Digital transformation as a driver for business ecosystem development

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Abstract. The business ecosystem today is a strategic priority for big business in various industry markets. The empirical experience of this business model from the point of view of history is small, but it is of great scientific and practical interest, since such experience is objective today and promising in terms of the future digital transformation of the economy. The purpose of this work is to study the theory and practice of the formation of business ecosystems in their diversity and evolution, as well as to assess the prospects for further development of this business model in the context of digitalization and the introduction of artificial intelligence into cognitive business processes (taking into account not only economic, but also natural scientific laws of development). The results obtained made it possible to formulate the genetic features of future business ecosystems and the transformation of their participants into the format of a quasi-living organization.

Keywords: business ecosystem, digital transformation, artificial intelligence, quasi-living organization

1 Introduction

Digital transformation penetrates into all spheres of life of economic agents. Under its influence, objective and parallel realities coexist: decentralized finance (DeFi), built on the basis of blockchain networks, and FinNet space, a decentralized virtual financial system that exists in parallel with centralized finance. Under these conditions, business is being modified – start-ups, unicorn companies, BigTech digital giants, metacorporations, quasi-living organizations appear. Modern business is characterized by gigantic volumes of information for making managerial decisions (including unstructured data – Big Data), which necessitate the use of an algorithmic apparatus along with new technologies for data storage, extraction, analytical processing, and forecasting. Alternative business financing tools are emerging, including hybrid, P2P lending, and crowd technologies. A new systemic quality is being formed in corporate assets – digital financial assets. A special place in the digital transformation of business is given to artificial intelligence (AI), which over the past

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decades has evolved from a descriptive function to analytical, predictive and prescriptive. As AI develops, algorithmic trading of various assets is being formed, which, in fact, leads to the exclusion of human cognition from the process of making managerial decisions.

Digitalization, including AI, not only creates new opportunities, but also generates extremely significant risks. In solving certain specific problems, AI has already surpassed human capabilities, for example, in complex calculations. This poses a threat of AI dominance over its human creator in the near future.

Digital transformation in general and AI in particular form a new systemic quality in business – the collaboration of diverse businesses on a single platform within the business ecosystem. The very concept of a business ecosystem appeared in the last decade of the 20th century. Today, in the broad sense of the word, this is understood as a localized business environment with all infrastructure formations, the participants of which operate and interact with each other in a common “value chain”; in the narrow sense of the word, a business ecosystem is a platform-oriented business model that develops not only according to economic laws, but also taking into account natural science laws of dialectics.

2 Materials and methods

The purpose of this paper is to study the theory and empirical experience of the formation of business ecosystems in all their diversity and assess the prospects for their further evolution. To achieve this goal, the following tasks have been set:

- to review the concept of the business ecosystem in dynamics and evaluate its viability in the light of systemic trends in society;
- to study the empirical experience of the formation and evolution of business ecosystems and their modern archetypes;
- to evaluate the impact of digital transformation on the modification of the modern business ecosystem and formulate the prospects for its development, taking into account the laws of natural science;
- to show the place and role of AI in the development of the business ecosystem and the transition of its participants to the format of a quasi-living organization.

In the course of the study, primary and secondary data were analyzed – academic literature and best practices, i.e. operating ecosystems in their evolution, enabling to synthesize theoretical and empirical materials. The conducted research is based on general and special methods of scientific knowledge: a systematic approach, methods of grouping, classification, event-analysis (event window method), comparative analysis (comparatistics). An attempt to look into the future of business ecosystems, in fact, means the application of the Gray-box model and is based on the correlation of natural science and economic laws of dialectics.

3 Results

3.1 Business ecosystem as a result of the digital transformation of the economy

The concept of “ecosystem” in terms of economics and business is used in Frosch and Gallopoulos [1], “industrial ecosystem”. By analogy with bio-ecosystems, the idea is the circulation of resources and energy, as well as money circulation.

