Capabilities for platform ecosystem adoption: the case of an industrial incumbent company

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Abstract – **Platforms, especially digital ones, are causing an ever bigger interest from the scientific and expert domains since the most successful companies in the world are applying a business model which relies on some type of platform. Mostly, it is about newly founded companies that achieve unicorn status in a short period. However, incumbent companies as well, ones that have already won over a significant part of the market with their products, searching for ways to rapidly transform using the business model based on the platform ecosystems. To make the transition successful, it is necessary to take on a full transformation led by the usage of capacities and resources which can contribute to the aim, but surely develop some new organizational skills as well. While the progress and functioning of B2C platforms are mostly well analyzed and described, literature connected to B2B platforms is still not developed enough. To understand which organizational skills are key to a successful transformation from product-oriented business models to platform ecosystems, primarily in the B2B context, we have conducted broad research based on the case study method for the company Končar Digital Ltd. and its project digital platform. We have recognized three major groups of organizational IS capabilities: skills connected to technology knowledge, governance skills, and skills of market positioning. Our research brings to a better understanding of the incumbent's transformation to platform ecosystems. All owners of the platforms can use the results of our research as a ground and counsel for better design of their platforms.**

Keywords: **organizational capabilities, IS capabilities, digital platforms, digital ecosystems, value creation, platform ecosystems**

INTRODUCTION

Thanks to the enormous success of global companies such as Google, Amazon, Facebook, etc., digital platforms have begun to attract much attention from both researchers and professionals. The platform, as a foundation on which to build something, is not new. Production lines in industrial activities have existed for a very long time. Platforms on which new cars are developed are a good example, as are operating systems in the IT industry. Likewise, "two-sided markets," sometimes known as "multisided markets," that connect sellers and buyers, have existed since the Middle Ages [1]. However, digital platforms or more precisely software-based platforms deserve special focus because they offer incomparably more opportunities for innovation and growth than any other type of platform [1].

The application of platforms has been well researched in the field of B2C business and there are many examples of successful B2C platforms, for example in the field of video games or browser add-ons [2] and they mainly represent two-sided markets. Independent developers (complementors) who rely on the modularity of the platform represent one side of such a market, while the other side consists of users of such services. The basic rule and advantage of two-sided markets are that they can induce a network effect [3]. The platform becomes more attractive to participants on one side of the platform as the number of participants on the other side increases. E.g. Apple iOS platform is becoming more and more attractive to users of that platform when the number of independent developers who develop and market their products on the platform increases. The reverse is also true, the greater the number of end-users of the iOS platform, the more interesting it is to independent developers. Once critical mass is reached, platform growth becomes exponential, the ultimate goal of any platform. However, in the B2B segment platforms are still a relatively new phenomenon and unlike B2C platforms, B2B platforms face several specific problems, both in terms of characteristics of target markets and like relationships between individual stakeholders and much more demanding technological complexities. Independent application developers as complementors in the B2B segment, although an important part of the ecosystem, are not the only ones and are not sufficient to create enough value for customers. IIoT (Industrial Internet of Things) as a B2B platform most often plays the role of an integration layer that connects end devices and applications themselves. This includes providing the technological infrastructure for data collection, the operating systems and other tools needed to analyze large amounts of data. To collect and share data, it is necessary to involve someone who will provide connection and networking technology. All this leads to a much more complex ecosystem than B2C ecosystems. All participants in such an ecosystem need to think about their business model and the way they monetize their products and services. In such an ecosystem, for example, independent developers can use the platform as an additional sales channel, and sensor suppliers can choose to take over some of the data processing and develop data analysis and processing capabilities.

Incumbent companies need to consider how to position platform ecosystems at the heart of their business models and change organizational IS (Information Systems) capabilities accordingly. First, they need to make the right use of modern digital technologies such as cloud computing, the Internet of Things (IoT), and the exploitation of large amounts of data. Second, incumbent companies need to consider how to develop the organizational skills needed for a more intensive collaboration with partners, as existing direct contacts and relationships are replaced by depersonalized relationships with a large number of independent developers through the platform [4]. Third, software marketing and sales are changing from direct to indirect, through online commerce on the platform itself, for example. Incumbent companies have the additional challenge, how to take advantage of new indirect sales and marketing channels and not destroying existing direct relationships with existing customers. Establishing a platform ecosystem requires established players to transform organizational skills through three main dimensions: technology, governance, and market approach.

