Digital ecosystems as a form of modern business transformation

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Abstract. The article is devoted to transformation of business models of digital organizations into ecosystems, forms and features of such ecosystems, technological needs vs capabilities of SAP solutions. The article was prepared for the Project No. 2 under the donation agreement No. 1154 dated March 01, 2019.

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1 Platform economy

The vast developments in information technology (IT) have radically shifted the role IT plays in organizational changes from supportive and restructuring function to the main transformation driver where digitalization becomes the way company operates, attracts new clients, deals with risk and opportunities of growing markets and even creates a completely new niches. The current level of influence digital technologies has on business allows us to talk about creation of the company of a new kind – the digital organization. Digitalization of economy is particularly well-reflected in products and services which are linked to a daily life and convenience of people, cyber-physical systems which have an integral interaction between the virtual and real parts of the world [1].

Digital technology breakthroughs not only increase business complexity but as well offer new opportunities. One of the first reactions to such opportunities was formation of the Platform economy. The Platform economy refers to business models based on IT platforms as its core element. Typically, the concept of such platforms is associated with online matchmakers or technology frameworks including commercial transactions e.g. Alibaba, Amazon, Uber, Airbnb, Baidu etc. Platforms provide the ability to apply customized solutions and related services, advertising and etc. without the need of independent development of own IT solutions (known as "in-house" IT development) or acquisition of relevant patents [2]. The rise of platforms has been analyzed by numerous experts and the most named factors which led to it are the following:

- the competition itself;
- high share of technology in the cost of goods;

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- emerging technological opportunity to extract network effect from the interaction of product manufacturers and their consumers;
- development of appropriate infrastructure for all these phenomena.

The Platform economy suggests in every case of its implementation four type of participants:

- platform owners (intellectual property management system);
- platform providers (communication between platform owners and users);
- manufacturers (sellers) of products and services;
- consumers of products/services.

The key task of platforms is to serve as a basis for direct interaction between participants.

The transition to the platform economy meant several fundamental changes in the way business operates:

- transition from resource control to resource coordination;
- shift from internal optimization to interaction with external parties;
- transformation from consumer value to the value of networking;
- reorientation of information technologies and business systems from organizational management to social networks and consumers communities.

The core of the platform economy business is interaction - mutually beneficial exchange between producers and consumers. Therefore, the main task of platform owners is the formation of platform architecture and establishment of rules for its use [3]. The value of platforms increases with the growth of the number of its users. Conventionally, platforms can be classified and divided into the following groups [4]:

- exchange trading (eBay, AirBnB);
- transaction platforms (PayPal, Apple Pay);
- media platforms (YouTube);
- software or hardware standardization platforms (Xbox, iOS);
- industry platforms: tourism (Tripadvisor), trade (AliExpress), finance (PayPal), human resources (LinkedIn), etc.

Another way of classifying platforms is related to functional and technological components:

- information system (back office-ERP);
- portal and client applications (client experience);
- data and analytics (data warehouses);
- the Internet of Things (connected physical devices), etc.

Analysis of the platform economy development allows to note the rapid growth of companies that have created different kind of platforms, a sharp increase in sales, formation of additional ways to create added value and other economic effects. Such companies have, at their core, become digital companies, with digital platforms, digi-

tal processes, digital sales and service channels, with a specific corporate culture that supports the use of analytics, flexible adaptation and constant organizational change.

It is possible to trace the further transformation of the platform economy in terms of platforms themselves [4]:

- simplification of joining platforms;
- an increased difficulty of creating a new unique platform using the existing "successful" platform as a benchmark;
- rapid and unlimited growth of activity of platform companies, the constant emergence of new customers;
- platforms availability seven days a week and 24 hours a day;
- advance of security systems due to growing need of reliability and trust from customers;
- increasing trend towards openness of companies. Platform companies must loosen their grip on some of their company values because of the need to keep models open to interaction.

On the other hand, platform competition has led to several specific features of the platform economy [4]:

- dependence of the competitiveness of a platform on the activity of its participants. The more users, the more active they are and the better product they offer, the more competitive the platform is;
- development of platform services - offering content and software;
- facilitation of interaction between members of the platform. Ease of registration, clear interfaces, ease of downloading content, simplification of the process of joining the network, search for partners, exchange of information.

2 The Economics of ecosystems

The further development of IT as a digital transformation factor has led to another breakthrough - transition from the platform economy (platform as a business model) to the ecosystem economy (digital ecosystem as a business model). The ecosystem economy framework creates possibilities for a global interaction and integration of businesses, sharing of knowledge and resources, crowdsourcing and much more.

The reasons for this phenomenon are linked, on the one hand, to the ability of IT to provide new business opportunities in terms of new formats of business interaction, data analysis, and availability of IT for an average business at a reasonable price.

On the other hand, the transition of the platform economy into the economy of ecosystems ensured meeting the needs of market participants in the rapid and with minimal effort access to quality products and services. The fact is that the business environment is becoming more complicated, and the nature of competition itself is changing. This requires the formation of new companies properties: ensuring viability not on the basis of short-term efficiency, but on the use of synergies from the interaction of market players through use of convenient digital channels, provision of personal

data to provide targeted and customized products and services, in other words - decision-making based on data analysis.

There are different definitions of the digital ecosystem that overlap or complement each other in some way.

First, as the successor of the platform economy, the digital ecosystem can be considered as a platform for a wide range of goods and services for customers of a certain profile. In fact, digital ecosystems can be portrayed as a technological development of platforms of a certain kind.

Another form of digital ecosystem brings together participants in the labor division process within a value chain and their customers. Let's consider the value-added community in which there is a brand-company that generates the concept/idea of a product or a service, then the ecosystem is an interface for integration of participants in the chain "idea generator – manufacturer – supplier – consumer". Within such a digital ecosystem, cooperation, exchange of services, sharing of the results and processes support are provided.

