called "ecosystems", which already have experience of being tested in banks (Baumgartner et al., 2024). The ecosystem includes a single electronic platform.

The formation of an ecosystem provides opportunities for increasing the efficiency of intermediaries (Fimyar and Koval, 2024), since the quality of monitoring increases due to the increase in the amount of reliable data on clients, the risk of investments decreases, the volume of income increases, competitiveness increases, and economic growth in the country is stimulated. At the same time, the obvious advantages of the formation of ecosystems create some problems and threats to the economic activities of various business entities:

- firstly, the competitive position of those intermediaries that do not have a formed ecosystem and do not participate in the ecosystems of partners is sharply worsened, thereby creating a barrier to free competition, which can ultimately lead to an inefficient distribution of resources in the financial market;
- consumers, participating in ecosystems, are artificially isolated from other possible providers of financial services; loyalty systems in the form of discount systems, individualized pricing, incentives, bonuses, etc. create a closed consumption loop, limiting competition and distorting the market situation through tendencies toward monopolization;
- a threat to the information security of clients' personal data, the risk of information leakage and unfair use of data is created by narrowing the possibilities for state control;
- deep partnerships within the ecosystem increase reputational risks, since in the event of problems in the activities of one of the ecosystem partner participants, these problems spread to all participants and determine the business reputation of the entire system.

The formation of an ecosystem is certainly an opportunity for large players in the financial market, small and medium participants in financial intermediation will be limited to other digital technologies (Jamadagni et al., 2024).

The use of modern digital tools creates the risk of reducing the pace of development of financial intermediation, since innovations in the financial market have made it possible to effectively carry out direct financing transactions.

It should be noted that recently the role of network structures of financial intermediation has been increasing, the process of integration is taking place, banks

are merging with insurance companies, and participants of stock markets. There is an intersectoral interaction between financial intermediaries, which allows for more efficient transactions in the markets. Intersectoral interaction of financial intermediaries occurs due to the following factors:

- Uneven distribution of financial resources between different markets;
- The need to transfer financial assets from one sector of the financial market to another;
- Active development of production relations, which requires a greater amount of finance in a short time;
- The possibility of generating income through related operations;
- Experience in a narrow field with various financial intermediaries.

The interaction of financial intermediaries can have external and internal forms. At the external level, business relations between banks and insurance companies, post offices, and pension funds are established.

The implementation of interaction between financial intermediaries will allow achieving the following positive results:

- Integrate mediation technologies, borrow innovative breakthrough technologies;
- Develop new territorial markets;
- Increase competitiveness and expand the scale of operations.

Considering how alternative options for mechanisms for the development of financial intermediation institutions are formed, it can be noted that it is necessary to create a favorable institutional environment, reducing investment risks, forming a clear and stable taxation regime. A similar position is held by many authors, who, among other things, consider a favorable institutional environment from the point of view of the legal field, effective protection of the owner's rights (La Porta et al., 1996).

From the point of view of developing economies, it can be noted that financial intermediation can actively develop if the following conditions are present:

- The existence of a sufficient volume of objects for financing, that is, investment with an acceptable level of profitability and risk;
- The existence of effectively functioning instruments for the accumulation of savings, eliminating the possibility of leakage from the financial system;
- Protection of the rights of financial market participants;
- Formation of a favorable competitive and institutional environment for business development.

If the above conditions are absent, financial intermediation will not develop at the proper level. To ensure the necessary conditions, it is necessary to form the country's investment attractiveness for the implementation of the inflow of financial resources. To do this, it is necessary to ensure the sustainability of business development conditions in terms of the regulatory framework of business relations and the tax burden. An advanced tool for developing the economy and forming investment attractiveness is the implementation of an innovative development strategy, which involves the introduction of innovations in management and in financial markets, the commercialization of domestic developments in the real sector of the economy. Venture investment can give impetus to the development of financial intermediaries.

The level of transaction costs in the country's economy, along with the degree of corruption in procedures related to registering an enterprise and obtaining permits

from various authorities for investment projects, is of great importance. Corruption costs create high barriers to entry into the market, increase the risks of doing business, which reduces the investment attractiveness of the country and slows down the development of financial institutions.

For the development of financial intermediation, in accordance with the theoretical concept of the coalition of intermediaries, the integration of intermediaries seems to be a promising process, which will reduce risks and minimize information costs and monitoring costs. The integration of insurance and banking structures is quite actively used in the market, which allows increasing the client base, increasing profitability from one client, and increasing the effectiveness of risk management.

