Digital Platforms Business Models

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Abstract

Digital platforms have been recently studied in the literature as their relevance and impact is increasing rapidly. The purpose of this paper is to investigate based on the available literature the business models of digital platforms, and to form some typologies for understanding them better. In this endeavour we extracted 25 cases of digital platforms through a literature review process, continued with analysing them in detail to create four taxonomies of various business models of digital platforms. Results show a large variety of business models for digital platforms, and also an evolutionary trend. We grouped the data using the business model canvas, including key partners, key activities, key resources, value proposition, customer relationships, channels, customer segments, cost structure and revenue streams, resulting in four archetypes such as: marketplace, social community, software ecosystem and digital product. Future research may test qualitatively the evolution of a business model within each category, but also the Software Ecosystem model is studied from a managerial perspective, as it has only been explored from the information systems lens.

Keywords: *Digital platforms, Business model, Marketplace, Social community, Software ecosystem, and Digital product.*

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1. Introduction

The formalization of business models has started at the end of the 20th century, with Porter conceptualizing the value chain, and the first concrete models appearing in literature in the beginning of the 2000s, starting with Magretta (Nielsen and Lund, 2014). However, the development of new technologies has created new opportunities for entrepreneurs and the more they included these technologies in their

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value chain, the more the business model changed. This process, known as a digital transformation, has driven the development of the existing Industry 4.0.

The core component for the digital transformation has been de development of platforms, with a focus on the digital platforms. With the successful industry disruptions created by Google, Amazon, Facebook, Uber, Netflix or Wikipedia, many entrepreneurs have developed businesses on digital platforms. Moreover, existing companies moved their activities on digital platforms through cloud computing. This digitalization phenomenon was highlighted also by the COVID-19 pandemic, when most business processes were conducted exclusively online.

In the present state of the industry, digital platforms seem to be included in all the sectors of business. However, when taking a closer look, there is extensive literature written on the functionalities of digital platforms, and considering them from different perspectives – facilitators, products, intermediaries etc. However, most of existing literature highlights the characteristics of digital platforms, and the influence it has in the company, but there is little research on case studies looking from a business modelling perspective.

2. Digital platforms: theoretical framework

2.1 Digital platforms

In the last 10 years especially, platforms have disrupted most of the industries as we knew them at the beginning of 2000s. There is a strategic question for all technology companies to consider on how they can expand their business portfolio (Stoian and Tohanean, 2021). Even though the term platform has been conceptualized for a long time from a non-digital view, they are now the center of Information Systems (IS) field (de Reuver et al., 2018). We can see platforms as being the base of existence for social media, mobile telecommunication, finance, mobility, or healthcare, and they have facilitated the development of platform economy (Fu et al., 2011) and later sharing or collaborative economy (de Reuver et al., 2018).

Non-digital platforms are defined as being made of a stable core and a variable periphery, the stable core being a point of control for the company. Studies also show that platform definitions highlight the use of common elements in complex products or services and manufacturing systems (Baldwin and Woodard, 2009). However, we first need to consider the technical definition, meaning that a platform is a technical construct consisting of an expandable codebase together with third-party modules that extend this code base (de Reuver et al., 2018). There is also a socio-technical point of view, where digital platforms are an assemblage of technical elements (hardware and software) which is linked to organizational processes and standards (Tilson et al., 2012). In another definition, for a company, a digital platform is built over the technology and business foundation. They come together with business strategies and processes and aim to enable better

communication and interactions between main company, collaborators and consumers (Setia et al., 2020).

Taking the definition one step further, we reach the phantomization, meaning "the act of shifting to digital platforms for offers of products and services" (Setia et al., 2020). It is a strategy which holds the digital platforms as leverage for facilitation of interactions between producers and consumers. The way to achieve that is by increasing the directness of interaction between suppliers and consumers, while the company, through the platform, assumes the role of an intermediary (Setia et al., 2020). Phantomization is transforming entrepreneurship by changing the identity of the companies themselves, using digital platforms to underline the importance of new value creation and to organize the value creation processes (Nambisan, 2017); Setia, Soh, and Deng 2020).

2.2 Business models

Business-model activities perspective aligns with Porter's idea of seeing the firm as a value chain of different activities (Porter, 1981). A business model is a description of the activities a company has to put in place in order to carry out its strategy (Arend, 2013). Agreeing with him and looking at the frame of the business model from "an activity system perspective", Zott and Amit (Zott and Amit, 2010) state "we conceptualize a firm's business model as a system of interdependent activities". In a similar note, Chesbrough (Chesbrough, 2007) describes a business model as a "series of activities, from procuring raw materials to satisfying the final consumer. Presented in a very simple way, the business model logics perspective emphasizes how certain activities make sense for a business in terms of the value-creation logics that those activities introduce (Ritter and Lettl, 2018). Brynjolfsson and Milgrom (Brynjolfsson and Milgrom, 2013) summarizes the logics of a business model with an example like "doing more of x raises the returns of doing y and vice versa".

