



The Digital Ecosystem as a Business Model

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Abstract

Digital ecosystems are modular type structures composed of loosely connected components that can be combined in different ways. They allow the development of a new business model, which is based on a network of business partners and organizes economic activities in a new way. The digital ecosystem brings together actors from different sectors, with different perspectives and opportunities, who share resources, experiences and ideas, and create value for the end user. The technological basis of digital ecosystems is formed by shared platforms and a set of standards, leading among which is the application programming interface (API). Based on theoretical and methodological publications, the article examines the concept of the digital ecosystem as a business model of partnerships, as well as the technologies on which it is developed.

Keywords: digital transformation; digital ecosystem; application programming interface; API; digital platform.

1. Introduction

Information and communication technologies (ICT) reveal the potential for the development of effective and efficient business partnerships, which not only support the strategic goals of the business, but also form new directions for development. Manifestations in this direction are joint platforms and digital business ecosystems, which organizations are increasingly using to create and maintain useful (often atypical) business partnerships in their efforts to address a mix of challenges.

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They are: to ensure business continuity; to respond to the dynamic demands of the market in real time; to develop products and services and to change operations and processes in an environment of financial and time constraints; to be effective; to minimize risks and counteract rapidly evolving threats; to comply with new regulations. In addition, all this in the conditions of intensified competition. The factors that stimulate the creation of digital ecosystems are economic, organizational, technological, etc. ICT, and in particular the Internet, are of particular importance, and mobile and cloud technologies have drastically changed the way we serve our customers.

Customers receive a much more integrated offer, based on the connection of individual products and services (something impossible before). Structures of modular type are created, composed of separate and loosely connected components, which can be combined in different ways.

As a result, the supply of *product-service packages* provided through a network of interdependent suppliers is growing.

The purpose of this article is to study the concept of the digital ecosystem as a business model of partnerships, as well as the technologies on the basis of which it is developed.

2. Concept of Digital Ecosystem

The term 'ecosystem' in the business context is generally used to indicate an organized partner network involving actors from different sectors. Participants use a shared set of standards and a shared platform, which are making the products and services they offer *compatible and interdependent*. This bonding between network partners creates relationships that are difficult to create and maintain in other environments[1].

For the modern customer, the *offer of variety and the possibility to choose* from products and services are crucial. However, it is very difficult or impossible for business organizations to meet *all the potential expectations* of their customers, as well as to afford the costs of relevant experiments and innovations[2].

Digital ecosystems largely provide a solution to the problem of meeting customer expectations.

In particular, expectations for: access to a network of related services of one or more industries (marketing, trade, selection of suppliers, logistics, payments, financing); this access should be through one portal (a kind of "one-stop shop" solution); covering "all the needs" of the clients in the defined area; etc.

The most successful modern representatives of this business model are Amazon, Aliexpress, Facebook, Google and others.

As a new business model, digital ecosystems organize economic activities in a new way, based on *a network of business partners*. According to some researchers, the potential of the supply chain is gradually depleted and replaced by the model of the digital ecosystem. Supply chain partners become freelancers who work closely together to create mutual.

In the documents of the World Economic Forum from 2019, the digital ecosystem is considered as „*consist of interacting organizations that are digitally connected and enabled by modularity, and are not managed by hierarchical authority (like in a supply chain)*“[3].

Another feature of this business model is that the participants voluntarily give up any control over certain resources in the name of the joint activity of the partners in the decentralized network.

Instead of relying on the buyer to integrate goods and services himself, or to buy them in a package from one source, digital business ecosystems provide end customers with the desired choice. The customer chooses from a "menu", which in turn is provided and managed by a participant in the ecosystem[4].

The digital ecosystem can bring together many and diverse actors with different perspectives and opportunities, who share resources, experiences and ideas, and create value (directly or indirectly) and/or satisfaction for the end user. In practice, all participants *jointly* achieve *value for all*, thus they are interdependent. At the heart of the digital ecosystem are the application programming interfaces (APIs) – „*the means of exchanging data, functionality, and value across the digital ecosystem in the modern economy*“, provides the interaction between the different application systems and „*enable developers to modularly recombine data and functionality for new uses*“.

Building a digital ecosystem can pursue a variety of goals. It can be built only by *internal participants* and be used within the organization. This is in order to carry out operational activities, automate processes, increase productivity, etc. When the digital ecosystem involves *external actors* – other organizations and individuals such as suppliers, developers, customers, partners, regulators and even competitors, complex networks are formed. They resemble „*the complex interconnections of natural ecosystems: they are designed to be adaptable, sustainable and mutually beneficial for all participating countries*“. Modern organizations can build and participate in internal (own), public, partner and industrial digital ecosystems and through them benefit from the commitment of all participants and their joint efforts, to achieve their own strategic goals, as well as for the realization of innovations[5].

The strategy of business organizations to deploy a specific ecosystem must be considered in accordance with two things:

- The role that the company will play in the ecosystem. Practice shows that a company usually plays multiple roles in overlapping digital ecosystems.
- The specific local operational needs and characteristics, as it depends on many factors such as: geographical location, competition and regulations. The diversity in the meanings of the factors also determines the existence of many ecosystems.