Financial intermediation depends on global economic trends, since it is associated with the international movement of funds, therefore, in order to develop financial institutions, it is necessary to develop a system of risk reduction and reducing dependence on international counterparties, which is especially relevant for the Russian Federation.

We should also note the dependence of financial intermediation on inflation trends: in conditions of rising inflation, the activity of financial intermediaries decreases, and the number of so-called "refusals of financial intermediation" increases. "Disintermediation" also increases, when investors and savers conclude transactions between themselves independently, without using the services of an intermediary. Thus, to develop financial intermediaries, it is necessary to ensure control over the level of inflation.

3.3. Problems of development of financial intermediation in developing countries

The exchange rate regulation policy chosen by states has an influence on the dynamics of the financial sector development. According to this indicator, countries can be divided into the following groups (**Table 2**).

Table 2. Exchange rate regulation policy in post-soviet countries as of 2020.

Name of the policy	List of States
(1) Free floating rate	Russia
(2) Relatively rigid pegging of the exchange rate:	
1) Conditional binding	Turkmenistan
2) Stabilization Agreement	Tajikistan, Azerbaijan, Armenia. Kyrgyzstan
3) Analogue of creeping binding	Uzbekistan, Kazakhstan
(3) Formally floating rate	Moldova, Belarus, Georgia. Ukraine

Note: compiled by the author based on data from (Golovnin and Grinberg, 2021).

It should be noted that in 2020, only Armenia and Moldova used managed floating of the exchange rate; the other post-Soviet countries used various targeting options.

The policy of currency restrictions has been used for a fairly long period of time by Turkmenistan, Uzbekistan and Belarus.

Comparison of the dynamics of economic development and the exchange rate management policy chosen by states allows us to conclude that strict regulation promotes economic development. This is demonstrated by the example of Uzbekistan, Turkmenistan and Tajikistan.

In some developing countries, Islamic banking has been actively developed (Alsaati, 2021).

The following features of financial intermediation based on the principles of Islamic lending can be highlighted:

- Reducing risk for investors, since risks are differentiated into two components: work and capital;
- Capital is involved in the production process in exchange for wages or a share of the income;
- It is mandatory to indicate the exact price in transactions (Cholbaeva, 2021);
- Prohibition of transactions with non-existent goods.

It should be noted that Islamic lending as a type of financial intermediation is widespread not only in Azerbaijan, but also in Tajikistan, Kyrgyzstan, Uzbekistan and Russia.

The main difficulties of modern legal regulation are manifested in the sphere of using digital currency (cryptocurrency), digital rights (tokens). The legal status of these phenomena is not clearly defined, which creates problems in their use in managing financial flows. The uncertainty of the legal status of new technological solutions in the financial market leads to the lack of guarantees of the rights of users of blockchain technologies and smart contracts. This can lead to financial losses and deterioration in the well-being of the population.

Regulatory risks are particularly evident in cases where cross-border or international agreements are in place and entities from different countries must determine which law to use.

The significance of regulatory risks can be illustrated by an example: the LinkedIn service ceased functioning in Russia after a legislative requirement was introduced requiring the storage of information about Russian citizens in Russia.

As a result, one can agree with the opinion that the price for the flexibility of new technologies is their riskiness and vulnerability to external and internal threats (D'Anconia, 2017).

3.4. Proposals for the development of financial intermediation

The author has developed a scheme for conducting the strategizing stage in developing a model for the development of financial intermediation institutions in post-Soviet countries; the target setting of which is to focus on increasing the well-being of the population.

The author proposes to introduce into scientific circulation the "engagement effect", which is the consideration of the human factor based on the concept of human-centrism, which is especially effective for increasing the efficiency of economic processes in Industry 5.0.

Based on the selected model of financial market development, the results of the conducted diagnostics, the parameters of the banking system development are

determined. In this case, it is necessary to determine the model of the banking system, the role of the financial regulator in the market. The degree of influence of banking structures for post-Soviet countries is shown in **Table 3**.

Table 3. The prospective role of banking structures in the market of post-soviet countries.