Another successful example of digital ecosystems are companies that used the initial platform they have created as a prototype for further business development. So, they have used their business solution for generating number of new platforms providing other services e.g. Yandex which has developed Yandex Taxi, Yandex Drive, Yandex Market, marketplace "Beru" etc.

The changes that have occurred with the advent of digital ecosystems have dramatically impacted all market stakeholders and participants.

Customers have become a part of the digital ecosystem that meets the full range of their needs (goods, services, information, interaction) within a single platform. One of the new possibilities for them is the synergistic effect of the simultaneous use of several products and services. In fact, these are dynamic structures with the possibility of simple and convenient direct communication and feedback, with high-quality content and high loyalty.

Suppliers received new sales channels and increased sales volume, as well as a new key asset – data for analyzing and understanding their potential and existing customers.

The digital ecosystem organizers have become the owners of many loyal customers, guaranteed income and a huge customer base with a potential they could not imagined before. The most essential part of these processes, the core of a digital ecosystem, is the organization of work with data. In such systems, data is generated constantly. Data work consists not only of collecting data, but also of procedures for exchanging, cleaning, converting and analyzing data. The purpose of using data: personalized offers, integrated marketing, customized sales, and other ways to increase sales to existing customers, increase their loyalty and of course attract new clients.

3 Establishment of the ecosystem economy

To create a digital ecosystem a company must have a certain number of competencies as well as an appropriate technological solution or an ability to develop it. Reeves,

Levin and Ueda [5] describes six rules for the natural complex adaptive systems viability that can be applied to companies that are forming digital ecosystems. According to the article such companies must:

- maintain diversity in three areas: people, ideas and areas of activity. Which means to critically assess capabilities, predict and control; to understand what can be done in cooperation with other companies, and what is beyond control; to manage what they own, and evaluate external changes; to create conditions for independence and initiative of employees and business units; to promote diversity;
- strengthen the modular structure (the more flexibility in the system, the more reliable it is);
- promote redundancy of system components (as opposed to ideas of lean-business and efficiency, maintain redundancy of the system for its sustainability);
- manage an adequate level of certainty and be prepared for risk;
- respond to changes and adapt;
- cultivate trust and reciprocity.

The company-creator must understand the needs and requirements of the target customers, be known and attractive on the market, have sufficient technological and human resources and competencies, demonstrate readiness for innovation, openness, the ability to adapt to the changing business environment.

In terms of technology, the company-creator should have a flexible and scalable IT infrastructure that provides interaction with partners and customers through an open API (application programming interface) and internal integration of systems and services.

The classic prototype solution for the formation of the digital ecosystem is the extended SAP Leonardo platform [6], which combines technological and digital core of S/4 HANA with the capabilities of machine learning technologies, the Internet of things, Big Data analytics, blockchain and etc., resulting in a single analytical platform.

To name a few of successful companies that have formed digital ecosystems an example of Sberbank, Alibaba Group, Yandex, Tinkoff Bank can be considered and the list goes on.

Sberbank is transforming from the model of a "classical bank" into a universal digital company that aggregates producers and consumers. Alibaba Group offers banking, insurance and clearing services. Yandex has formed a platform for services development and successfully generates more and more new platform businesses. Tinkoff Bank has formed and is developing an ecosystem for medium-sized businesses.

There are numerous examples of closed ecosystems as well. Decentralized autonomous organizations are a kind of closed-type digital ecosystems based on blockchain technology. These companies do not exist physically, are virtually located on computers, but operate and create products, have employees and shareholders, receive income. They are self-governing closed decentralized platforms for the deployment of profitable business with low overhead without counterparty risks and the cost of constant purchase/sale of fiat currency, with a small commission, instant confirmations

and stable operation in a secure digital environment. "BitShares" perfectly illustrates such a company [7]. In fact, it is a set of tools to help third-party companies better serve customers, with their own currency, special miners and decision-making procedures.

4 Conclusion

Today's development of digital transformation processes is manifested in a variety of areas of economic activity. Digitalization is transforming the forms and the ways of doing business. This process itself has a certain dynamic. The first stage was the transition from a classical business company to a digital business company. Then the formation of the platform economy based on digital business companies. Now economic life is undergoing further changes. One of the main examples of that change is the metamorphosis of the platform economy into the ecosystem economy. This transition is driven both by the new capabilities of IT used not only for internal integration, but primarily for the formation and support of external networks of communities, and the needs of business in sustainable development and its ability to form the rules and infrastructure for the digital ecosystem platform.

At least three separate types of ecosystems have evolved: the ecosystem as a platform for trade and service delivery, the ecosystem as an association of value chain participants (a value-added community), and the ecosystem as a self-developing organization.

There are successful examples of the formation and use of digital ecosystems in the market. Within the ecosystem economy, there are typical public infrastructure solutions for ecosystems establishment – for example, SAP Leonardo. As well there is a certain mass of private solutions – companies building ecosystems based on architecture of own "in-house" IT frameworks and platforms.

Another possible classification of ecosystem solution is related to their conditional openness or closeness. Most of the known functioning ecosystems can be defined as the open type. In fact, this concept continues to develop the ideas of value-added communities and meta-markets. However, there are also closed ecosystems, for example, decentralized autonomous organizations that form their ecosystem in a completely closed space.

Today there are all the necessary and sufficient conditions for successful development of the ecosystem economy. Ultimately, further IT development, new technological breakthroughs will lead to digital transformation of new industries. Highly likely we can expect formation of digital ecosystems in most areas of business and even in non-profit sector and public services.

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