The *typical roles* of an organization in the ecosystem are: *orchestrator, modular producer and consumer*. Orchestrators are organizations that connect individual partners and create shared value for participants. It is they who provide a platform and enable others to produce and sell goods and services through the ecosystem. What is specific about the modular manufacturer is that it provides value for many ecosystems. PayPal is this

type of ecosystem. It provides online payments and financial services used in many digital ecosystems. The user of the ecosystem can be an organization or a person who uses the value generated in the system.

One of the main advantages of digital ecosystems is the implementation of *innovations*, as evidenced by the huge number of technology start-ups. The success of an ecosystem may depend on helping a partner to be innovative, as innovation is multiplied throughout the ecosystem. This is facilitated, on the one hand by the possibilities for fast (and at minimal cost) sharing of digital resources, and on the other hand – the expansion of traditional partnerships and access to a wide network of partners and developers, each with their own infrastructure, resources, perspectives and ideas[6].

Mutually beneficial opportunities are created for external partners and customers to develop applications for new or more efficient ways to use the resources of organizations - new products and services for end customers. The leading benefits of digital ecosystems are in areas such as: supply chain flexibility; readiness for regulation; understanding market conditions; higher levels of customer satisfaction; revenue growth; risk reduction.

3. Technologies

The technological base of digital business ecosystems are modern ICT and, first of all, cloud technologies.

Participants use *shared platforms* and a *shared set of standards*, thanks to which their activities, products and services are mutually compatible.

The development of digital ecosystems also stimulated by mobile technologies, artificial intelligence, Big Data and Big Data Analytics, personalized solutions, etc.

Main components of the technological infrastructure of a digital ecosystem are the platform and application programming interfaces (APIs). *The platform* is the foundation of the ecosystem, a means by which partners build their products or services. To maintain a successful ecosystem, the platform should have certain features - openness and modularity. *Openness* is the ability to provide access to the resources of the platform. It allows the ecosystem participants to develop their own products and services, while *modulation* provides opportunities for various organizations to build complementary products or services. The platform should also cover features as a high degree of *accessibility*, *reliability* and *security*, and so on.

API is the technical tool by which the data flow between components in the digital ecosystem is transmitted. It is based on a set of protocols that regulate communication between the software components of the system and thus provide *interoperability* between different actors in the digital ecosystem. The importance of the API for the development of the digital ecosystem is highlighted by representatives of science and business. APIs are at the center of digital ecosystems and determine the platform, the realization of network effects as well as market expectations[7].

According to Weir, API provides the creation of new ecosystems and added value is obtained from creating new products and services. Combined shared digital assets are used for this purpose.

The advantages of using the API, respectively of the digital ecosystem can be systematized as follows :

3.1. Technical advantages

- provide access to different platforms and devices;
- provide technological and organizational flexibility and alternative to the digital medium components;
- facilitate the transition to modern architectural solutions;
- realize internal and external interactions in the digital environment;
- contribute to security of systems because they set the types of systems and participants and allow interaction between participants and systems;
- Provide interoperability of applications and systems (some of which inherited), reduction in operating costs, increase sales;
- realize effects from sharing information in and between companies such as: improving internal integration and rapid data exchange between different departments and teams in the company or as a result of better use of internal data flows; optimizing existing processes; integration with third-party partner systems, external developers, etc.

3.2. Economic advantages

- stimulate innovation, especially in the following three dimensions: provision of services (multi-channel access, access to functionality, charge on a subscription base or transaction base); client interface (end customer access, support on user authentication); delivery system (product complementarity; revenue sharing); technology (security, stream connection)
- a means of developing new business strategies;
- stimulates the cooperation of various business levels (Maheshwari, 2019);
- generate new sources of revenue as a result of the access to corporate information assets provided;
- increasing efficiency because of reducing costs and time to develop API. This is achieved by repeated use of already existing API through the Rushing of Business Functionality; and as a result of improved business processes;
- a means of complying with regulatory requirements and regulations.

3.3. The main risks of using the API are:

- security risks associated with increased vulnerability when systems are freely connected through the API without taking into account specific environmental conditions and often blind confidence in API by consumers;
- Risk of miscellaneous APIs tailored to the technological problem and a missing business context;
- absences from a common strategy for their use of API in organizations;
- Lack of implementing regulations, etc.

4. Conclusion

In an effort to function effectively, organizations are developing new business models. Digital ecosystems are modular type structures composed of poorly related components that can be combined in different ways. As such, they allow the development of a new business model based on a network of business partners and organizes economic activities in a new way.

The digital ecosystem combines participants from different sectors, with different prospects and opportunities that share resources, experience and ideas, and create value for the end user.

The technological base of digital ecosystems is formed by shared platforms and a set of standards. They provide compatibility of participants in terms of activity, products and services.

The platform is a means by which partners build their products and / or services, and interoperability between them is implemented through the API. The use of APIs provides many technical and economic benefits to the digital ecosystem, but it also poses a number of challenges.

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