Country	The degree of influence of banking structures in the financial intermediary market
Azerbaijan	High, includes Islamic banking
Armenia	Medium level, decentralization of the financial intermediary market is envisaged
Belarus	High degree of influence of banking structures dependent on the state
Georgia	Medium level, decentralization of the financial intermediary market is envisaged
Kazakhstan	High degree of influence of banking structures
Kyrgyzstan	Medium level, decentralization of the financial intermediary market is envisaged
Russia	High degree of influence of banking structures, including private-public institutions
Tajikistan	Medium level, decentralization of the financial intermediary market is envisaged
Uzbekistan	High, includes Islamic banking
Turkmenistan	High degree of influence of banking structures

One of the ways to reduce the uncertainty of the legal status of smart contracts is to amend the existing legislation, which has already been done by such post-Soviet countries as Belarus and Estonia. The legislation of Belarus contains special regulations governing electronic contractual relations.

For developing economies, the most reasonable approach, according to the author, would be a gradual development of the legal framework in accordance with the trends of introducing new technologies into the country's financial system: creating amendments to existing legislation, and then adopting full-fledged special legislative acts. When using blockchain and smart contracts, an interdisciplinary approach is needed, economic and legal instruments must be used together, which requires special skills from market players and government regulators. Some researchers quite rightly believe that in the future a new mechanism for regulating transactions may arise—"Lex Cryptographia", which will be implemented through decentralized organizations (Reidenberg, 1998). We consider it possible to agree with the opinion of Russian economists that for the effective involvement of new technologies in the country's financial system, it is also necessary to restructure the legal field, change the state legal system (Ivashchenko et al., 2019).

Experts do not predict a revolutionary transition from the principles of Web 2.0 to the principles of Web 3.0; a gradual interpenetration of basic concepts is expected, but smart contracts and blockchain technologies are an integral part of the financial market in the future. Decentralization of the financial intermediation market is an integral part of Industry 5.0.

On the one hand, decentralized finances do not provide for any regulation, which comes from their essential characteristics related to anonymity, autonomy, and opacity of all information for one participant. At the same time, in order to ensure the necessary level of trust and guarantees, as unconditional characteristics of the financial intermediaries' market, it is necessary to use state levers.

It should also be determined that, in general, any quantitative assessment of the promising opportunities for economic integration based on decentralized technologies seems inappropriate, since the decentralized finance market is a poorly predictable object due to the closed nature of transactions. In the context of complexities in the external environment and the changing legal system of many countries in the field of blockchain technologies, it is almost impossible to make reasonable forecasts. The trends in the development of the cryptocurrency market are extremely vague, in the author's opinion, it is more appropriate to talk about a substitute for money, that is, a new digital asset, largely based on trust and faith in, primarily in the state as a guarantor of the preservation of assets (Turyan, 2023d).

In those countries where the problem of energy consumption is not so acute, blockchain can be used more actively. For example, the spread of blockchain in Georgia is associated with low energy prices. Some experts claim that 10% of the country's electricity is spent on mining (Chepkova, 2019). A positive example of the use of blockchain in Georgia is the work of the land registry of this state with 1.5 million property rights. The process of working with the registry is carried out using blockchain in 10 minutes, operating costs are reduced by 90% (Ponomarchenko, 2022).

We believe that more promising technologies in the field of economic integration of legal entities, households and the state, based on decentralized financial flows, are platforms for recording rights to securities, the so-called e-voting. Such tools are already used in Russia by the National Settlement Depository (NSD) and DataArt (Mikhailov and Shpak, 2020).

In our opinion, one of the goals of the integration of legal entities, households and the state based on blockchain may be the expansion of "green investment".

4. Discussion

The development of financial intermediation within the framework of Industry 5.0 presents both significant opportunities and complex challenges for developing economies, particularly those in the post-Soviet region.

One of the most significant trends revealed in this study is the shift towards human-centric financial systems under Industry 5.0. Unlike Industry 4.0, which emphasized automation and efficiency, Industry 5.0 integrates the human element into the financial system, emphasizing the behavioral characteristics and capabilities of individuals. This human-centric approach seeks to balance technological innovation with the needs and capacities of people, particularly in developing economies. For the former USSR republics, this shift is crucial as it aligns with their socioeconomic needs, ensuring that financial systems foster greater inclusivity and contribute to the overall well-being of the population (Singh and Verma, 2023).

