A Conceptual Framework of Developing Ecosystem Strategies for Digital Financial Services

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Abstract. During digital transformation of the economy, the existing business models have being reviewed on the basis of new structures – digital business ecosystems reflecting the convergence of digital technologies and processes used in business practice and in the market, leading to increased profitability and customer value. According to the authors, one of the most dynamic sectors of the digital economy is digital financial services, which are an integral part of most digital business ecosystems.

Digital financial services brought to the market by FinTech companies and banks, interacting with each other and with many other digital services, create complex digital products that carry higher value for end users than traditional products. In order to participate in digital business ecosystems, financial industry enterprises establish digital ecosystem strategies. An analysis of scientific publications shows that the issue of modelling digital financial services taking into account the characteristics of digital business ecosystems is underdeveloped, and this leads to the adoption of ineffective ecosystem strategies in the financial industry.

The purpose of the study is to develop an ecosystem strategy approach to digital financial services that takes into account the peculiarities of digital business ecosystems. The research methodology includes as follows: a review of existing approaches to modelling digital business ecosystems, identification of specific features of digital transformation of financial services that need to be taken into account when developing ecosystem strategies, development of a conceptual model for digital financial services, justification of the approach to forming ecosystem strategies for digital financial services.

The solution proposed by the authors is based on a conceptual framework of developing ecosystem strategies for digital financial services. When building ecosystem strategies, we use the role model of participants in the digital business ecosystem and the conceptual model of the digital financial service, which reflects its principal structure, as well as the basic logic of its functioning. In developing the conceptual framework, the following features of digital transformation of financial services have been taken into account: changing the value proposition to include values into the network, developing innovative mobility, building value-oriented staff competencies and using digital trust.

The implementation of the proposed approach allows financial industry enterprises to make effective decisions on the formation of ecosystem strategies for digital financial services. The approach proposed by the authors is currently being tested in one of the largest brokerage companies in Russia, which is currently undertaking a digital transformation process.

1 Introduction

In 2001, Paul Adler published an article entitled "Market, Hierarchy, and Trust: The Knowledge Economy and the Future of Capitalism", in which he predicted changes in the basic principles of the economy by moving to-wards a networked form of community / trust-based organisation that best provides incentives for knowledge generation and dissemination, leading to faster innovation [1]. Without going into the details of the heated discussion in the scientific community that this article caused, we note that currently the trend of transition to net-work organizational forms is confirmed by the rapid development of digital business ecosystems, which cause the emergence of a huge number of business innovations in various sectors of the economy.

A Digital Business Ecosystem (DBE) is a concept that combines a notion of a business ecosystem, introduced by D. Moore, and a notion of a digital ecosystem, which reflects the technical infrastructure that connects computers and digital devices via Internet channels. This concept allows us to model the evolutionary and self-organizing behavior of economic entities in a distributed digital environment.

The expansion of the scale and diversity of the DBEs is one of the most important manifestations of the ever-growing digital economy. Currently, all private individuals, consumers, businesses, and organizations that have access to the Internet interact in one way or another with a variety of DBEs. At the same time, new opportunities for creating and developing businesses in various sectors of the economy are constantly emerging [2]. However, this requires entrepreneurs to be able to build their business strategies in the DBEs considering the network (non-hierarchical) nature of the relationship.

One of the most dynamic sectors of the digital economy is digital financial services (DFS), which are an integral part of most digital business ecosystems. DFS brought to the market by FinTech enterprises and banks, interacting with each other and with many other digital services, generate complex digital products that carry higher value for end users than traditional products. For their realization of digital products, enterprises from the financial industry develop their ecosystem strategies (ES).

A significant number of scientific publications are devoted to the formation of strategies for enterprises' participation in the DBEs [3, 4, and 5]. Researchers offer different approaches for compiling ES and focus on the need for DBE modelling, but the proposed modelling approaches have often a generalized expression and do not take into account industry specifics. In particular, the issue of modelling DFS that

take into account the features of DBEs is underdeveloped, which leads to the adoption of ineffective ES by financial institutions.