The idea of co-evolution of natural and social systems can be seen in Rothschild’s “Bionomics. Economy as Ecosystem” [2], in it, the market economy is considered as a living and developing ecosystem.
But a business strategist Moore [3, 4] is considered the author of the concept of “business ecosystem”; he formulated its key characteristics:

- interacting organizations and individuals – the organisms of the world of entrepreneurship;
- set of participants, including direct and potential competitors; “environmental consciousness” and collaborations;
- laws of business ecosystem development and co-evolution (joint evolution) of its participants;
- stages of co-evolution (1 – foundation of the ecosystem; 2 – expansion of the ecosystem; 3 – establishment of dominance in the created ecosystem; 4 – renewal or death).

Somewhat later, the concept of business ecosystems was considered by Jackson [5], Hamel and Prahalad [6], Lee and Kim [7], Rong et al. [8] and some other authors.

The concept of a business ecosystem has not only been actively studied by scholars in the last 2-3 decades, but is also being implemented on a large scale in practice. If initially the term was addressed to companies from the field of information technology, today the concept is being implemented in many segments of the economy – e-commerce, industry, agriculture, mass media, etc. Textbook examples of the ecosystem have already been created: in IT – Microsoft, Apple, Google, Tencent, in media – Facebook (Meta), in e-commerce – Amazon, Wal-Mart, Alibaba, EBay, Taobao, in the hotel business – Airbnb, TripAdvisor, Open Table, in agriculture – John Deer, etc. In recent years, financial ecosystems have been actively formed in the global and Russian markets [9].

Archetypes of business ecosystems differ depending on the type of activity and methods of interaction between participants. By type of activity, they are differentiated into:

- production (according to the classification by the BCG consulting company – economicosystems of solutions),
- financial,
- service.

In the BCG classification, the last two archetypes are called transaction ecosystems.

Judging by empirical experience, transaction ecosystems are actively developing today, the largest digital companies are becoming their core. At the same time, the boundaries between financial and non-financial ecosystems are blurring. Thus, retailer ecosystems are developing through the purchase of small banks: Ozon (ONEY BANK, renamed OZON Bank) and Wildberries (Standard Credit Bank renamed Wildberries Bank) have their own banks, and X5 Retail Group created a partnership service with Alfa-Bank, integrating it into the ecosystem as X5 Bank [10].

BCG experts highlight the following features of the modern business ecosystem:

- modular principle (offers for consumers can be developed independently, but they function as a whole; the client chooses which options to use and how to combine them);
- customization (in an ecosystem, products must be compatible and adapted to a common platform);
- multilateral relations of participants (bilateral relations are unlikely; interaction with different participants is typical – marketplace, delivery, payment systems, application developers, etc.);
- coordination (an ecosystem is a complex mechanism, it is almost impossible to manage it “top down” and control everything from one point; coordination is carried out through the introduction of common standards, rules and processes) [11].

A study of the economic nature of modern business ecosystems in their evolution allows drawing the following conclusions:

- the concept of a business ecosystem is at the intersection of objective megatrends in society (informatization, digitalization, servicization, virtualization of society/economy), being a synthesis of several scientific areas (systems theory, synergetics, tectology) and is at
the intersection of several areas of economic knowledge (strategic management, business modeling, logistics and many others); because of this, the trend towards the formation of business ecosystems is unlikely to be among the transient ones – this is a promising direction in the development of theory and practice;

- business ecosystem today is a technological platform-oriented collaboration of various financial, near-financial and non-financial businesses, flexible and evolving in a co-evolution format, modifying not only ecosystem participants, but also the competitive environment;
- each business ecosystem is specific depending on the type of activity of the core, technology platform, geographic location, cash flows, applied measurements, and the diversity of business ecosystems is multiplied over time;
- at the same time, the cross-industrial boundaries of modern ecosystems are blurring due to the emergence of super services and open models of interaction, as well as partnerships between the state, BigTech, FinTech companies, banks, telecom operators and retailers [12].