THEORETICAL BACKGROUND

This research is based on two theoretical streams: Organizational information systems capabilities and platform ecosystems. Since the domain of platform ecosystems is located on the border of the information systems and management domains, below we will provide an overview of the most important literature for both streams of research.

Organizational capabilities

Thanks to the increasing use of information and communication technologies and the rise of the digital society, intangible resources (knowledge, intellectual property rights, licenses, etc.) and everything related to digital technologies is becoming central themes of successful business strategies. Accordingly, the dominant strategic paradigm shifts from competitive forces to the resource-based view [5]. Under this approach, companies can build their strategic advantage on unique and scarce resources. The resource paradigm says that companies own two groups of resources. One group of resources enables a competitive advantage, however, there is also another group of resources that provides long-term and sustainable competitive advantage [6]. Valuable resources that are also scarce can bring a temporary competitive advantage. However, resources that are also very difficult to copy or to be substituted can provide a long-term competitive advantage [6]. Resources are defined as the set of assets and capabilities used to identify market opportunities or threats and to take adequate action to seize opportunities or defend against threats. Assets represent everything tangible and intangible that companies use in the processes of designing, manufacturing, and offering products and services. Capabilities are a common name for the organization's shared capacity to conceive, apply, and exploit its assets to undertake productive activities [7]. In short, organizational skills serve to get companies to achieve the desired results [5]. Everything related to assets, especially tangible ones, can rarely be a source of competitive advantage, especially

not in the long run, as this type of resource can be easily copied. However, the real source of competitive advantage for a long period lies in organizational skills. Organizational skills are associated with specific knowledge and skills, often implicit, that is deeply woven into an organization and very difficult to copy into another company [8].

Authors in the field of information systems that rely on the resource paradigm tried to find IT resources that could be a source of competitive advantage. Mata et al. [7] argue that IT management skills are the best candidate to be a source of competitive advantage, because they are rare and specific to each company. Ross [9] also mentions IT skills (human IT resources) but she also claims that in the group of strategic IT resources belong reusable technology platform (technical IT assets) and quality and strong cooperation between IT management and top management (relational assets). In the literature, it is possible to find different approaches in the identification of organizational skills and then related classifications. For the purposes of this study, we decided to rely on Reference [6] and [10] and according to their research, we made a summary shown in Table 1.

Platform ecosystems

As the term platform is used in different contexts, so there are many definitions of platforms. For the purposes of this paper, we will use two basic types of platforms: transactional and innovation platforms. Transactional platforms represent the realization of what is called a "two-sided market" in the economic literature, "A market that includes two groups of users operating through a common platform and the benefits and decisions to join one group of users depends on the size of another group of users" [11]. In this case, the platform serves as an intermediary between two or more stakeholder groups [12]. Platforms as two-sided or multi-sided markets are based on the idea that it serves as an intermediary in finding and connecting suppliers and customers. The ecosystem that is formed and developed in this way very often has several other participants who also participate in the creation and distribution of values through a common platform. Platforms create digital ecosystems in two ways: as a technological basis for creating new products and as a market intermediary [14]. In the first case, the platform is an artefact that, thanks to its technical characteristics and architecture, provides the basis for the development of complementary products and services [13]. This approach that looks at platforms from an architectural perspective has its roots in the literature dealing with product lines and attempts to explain how the core of technology can be used to produce multiple products [15]. Over time, this largely internal view of platforms has evolved into an external view of platforms: "a platform is a product, service, or technology that provides the basis on which external and independent firms can develop their complementary products, services, or technologies" [13]. Very often platforms have features of both types: technological basis but also market intermediary [13].

The way values are created for customers within platform ecosystems is also changing significantly, moving from a traditional linear supply chain to a network of

participants who work together to create value for end-users. Therefore, the very nature of the collaboration between platform owners and other stakeholders is changing significantly. Direct producer-supplier relationships are being replaced by much more sophisticated relationships which are based on balancing the total amount of value created and the amount of value each stakeholder retains [4]. According to the resource paradigm, value creation is based on the collaboration and combination of complementary resources and organizational skills from multiple companies, which requires the application of new governance frameworks. With value co-creation companies want to be as innovative as possible because they individually do not have enough innovation capacity. Through the ecosystem, they leverage a network of complementors, primarily independent developers, to be more creative [16]. In platform ecosystems, which have a digital platform at their core, increased productivity is achieved through the use of Boundary resources such as application programming interfaces (APIs) and software development kits (SDKs), which allow independent firms to engage in development and offer additional complementary products and services that will increase customer satisfaction with much less effort and expense, as they do not have to develop their products from the scratch [17]. An organizational capability approach and the role of organizational skills in