Therefore, there is a need for research into approaches to modeling DBEs for financial sector companies, which would allow them to develop ES, and that in our opinion implies solving the following research problems:

An insufficient research into approaches to modelling digital business ecosystems, which makes it difficult to determine the specifics of digital transformation of DFS;

A lack of knowledge about the features of digital transformation of financial services (FS), which makes it difficult to design a conceptual model of DFS;

Missing conceptual models for DFS, which make it difficult to develop an approach to forming ES for DFS;

A lack of development of approaches to the formation of ES for DFS, which leads to inefficient decisions by financial enterprises.

The purpose of the study is to develop an ES approach to DFS that takes into account the peculiarities of digital business ecosystems. The research methodology includes as follows: a review of existing approaches to modelling digital business ecosystems, identification of specific features of digital transformation of FS that need to be taken into account when developing ES, development of a conceptual model for DFS, justification of the approach to ecosystem strategies' development for DFS.

2   Review of Existing Approaches to Modeling Digital Business Ecosystems

Application of an ecosystem approach to modelling economic phenomena was proposed by James Moore in 1993, who defined a business ecosystem as an economic community of cooperating organisations consisting of producers, suppliers, customers and other stakeholders who interact with each other to produce products of value to consumers [6]. At the same time, due to the development of the Internet and digital technologies, the concept of a digital ecosystem has been formed, which, in essence, represents the IT infrastructure for interaction between entities in the digital environment, including for business operations.

In 2002, a discussion paper written by a research group engaged in the introduction of information and communication technologies into the activities of European small and medium-sized enterprises conceived the concept of the DBE, reflecting "a co-evolution between the business ecosystem and its partial digital representation – the digital ecosystem". In 2007, this concept was theoretically justified [7]. Under this theory, DBEs are decentralised systems with self-development properties that can be described in terms of autopoietic systems. Such systems are structurally defined, meaning that the behavior of these systems depends on their structure, similar to the organization of the Internet, when the structure determines how the system is developed and managed. Therefore, one of the key principles of DBE functioning is indirect regulation of its functional capabilities, which can determine some types of its behavior and prevents others. Also, the principles of functioning of the DBEs include as follows: missing single point of failure or control; independence from any individ-

ual entity or level of authority; opportunity of equal access for everybody; ability to constantly develop, differentiate and self-organize; scalability and reliability; activation and support of self-developing production and technological networks.

A special feature of the DBEs is the absence of one-sided hierarchical control, as well as the existence of suppliers of complementary products or services that are not contractually linked but have significant interdependencies. At the same time, researchers recognize that some degree of coordination have been carried out in ecosystems by establishing basic requirements, standards, and interfaces that allow achieving system-level goals defined by the "architect" of the DBEs [8]. As a rule, the role of "architect" is being performed by the platform owner.

Modularity and complementarity are specific features of the DBE architecture that allow coordination without hierarchical control. Modularity is a decomposition of a product into several independent subsystems that interact through clearly designed interfaces. Complementarity is determined by the presence of complementors, which provide complementary components for building complex innovative products with high customer value [8].

It is the modularity that allows a number of different organisations to coordinate activities without control from above, and it creates conditions for an ecosystem, and also is a necessary but not sufficient prerequisite for its existence. Sufficiency is determined by the presence of complementors which can, through interaction on the basis of complementarity, form and monetize innovations that carry high value for all participants in the DBEs. There are two types of complementarities: a unique one, when complementors have unique complementary product elements that cannot exist separately, and a supermodular one, where concerted joint investments by different actors generate greater returns than in case of a separate use [8].