By focusing on the human factor, financial intermediaries can enhance their service offerings to include personalized financial solutions that cater to a broader range of individuals and businesses. The human-centric approach also stimulates innovation in the financial services sector, which is a key driver of economic growth. This transformation can create opportunities for increased participation in the financial system, especially for marginalized populations, and foster more sustainable economic development (Akundi et al., 2022).

The role of digital transformation in reshaping financial intermediation is a central finding of this study. The integration of cyber-social systems, blockchain technologies, and decentralized finance has fundamentally altered how financial intermediaries operate. Digital platforms now enable faster, more secure, and more efficient financial transactions, reducing reliance on traditional banking systems (Turyan, 2023a).

In developing economies, especially in post-Soviet countries, the adoption of these digital tools has the potential to solve longstanding issues such as information asymmetry and high transaction costs, which have historically hindered the efficiency of financial systems. By incorporating decentralized financial mechanisms, financial intermediaries can offer greater transparency, lower costs, and improved access to financial services. Moreover, blockchain technologies enhance trust and accountability, as they provide a secure, immutable record of transactions. This is particularly relevant in economies where public trust in financial institutions has traditionally been low due to corruption and inefficiency (Onuchic, 2022).

However, the adoption of digital systems also introduces new challenges, such as cybersecurity risks and the need for robust regulatory frameworks. As financial transactions move to digital platforms, developing countries must address the growing threat of cyber-attacks and ensure that legal systems are equipped to handle issues related to digital currencies and blockchain technologies. Regulatory uncertainty, especially surrounding cryptocurrencies and smart contracts, remains a significant hurdle for many developing economies, as current laws may not adequately address the complexities of these new technologies (Bernanke, 2004; Reidenberg, 1998).

While Industry 5.0 and digital transformation offer numerous benefits, developing economies, particularly those in the post-Soviet region, face specific challenges that must be addressed. These include underdeveloped institutional frameworks, corruption, and regulatory gaps. Corruption creates high barriers to entry for financial intermediaries, increases transaction costs, and discourages both local and foreign investment (Golovnin and Grinberg, 2021). As a result, the development of financial intermediation is often slowed, preventing these economies from fully realizing the benefits of Industry 5.0.

Additionally, the uncertain legal status of new financial technologies, such as cryptocurrencies and blockchain, exacerbates the risks associated with financial intermediation in these regions. Without clear regulations and protections, both consumers and financial institutions face significant risks. This uncertainty hinders the ability of financial intermediaries to fully embrace digital transformation, limiting the potential for growth in these economies (Turyan, 2023b).

Despite these challenges, the evolution of financial intermediation in Industry 5.0 opens considerable opportunities for growth in developing economies. New forms of financial intermediation, such as FinTech companies, peer-to-peer lending platforms, and microfinance institutions, are providing more accessible and affordable financial services. These technologies democratize finance, enabling individuals and businesses that were previously excluded from the financial system to participate in the economy (Bongomin et al., 2021).

In particular, the formation of financial ecosystems—networks of interconnected financial services—offers an innovative solution for improving efficiency and

competitiveness in financial intermediation. These ecosystems enhance the quality of financial services by integrating various stakeholders, including banks, FinTech companies, and regulators, on a single platform. This integration allows for better data collection and analysis, improving the accuracy of financial decisions and reducing risks. Ecosystems also create opportunities for innovation, as financial intermediaries collaborate to develop new products and services that cater to the evolving needs of consumers (Baumgartner et al., 2024; Fimyar and Koval, 2024).

For post-Soviet economies, the adoption of these new financial models could stimulate economic growth by increasing financial inclusion, improving access to capital, and fostering innovation. Microfinance institutions, for example, play a vital role in providing credit to small businesses and individuals, helping to stimulate entrepreneurship and economic development. Similarly, FinTech companies can offer innovative payment systems, credit services, and investment opportunities that are tailored to the needs of the local population (Turyan, 2023c).

Another key finding is the potential for decentralized financial systems to enhance economic integration. Decentralized finance allows for the seamless integration of households, businesses, and governments, making financial transactions more transparent and efficient. Blockchain technology enables secure, decentralized financial transactions that reduce reliance on traditional financial institutions (Ponomarchenko, 2022).