Table 1.   Organisational IS Capabilities

Domain	Capability	Description
Technology	IS infrastructure	The organization's ability to engage and use IT assets, such as: hardware, software and network technologies along with other resources and capabilities
	IS development	The company's ability to implement solutions based on new technologies, but also the ability to look at upcoming technological trends
	IS technical skills	The company's ability to harness the skills of its employees related to hardware and software
Governance	Relationship management	The company's ability to organize and optimize relationships with external stakeholders
	Open interfaces	The company's ability to establish specific interfaces to collaborate with external partners to share data
	Partner orchestration	Ability to influence external suppliers and orchestrate their efforts to create more value for them than for the company itself
Market	Customer management	The company's ability to understand customer requirements and expectations and respond accordingly to them
	Market responsiveness	The ability of a company to collect, process and use information from external sources to respond to market changes
	Electronic marketing	The company's ability to successfully combine IT, human and business resources for targeted marketing through digital channels

business value creation processes provide a good basis for

understanding how to build successful platform ecosystems [18].

CASE DESCRIPTION

The Končar – Digital Ltd. company was chosen as a case study. The selected company is part of the Končar Concern, which is one of the leading manufacturing companies in Croatia. Končar Concern is well known for its products in the field of energy and transportation. However, it is less known that Končar has a 40 years software development tradition. The explosive growth of the application of digital technologies in both the B2C and B2B segments prompted Končar to reconsider its strategy and find an answer to the opportunities that come from digitalization. With the founding of the Končar-Digital company, the Končar Concern in its second century of existence has organizationally emphasized its commitment and turn towards digital technologies.

"Creating a new business line Digital solutions and platforms is the KONČAR's response to the challenges of the global electricity market and is a testing ground for innovation, with three key roles - expanding product portfolio, improving operations, and attracting new talent from the market, primarily engineers." (Gordan Kolak, mr.sc., President of the Management Board of Končar Concern in the weekly Nacional on November 1, 2021.)

The main advantage of Končar Concern is a large amount of domain knowledge and the ability to develop specific and specially tailored solutions for its customers. Končar has extensive experience in standardization and interoperability, and their software solutions ensure compatibility with a large number of technologies, including some very old, which protects previous investments but also ensures the rapid implementation of solutions. Končar invests a lot in the development of basic technologies and, unlike the typical competition, supports proprietary protocols designed by other vendors, which enables the resolution of very specific problems at the lowest technological level.

The first versions of the software were electrical substation management solutions that support a large number of specific industry protocols and ensure a high level of performance. However, Končar quickly realized that it makes sense to strive for a generic solution, a platform, on which bases it will be easier to build more diverse solutions. As we can see from the statement of the head of development and research, this path was iterative.

Although previous versions of our solution follow the principles of modularity, we have evolved in this regard. Today, in our platform, we have more strictly defined interfaces for data exchange between the internal components of the platform. On the other hand, the technology cycle lasts approximately 5-10 years, following new technologies we have made a significant shift towards a platform solution as well.

Being aware that a good product is not in itself a guarantee of market success, Končar Concern did market research and analyzed the various business models behind successful companies. In the end, they opted for the COSS model (Commercial Open Source Software) which they estimated would make the best use of their strengths and ensure market success [19]. Most companies that have

opted for the COSS model have put the core part of their systems in the open-source community but revenue generates from additional specific solutions and customer support services [20]. As we can see from the statement of the Member of the Management Board of Končar-Digital, they decided on a model that will allow them to monetize their domain knowledge [21].

Our business model relies on the COSS philosophy which says that everything that is generic and has no domain-specific business value should be left to the open-source community, and what represents specific domain knowledge should try to protect. Core without domain knowledge does not represent a competitive advantage but very quickly becomes a commodity.

Before the transition to a platform business model, cooperation with partners was based on reselling licenses to third parties. The partners could achieve one of three statuses: gold, silver, or bronze. By granting certain status to partners, Končar managed the levels of rights and discounts that each partner enjoys. By launching the platform, Končar-Digital also introduced a new model of partnership, technological. According to the statement of the Member of the Management Board: the goal of the new program is to make it easier for independent developers to enter the platform ecosystem. For this purpose, Končar-Digital developed special development packages and made them publicly available, and created a series of educational content to help new developers [22].