The issues of coordinating the interaction of partners within the DBEs are key checkpoints in the process of its design. R. Adner identifies two approaches to DBE modeling: an ecosystem membership-based one and a structural one [3]. The first approach focuses on breaking down the boundaries between industries and developing interaction based on symbiotic relationships in the DBEs, which creates new business opportunities. At the same time, the research focus designed to the number of participants in the ecosystem and the density of the network, as well as to the roles of actors, their relationship with the focal enterprise and its increasing impact. However, this approach is difficult to separate from the approaches developed in research on networks and multilateral markets.

The structural approach developed by R. Adner focuses on the creation of a value proposition and the relationship between partners in the process of its implementation. This approach has a strategic focus on building a complex product based on the interaction of a number of complementors, in which the coordinating organization does not have control over the participants and their actions. When building a value proposition, four main elements can be defined: the actions of participants to create a value proposition, the actors who perform these actions, the positions of participants that determine their functions in the value proposition, and the relationships between participants in the process of its implementation.

Most DBE modelling frameworks, such as BEAM, BOAT, and VISOR, focus on the focal enterprise, treating it as a platform. However, there are a number of studies that are based on a structural approach.

In the method of building for complex products in a strictly decentralized ecosystem based on the structural approach developed by M. Radonjic-Simic and D. Pfisterer, the following ecosystem modeling process is proposed: analysis of network business scenarios, definition of goals and requirements, description of the four above-mentioned elements of the DBEs, and creating of architectural drawings. The IT architecture is based on the use of a peer-to-peer network and applications [9].

In the DBE TEAM architecture framework, which also uses a structural approach, great importance is attached to the coordination of ecosystem participants. The framework contains nine groups of questions in the "architecture" domain and three groups of questions in the "coordination" domain, the answers to which allow you to create an overview of the architecture. The need for such a design is explained by the fact that there is no hierarchical control in the DBEs and coordination mechanisms play an important role, which must be clearly defined in the process of forming a value proposition. Groups of questions are placed on three architectural layers: strategic, tactical, and technological [10]. This allows for an alignment between business and IT aspects. Meanwhile, widely used corporate architecture methodologies, such as TOGAF, which consider architecture from the perspective of a focal point enterprise, are not suitable for DBE modelling which does not have a central coordinator.

The architectural approach to the DBEs allows you to develop robust strategies for participation in the ecosystem. In seeking an ES, two types of competition should be distinguished: internal competition for positions, positions and roles to distribute the value within the ecosystem, and external competition with other DBEs to capture value. The main difference between the enterprise strategy and the ES is that the first one is aimed at finding a competitive advantage, and the second one is aimed at finding reconcilement [3]. Therefore, the key issue in developing an ES is the way the ecosystem "architect" uses to array partners. The ability of a firm to play the role of "architect" is determined by its ability to bring partners to the positions and roles provided for in the ES.

In the process of forming a strategy, it should be taken into account that all complementors have their own interests and ES, as well as an understanding of the structure of the DBEs and its risks [3]. Therefore, an important point in defining an ES is to ensure the competitiveness of all partners. One of the methods for determining the consistency of ecosystem members in relation to the distribution of value is e3value, which makes it possible to construct a model of distribution of value in graphical and numerical form and to conduct experimental research on it in order to find steady states [10].

A starting point for developing an ES is to choose the role that the company plans to play in the ecosystem. The role of an "architect" or "orchestrator" means that there are opportunities to coordinate partners within the ecosystem and to build competitive products in the target market. The complementor's role is a local one and requires unique capabilities that allow interaction within the ecosystem when building com-

bined products. Both roles involve having a specific potential to operate in certain product markets, which should be taken into account when building an ES.

A development of an ES should also take into account the specific features of different industries, geographical areas and markets, i.e. the context in which the DBEs are immersed.