### 3.2 Architecture of the modern business ecosystem

The scale and development potential of business ecosystems is largely determined by software and hardware solutions – the availability and quality of the platform, on the basis of which a variety of businesses are combined with a single genetic interface and identification method, seamless data transfer and movement between frontal environments. The complexity and scale of the tasks determine the fact that far not all Russian companies that have adopted an ecosystem building strategy are able to realize this potential in the short term. Most ecosystems in Russia are at the initial stage of construction. At this stage, it is proposed on the basis of the formed platform and big data storages:

- to create own subsystems and services that will be able to attract cash flows, and therefore generate a margin;
- to bring customers to use a ready-made platform based on a single interface, providing them with value-added services that reduce customer costs and generate revenue from platform sharing.

In this capacity, an ecosystem is more like an information platform, to which customers of all levels are invited. The platform partially provides homeostasis to clients who use its opportunities, taking part of their income, and limiting contacts with the outside world. At the same time, even today, part of the cognitive functionality of the largest ecosystems is implemented with the participation of AI, which satisfactorily copes with the recognition of images and situations in the streams of video and audio information, as well as with the processing of statuses from status sensors. The tasks of real-time equipment control are more or less successfully solved. There are some processes of automating cognitive functionality based on AI, but so far they use the cognitive apparatus of people who manage processes and set tasks for executive mechanisms in conditions of incomplete information [13].

### 3.3 Prospects for the evolution of the business ecosystem (from the perspective of the natural science laws of development)

In the process of development, a business ecosystem will acquire many new properties – mandatory genetic features:

- set of objects and habitats;
- circulation of substances within the system;
- closed food (resource) chains;
● species diversity and sustainability;
● self-sufficiency and ability to self-regulation.

The subsequent evolution of the business ecosystems in terms of the natural science laws of development will take place in the following directions:
1) a noticeable number of objects should appear within each group;
2) objects should be stratified by access to the resources of the environment, that is, species will appear;
3) vertical connections should be formed between groups, ensuring the exchange of resources, energy and information;
4) all this diversity must have a habitat, for example, a city, region, state [14]).

In parallel with the species diversity of business ecosystems, their transformation towards a quasi-living organization is inevitable. The most important difference between a quasi-living system and a living one is its artificial origin and the presence of a “meaning of life” or goal setting [15]. The condition for a transition to this new quality is artificial intelligence, which is already being used (albeit partially) in making managerial decisions. This suggests the emergence in the future of quasi-living systems that have cognition thanks to AI and are able to independently manage processes. The differences between living and quasi-living systems will gradually fade as technology advances.

The evolution of the business ecosystem in these directions is a relatively long process, since genetic features are not formed all at once. And the challenges posed by the systemic risks of AI, as outlined earlier, prevent the fuss of scaling artificial cognition. In the authors’ opinion, the emergence of genetic features of future business ecosystems and the transformation of the latter into quasi-living systems will mean entering the next – the seventh – technological order.

4 Discussion

Business ecosystems that emerged two to three decades ago, according to Mckinsey, will displace a significant part of traditional value chains from the market in the current decade. By 2025, ecosystems will generate more than 30% of global corporate income – over $60 trillion [16].

Any attempt to look into the future of business ecosystems is nothing more than the Gray box model – a theoretical construct with partial data. Such attempts allow one to obtain limited knowledge, in contrast to the White box model, about which everything is known. But they give an increment of knowledge in contrast to the Black box model, about which almost nothing is known.

5 Conclusion

The reality is always richer than any concepts and hypotheses. But even today it can be argued that business ecosystems will not become a fashionable and passing trend. They are largely the result of a digital transformation of society, and their future is determined by the development of AI. Using the latter to implement the cognitive functionality of business ecosystem participants will mean a transition to a new system quality – quasi-living systems (organizations), the emergence of which is possible in a business of any scale (from a small company to a metacorporation).

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