We also have a technological model of partnership. By this model, we provide new developers to our ecosystem through education, tutorials, and software development packages, which are also publicly available.

Although Končar-Digital is still in the initial stages of platform development, the first references and efforts of Končar-Digital employees and the enthusiasm they demonstrate in their daily work leave no doubt that they will succeed in their intention to transform into a modern digital company.

Organizational capabilities for transitioning to a platform

During this study, we identified four organizational skills crucial for the transition to platform ecosystems. Two organizational skills belong to the domain of technology: modular software implementation and openness, while the other two organizational skills are based on better business relationship management: ecosystem coordination and platform evangelization.

Modular software implementation

There were several reasons for switching to the platform. First, the transition to the platform aims to simplify development and increase productivity. Second, the modularity of the platform facilitates the inclusion of independent developers on the platform as well as integration into the user environment. To successfully move to the platform in Končar-Digital, they had to develop the ability to implement modular software. We discovered four manifestations of this capability, which ultimately aid adaptation to the platform ecosystem.

The first manifestation refers to the need that finished software and components can be reused in the development of new solutions. In this way, three things were achieved. First, faster development. Second, much greater flexibility, which ultimately makes it easier to meet new customer requirements. Third, shorter time to market. The head of development and research pointed out the following:

The ability to share already developed components was a very strong motive for moving to the platform. Also, with the development of the new platform, we wanted to ensure the possibility of expanding to other areas of application.

The same source emphasizes that when switching to the platform, it is very important to simplify the internal architecture to avoid duplication of functionality and avoid the chaos that ensues soon after.

When designing a platform and implementing modularity, it is crucial to have a clear division of roles and responsibilities of each platform component. This makes it easier to isolate problems when they occur and avoids the accumulation and duplication of platform functionality.

The strong motive for the new development step was the difficulty of maintaining and upgrading the previous version of the software. With the old architecture, the wall was reached and every smallest extension became difficult. As witnessed in the third manifestation of this capability by the Head of real-time software product development, modularity has made components mutually independent, even to the point that they can be developed in different technologies, according to the Microservice paradigm, and replaced at any time, without compromising the platform as a whole.

The entire platform is modular, which greatly simplifies maintenance and further upgrades. At any time, any component of the platform can be separated and replaced by another, new component. Modularity is performed in such a way that the components do not have to be developed on the same technology, but on the technology that proves to be the most appropriate.

The fourth manifestation of modular software implementation refers to how individual components of the platform are interconnected as well as how independent developers built their solutions on top of the platform. Previous versions of the software used different methods to interact and exchange information between modules. However, the biggest problem was that it was not foreseen how external developers could access individual components without compromising the security and performance of the entire solution.

Core components are developed in a way that does not depend on each other, instead, they use a custom-developed protocol to communicate with each other. Core components communicate with other components, either proprietary or partner's components, according to a well-defined protocol, however, the level of security and interface types are different from those by which core components communicate internally.

Companies that do not have a long tradition and existing customer base face a problem known as the "chicken-egg", that is, emerging platforms find it difficult to create a critical mass of users, which is then stimulating enough to attract enough developers. Končar-Digital has an advantage in this regard because it is part of a large company with a long tradition, a large customer base but also great financial potential. The funding ability has enabled the development

team to experiment and seek the best solution. According to the Head of the development department that is one of the critical capabilities.

The advantages of a large company with a long tradition are primarily the financial potential that has enabled us to develop a product for the market with questionable prospects for success.

Openness

Previous versions of the software were mainly developed on Microsoft .Net technology. By switching to the platform, Končar-Digital made a complete turnaround in development and developed the platform on completely open technologies. Most of the source code is available on the GIT HUB [20] and can be downloaded and modified by anyone. For the successful application of the COSS business model, Končar - Digital had to build the ability to develop software on open standards and technologies. With this ability, Končar-Digital plans to increase the impact on the digital ecosystem.

Despite the common practice and distrust of the domain industry, Končar-Digital dared to embrace new technologies and base their future on open-source software. Not only did they opt for open source technologies, Končar-Digital decided to expose the core of its system to the whole world. The already mentioned head of the real-time system development department summed it up in the following statement:

One of the most important features and benefits of the Proza Hat platform is that it is implemented in open source technologies. In the field of process automation, such an approach is rare. Especially in SCADA systems that manage critical infrastructures. Despite the disbelief of such an idea, we have proven that this approach is correct and yields results.