3 Features of the Transformation of Financial Services in the Digital Economy

Financial services are understood as mechanisms for performing operations with financial resources in the interests of clients, provided for by law, aimed at supporting business operations, saving the real value of assets and extracting benefits. Such transactions may include money transfers, lending, insurance, capital and pension management, securities trading, etc. These operations are usually performed by commercial banks, investment companies, and other businesses operating in the financial markets. Historically, since the birth of modern banking in medieval Italy, it had focused on supporting commercial transactions through the use of ever-evolving financial instruments and has provided a level of confidence in the process of exchanging values. With the ad-vent of the digital economy and the emergence of technologies that enable digital trust to be maintained through blockchain technology and smart contracts, the basic value proposition of banks – "implicit trust" - has been replaced by "technically expressed trust", which has raised the question not only of the changing role of financial intermediaries, but also of the need for their existence [11].

As a result of the global financial crisis of 2008, when the extreme riskiness of the traditional banking business model, which allows transferring the main risks to taxpayers and depositors, was realized, the new FinTech financial industry began to be intensively formed, which was aimed at introducing innovations and reducing risks. Enterprises in this industry that operate in financial markets, using new business models based on digital technologies, began to provide serious competition to traditional participants, forcing them to transform. At the same time, the value proposition of traditional banks, based on stability, reliability and security, in modern conditions, when technologies provide trust and reduce the need for intermediaries, and enterprises are constantly looking for ways to introduce innovations, has become hopelessly out-dated.

It should be noted that in the conditions of digital transformation, the main objectives of FS aimed at supporting commercial transactions remain the same; however, there are significant changes in business models and business processes, which can be seen by comparing the organization of FinTech companies and traditional participants in financial markets [12]. The main difference between FinTech's value proposition and that of traditional banks is that new financial market players are using digital technology to implement innovations that bring higher value to the end customer in the supply chain, while commercial banks are trying to apply technology to improve existing business processes in order to defend existing market positions.

The disintermediation process brought about by the capabilities of Internet technologies means that participation in the supply chain depends on accurately determining the contribution to value. Therefore, financial intermediaries who do not study the supply chain and cannot provide evidence that they can add value to the customer will be pushed out. At the same time, the increase in value involves not only delivering services with lower costs, but also increasing the quality, speed, availability, as well as improving any other factor that will be valuable from the customer's point of view [11].

Building a value proposition that focuses on innovations that add value to the customer involves building a customer-oriented organization. Companies operating in the FS market can be divided into three groups by type of organization: value chain, value shop, and value network [11]. The first type of organization has a hierarchical structure and is focused on effective product management, the second type has a matrix structure and is aimed at realizing capabilities by combining resources, and the third type has a network structure and is aimed at providing additional value to the client. Traditional participants in financial markets are usually organized in the form of a chain of values and are structured hierarchically. In order to become a truly customer-oriented company, they shall reorganise themselves to participate in the value network, which is a complex task that requires a development of value-oriented competencies, an application of effective digital strategies for participation in the DBEs, and a creation of innovative mobility.

Innovative mobility [11], which FinTech companies are striving for, due to the availability of rapid deployment competencies, the use of IT infrastructure capabilities to connect to finished products and the construction of technologies for mass customisation, enables them to operate within the DBE, where the value proposition is based on the efficient distribution of resources among the network nodes in order to implement processes and opportunities. The main asset for participation in the DBEs is the relationship between the parties, and the criterion for participation is efforts aimed at increasing trust between participants and constantly reducing costs. To meet these criteria, staff must have knowledge of all business operations in the product supply chain in which they act as intermediaries for the exchange of values.

These features of the digital transformation of FS, related to the necessity of reorganizing and changing the value proposition to include value in the network, the development of innovative mobility, the formation of value-oriented competencies of personnel and the use of digital trust, should be taken into account when building ES.

4 Conceptual Model of a Digital Financial Service

M. Skilton defined a digital enterprise [13] as a legally based organization that allows using information technologies to generate economic and social values in the DBEs, considering the interests of all its participants. Following this, the Digital Financial Service shall be understood to be a service provided by a financial institution in a DBE that ensures an exchange of economic and social values generated by its participants.