This integration is vital for the development of financial markets in post-Soviet countries, where traditional banking systems are often underdeveloped or inaccessible to large segments of the population. However, while decentralization presents significant advantages, it also raises concerns about regulatory oversight and market stability. As financial systems become more decentralized, governments must strike a balance between allowing innovation to flourish and ensuring that there are sufficient regulations in place to protect consumers and prevent market abuse (Calomiris et al., 2015). Failure to do so could result in financial instability, particularly in developing economies that lack the institutional capacity to effectively regulate decentralized financial systems (Turyan, 2023d).

Looking ahead, the future of financial intermediation in developing economies will be shaped by a combination of digital transformation and human-centric approaches. To fully capitalize on the opportunities presented by Industry 5.0, developing countries must invest in building robust regulatory frameworks that support the growth of digital financial systems while addressing the specific challenges of corruption and institutional underdevelopment (Ulybina, 2020).

Furthermore, the development of financial intermediation in these regions will require a strong focus on innovation and collaboration between governments, financial institutions, and technology providers. By fostering an environment of openness and cooperation, developing economies can build financial systems that are more inclusive, efficient, and resilient in the face of future challenges.

5. Conclusion

The author proposes to use a modern, digital approach in developing a model for the development of financial institutions. The cyber-social approach proposed by the

author is an invention that will stimulate the development of the financial market of developing countries in the context of Industry 5.0. The convention in the development of financial intermediaries provides for the digital transformation of economic systems. The prerequisites for choosing a financial market model based on institutional conditions for the countries of the post-Soviet space are determined.

The development of financial intermediation in developing countries in new conditions is associated with the decentralization of finance, considering the human factor, using business ecosystems, Islamic banking, and partnership schemes of functioning. The ways of using financial intermediation and specific models for countries are determined by institutional factors, the logic of historical development, current problems, and target settings for the development of economic systems of society.

It is safe to say that the prospects of financial intermediation are inextricably linked with blockchain technologies and cryptocurrencies based on them, smart contracts, etc. At the same time, traditional types of intermediations, including banking and insurance organizations, will not lose their significance and influence on the financial system of developing countries, but will merge into it and become part of it.

The intensification of financial decentralization processes requires a proportionate increase and deepening of state intervention to ensure balance in the financial and economic systems of states.

While the current study provides an analysis of financial intermediation in the context of Industry 5.0, there are several research gaps that remain. The transition towards decentralized finance (DeFi) and the adoption of the cyber-social approach present challenges that require further exploration. Specifically:

Regulatory Framework for Decentralized Finance: there is a lack of consistent regulatory guidelines for DeFi across different jurisdictions, which creates legal uncertainty and complicates the adoption of decentralized financial systems.

Impact on Financial Inclusion and Inequality: although DeFi and digital financial solutions have the potential to increase financial inclusion, there is no empirical evidence on their long-term impact, particularly in developing economies.

Cyber-social Approach in Financial Services: the integration of human-centric values and digital technologies in financial services remains underexplored. Future research could investigate the specific mechanisms through which the cyber-social approach can be effectively implemented, such as through AI-driven personalized financial advice, social impact investing, or ethical AI practices in finance.

Interoperability Between Traditional and Decentralized Financial Systems: the coexistence of traditional banking systems and decentralized finance raises questions about interoperability.

Technological Risks and Cybersecurity Challenges: as financial transactions become more digital and decentralized, cybersecurity threats pose a significant risk. There is a need for further research on robust security protocols for DeFi platforms and strategies to mitigate vulnerabilities in blockchain technology.

Adoption Barriers in Developing Economies: while DeFi and blockchain applications show promise, their adoption in developing countries is often limited by infrastructure issues, such as internet accessibility and energy availability.

To address these gaps research is needed in the following areas:

Developing Inclusive Regulatory Frameworks: collaborate with policymakers to establish flexible regulatory standards that accommodate the rapid evolution of digital financial services while ensuring consumer protection and market integrity.

Assessing Social Impact and Behavioral Economics in DeFi: use behavioral economics to understand the social impact of DeFi platforms and the factors that influence user adoption. This includes studying user behavior in different cultural contexts to design more user-friendly interfaces and incentives.

Exploring Decentralized Identity Systems: research on decentralized identity solutions could be a key enabler for secure and accessible financial services, providing individuals in developing economies with a verifiable digital identity that enhances access to financial products.

Implementing Cyber-Social Financial Ecosystems: design financial ecosystems that integrate social elements, such as community-based lending or social scoring systems, using the cyber-social approach to create a more inclusive and human-centered financial environment.

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