When it comes to industrial solutions like SCADA systems then security is one of the key issues. In addition, security is one of the main reasons why open source is viewed with suspicion. However, the Končar-Digital was the first in the world to receive the IEC 62443-2-4 certificate for a system that manages critical infrastructure. On the other hand, thanks to their very deep knowledge of the functioning of communication protocols, they have protected communication against external systems and components to keep the platform secure and stable in all conditions.

Ecosystem coordination

The new business model and the transition to the platform brought a new challenge for Končar-Digital, how to continue to use the benefits of the old way of partnering, reselling licenses, while developing new relationships and attracting new partners to build new solutions on the platform. Končar-Digital had to develop a new capability: Ecosystem Management, To cope with the new challenges. The new capability will ultimately enable them to develop better cooperation with independent developers. We identified three phenomena of ecosystem management.

The first appearance indicates how Končar-Digital plans to lower entry barriers for all potential developers. These efforts were very well summed up by the head of the

department for the development of real-time solutions with the following statement:

To attract independent developers to join our platform, we have documented the system very well and put it on the GIT HUB where it is available to everyone. Also, we think that using modern technologies like Python and JavaScript, which are quite rare for this type of power system solutions, further lower entry barriers and attracts other developers.

From the statement of the same person, we came to another phenomenon which indicates that the choice of business model and making the source code available to all is an effort in this direction as well.

With the open-source technologies, we have gained access to a wide community, i.e. a large number of developers and other companies around the world that deal with similar solutions, thus enabling the collection of valuable knowledge and feedback about our solution.

The last recognized phenomenon confirms that good documentation lowers the entry barrier, however, the head of research and development adds that the simplicity of the platform also affects the lowering of entry barriers for new developers.

In terms of attracting potential partners, we believe that they will be attracted by the power of our platform with the simplicity and high-quality documentation of the solution. We are still putting a lot of effort into documenting the solution.

Platform evangelization

The energy sector in which Končar-digital operates is very specific and traditional, and much more effort is needed to convince customers to move to something new. This sector is still technologically lagging behind more propulsive sectors such as telecoms, media, and ICT, so the demands of such customers are more focused on compatibility with older technologies and very high in terms of security. The transition to the new solution also requires significant time for customers to embrace the change. Therefore, it is very important to develop the ability to create and communicate a strong vision of platform ecosystem development to motivate as many partners and independent developers as possible to join the platform and make the platform as simple and accessible to a wider range of users. In connection with this ability, we have identified two phenomena.

The first appearance indicates that Končar-Digital has developed a special program in cooperation with the Faculty of Electrical Engineering and Computing in Zagreb, where they promote their platform and educate new developers to work on it. One of the lecturers is our interviewee, the head of development and research, who pointed out:

We designed and performed a special program at FER in Zagreb, for which we also developed special video materials, user cases to bring our platform closer to the wider community.

The second phenomenon indicates that the program will expand beyond the borders of Croatia. Based on the success with FER [22], the cooperation will be extended to the University of Mostar, but this time together with the partner

JP EPHZHB, which is also a user of Končar-Digital services. We received a statement from a member of the board of that company.

It is preparing for the next winter semester to supplement the study programs at the University of Mostar, cooperation with FER, construction of a separate building for development, digitalized laboratories, specialist training for power plant employees.

Organizational skills related to the ability to establish and manage relationships with external entities (relational skills) should strike a balance between value created and retained. Namely, technology-oriented capabilities can reduce the potential for monetization in the short term, while by properly managing relationships with independent developers, platform owners can increase this potential exponentially and keep more and more of the value for themselves.

CONCLUSION

This case study of Končar-Digital and their platformization project provides an important empirical understanding of the organizational capabilities that platform owners must provide, especially in the early stages of a platform ecosystem, and how these capabilities affect value creation and value capturing processes. We identified two capabilities related to technology (modular software implementation and openness) and two capabilities driven by relationships with external entities (ecosystem management and platform evangelization). We also identified two very important skills that do not fit into the usual IS framework but have a very strong impact on the aforementioned organizational skills and enhance their overall impact: funding experimentation and attracting EU funds.

Technology-related organizational capabilities enhance value creation, but in the short run, they can decrease the value capturing for the platform owner. Relationship-driven organizational capabilities compensate for this by supporting shared value creation (co-creation) and value capturing. Platform owners must therefore combine technological and relational organizational capabilities to enable and balance the joint creation and capture of values in the ecosystem around the platform. Given the fact that many platform ecosystems decay early, this study contributes to the discussion of what is needed for platform ecosystems to survive the early stages of development.

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