In order to develop strategies for including FS in the DBEs, financial organizations need to have a conceptual tool to determine which elements of the DFS business model and architecture should be changed. According to the authors, such a tool can be a conceptual model of the DFS, reflecting its principal structure, as well as the basic logic of functioning within the DBEs. The basic methodological approaches to building such a model are the concept of digital transformation of business models and design methods for digital enterprises. A conceptual model shall also take into consideration the specific features of the digital transformation of FS, which are to be determined by the requirement to ensure trust, as well as by the development of innovative mobility and value-oriented competencies.

The features of doing business in the DBEs associated with a high rate of change determine the requirements for the structure of the digital business model, which should allow you to adapt the business model to market dynamics. According to the VISOR framework [14], the main components of the digital business model for dynamic DBEs are as follows: value proposition, service platform, interface, revenue model, and organizational model. As for FS, this model should also have a trust component [15]. These components are essential for understanding the DFS concept.

The architecture of a DFS, similar to that of a digital enterprise, is a combination of the architecture of a financial organization and the DBE architecture. The architecture of a financial organization, which includes the business architecture and IT architecture, can be represented as a set of layers, such as the business role, application, application platform, and communication infrastructure. The DBE architecture, in turn, contains a description of 4 clusters: social, process, digital, and technological [13].

The listed components of the digital business model and the DFS architecture are reflected in the DFS conceptual model, which is shown in Figure 1.
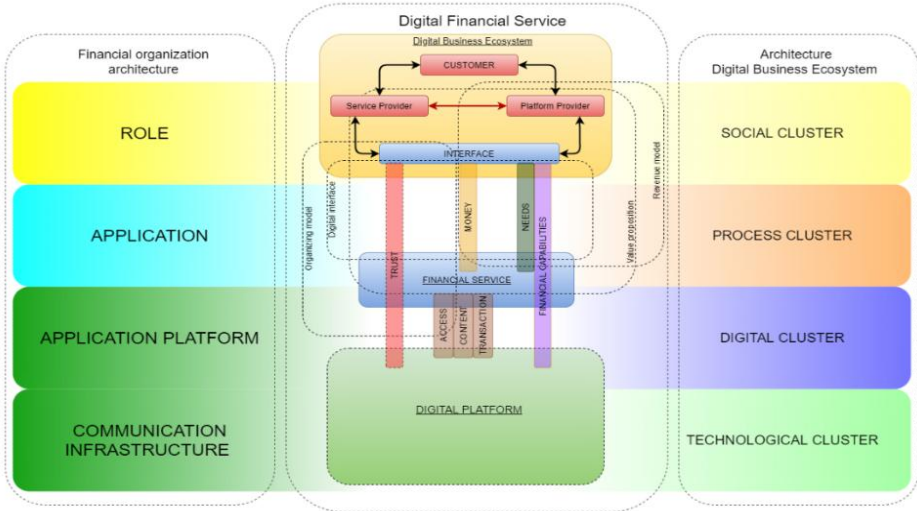

Fig. 1. Conceptual model of a digital financial service

The central part of the conceptual model shows a FS using a digital platform that connects to the DBE via a digital interface. Software applications of the FS that allow us to realize financial opportunities ensure that operations for the exchange of values in the DBE can be performed in accordance with the needs of its participants. The interaction of the FS and the DBE through the interface implies embedding both in the chain of distribution of values in the ecosystem and in the process of generating confidence in the service. Trust for ecosystem interaction can be considered a fundamental factor that plays an important role in the communication of DBE participants.

Dashed lines on the DFS model reflect the key concepts of the digital business model listed above.

The DFS model is presented in the context of the enterprise's architectural layers in accordance with the technical regulations of The Open Group's "Open Platform 3.0". These layers are reflected in the left part of the conceptual model. The right part of the conceptual model reflects the architectural layers of the DBEs in the form of 4 clusters, justified in research made by M. Skilton [13].

The proposed conceptual model, which takes into account the features of the digital transformation of financial organizations, allows us to develop an approach to the formation of ecosystem DFS strategies.

5 A Framework of Developing Ecosystem Strategies for Digital Financial Services

The development of an ES should enable the implementation of a number of key business functions of the DFS:

1. Forecasting the needs of actors in financial transactions, regardless of the organizational and legal form of ecosystem participants. This have to be achieved by implementing predictive models that use available advanced technologies such as Big-Data, blockchain, and customer experience analysis from various sources.

2. Facilitation of value exchange processes between ecosystem participants, through the formation of effective communications in order to find and embed the most suitable participant in the value chain to ensure secure transaction processing. This allows us to provide and form the most profitable value chains.

3. Maintaining trust between all DBE participants to ensure transaction security and risk control. This can be implemented by technologies of technically expressed trust.

A framework involving two steps in developing a strategy can serve as a tool for building ES for DFS: choosing a target role in the DBEs and identifying key elements that require changes to achieve the selected role.

To select the target ecosystem role, it is proposed to use an organizational model of roles in the business ecosystem proposed by P. Weill and S. Woerner [16]. Figure 2 illustrates possible ES related to the transition to a particular role in DBEs.
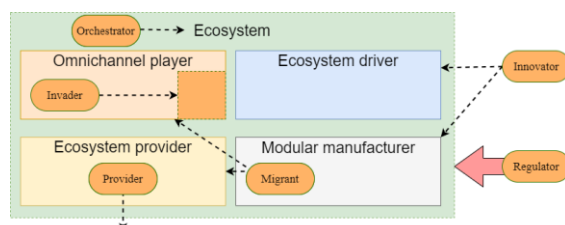
These strategies are described in table 1.

Fig. 2. Conceptual framework of roles for defining the DFS strategy through the ecosystem

Table 1. Table captions should be placed above the tables.

№	A brief description of the strategy	Role name in DBEs	Key transformable the elements DFS
1	Creating a platform or ecosystem to manage or integrate into the value chain	Orchestrator	Interface, Platform
2	Creating a project, solution, or product within an ecosystem, for the purpose of transferring or selling it, and then acting as a technology supplier	Provider	Technology cluster, Communication infrastructure
3	Role reversal strategy within the ecosystem	Migrant	Organizing model, Role
4	Increasing the sphere of influence within the ecosystem	Invader	Value proposition, Process cluster
5	Entering an ecosystem with new technology, ideas or capital	Innovator	Revenue model, Application platform
6	Developing norms, lobbying interests or the promotion of technologies capable of influence technology	Regulator	Organizing model, Revenue model, Social cluster

Forming a transition strategy for a role in a DBE involves the mandatory review of the role-specific elements of the DFS business model and architecture, which in turn leads to a development of solutions for the review of competencies in the DBE value chain. To develop a strategy, it is necessary to use the DFS conceptual model, which allows you to identify the key areas where the most significant changes occur during the implementation of a particular strategy. The table shows an example of the DFS key elements that must be transformed to implement various strategies in the DBEs.

The proposed framework for building ES, based on the use of the framework of organizational roles in the DBEs and the conceptual model of the DFS, allows financial enterprises to make effective decisions on the formation of DFS ecosystem strategies.

6   Summary

In the course of the study, the authors have found: 1) A development of the DFS ecosystem strategy, which im-plies a transition to the selected role in the DBE, should take into account the specific features of digital transformation of financial institutions; 2) specific features of the digital transformation of the DFS include: changes in the value proposition for inclusion in the network of values, development of innova-

tive mobility, formation of value-oriented competencies of personnel and use of digital trust; 3) the DFS conceptual model proposed by the authors, which takes into account the features of the digital transformation of financial organizations, allows us to develop an approach to the formation of ecosystem DFS strategies. Based on this, the authors have developed a framework that allows enterprises and organizations in the financial sector to make effective decisions on the formation of DFS ecosystem strategies. The conceptual framework proposed by the authors is being test-ed at an enterprise in financial sphere.

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