Business-model archetypes are general, well-known business model logics, and archetypes define generic logics of how organizations do business. Archetypes of business models are generic forms of value creation and capture that cut across industries (Baden-Fuller and Morgan, 2010). Examples of business model archetypes are the classic "razor and blade", two-sided platform business model, freemium, or even the ecosystem, which combines the product, service and trade archetypes, in order to create a more diverse and complex technological platform. Alignment: using the information from the early development of management and business models, Magretta (Magretta, 2002) states that a Business Model is how a firm's strategy describes "how the pieces of a business fit together". Business models nowadays focus on enhancing innovation (Barbu et al., 2018), but also on transforming how business is conducted (Stavre, 2013). In the given perspective, the success and failure of organizations are determined "not only by the elements of the business model but also by their complementarity, interrelationships and alignment" (Ritter and Lettl, 2018). (Osterwalder and Pigneur, 2010) choose a selection of nine elements which become known as the business model canvas: key

partners, key activities, key resources, value proposition, customer relationships, channels, customer segments, cost structure and revenue streams. In his study on business models for software in 2015, Ojala (2016) simplified the elements into four components: the product/service, the value network, the value delivery and the revenue model. Pucheanu et al (2020) add other layers referring to value proposition, value creation, delivery and value capture.

2.3 Digital platforms business models

From an economic point of view, platforms consist of three dimensions - the two-sided market, the network effects and the business ecosystem (Ladd, 2022). Platforms are marketplaces which include at least two-sides, the main being supply and demand side (Kim, 2016). However, they might also be multi-sided, when more actors are involved (Ladd, 2022). These actors are given useful tools which to ease the creation of transactions (Rossotto et al., 2018). In the developed environment, there are more suppliers and consumers which participate in transactions made through the platform. The platform owners play here the role of intermediaries, and generally they have no assets involved but the platform (Ladd, 2022). Through these interactions, all the platform users are involved in creating the "network effect" which is creating value for all of them. Due to this network effect, the marketplace created is affecting equally all the sides. A variation in demand or a change in schedule will directly affect the opposite side. However, as opposed to the classical economic paradigm, in a digital platform business model appear faster responses to the changes in supply and demand (Rossotto et al., 2018).

Considering all the above mentioned, we can say that a digital platform can be defined as a collection of components which are shared by one product family, the functionality of which may be expanded to other third parties. If the platform does not provide complementary products or services, besides itself, then it presents little to no value to the users (Rossotto et al., 2018). If the platform owners manage to involve more types of actors and create more connections, we can see here the creation of a business ecosystem, which will provide new values and benefits to all participants (Ceccagnoli et al., 2012; Kim, 2016).

However, in the given situation it must be started with how IT entrepreneurs create a business model on the basis of an opportunity and how software entrepreneurs establish and grow business models in the face of uncertainty (Ojala, 2016). Therefore, an opportunity doesn't exist unless an entrepreneur creates it through a process of enactment (Alvarez et al., 2013). Because the current study makes use of how IT entrepreneurs establish and then evolve their business models under conditions of uncertainty, opportunity creation theory was used as a theoretical framework for the study (Ojala, 2016). Furthermore, a clear definition of digital platforms business models is a subject for future research, since it is a constantly evolving area and thus, it is the purpose of this paper to study practical cases of digital platform businesses and try to establish models for them.

3. Research methodology

The aim is to create a taxonomy and provide some typologies of digital platforms business models based on existing case studies. Since the literature on digital platforms is interdisciplinary, we conducted an automatic and systematic search on Google Scholar by using the keywords “Digital platform” and “case study”, but also a combination of the sorts, “digital platform case study”, “digital platforms”, “digital platform business model”, “digital platform” and “business model”, “digital platform” and “model. Our initial search resulted in 18.100 publications to which we applied inclusion/exclusion criteria. First one was papers mentioning “digital platforms” and “case study”, leading us to 100 papers. Second was language, restricting the data base to papers written in English, leading us to 93 articles. Last step was represented by a thorough analysis of the abstracts to identify papers describing at least one case study on digital platforms. For the last step we conducted a full text in depth analysis and have critically examined all the 22 selected articles. At first, we included articles published in the last 5 years, but ended up by expanding to 7 years, since many articles from t 2022 were still difficult to access. Thus, the timespan for this research was of 2015-2022.

4. Results

In this section we present the results of the research on business models taxonomy, based on case studies considered. The endeavor implied considering each element of the business model canvas –using its elements as criteria for extraction: key partners, key activities, key resources, value proposition, customer relationships, channels, customer segments, cost structure and revenue streams. After the identification of these elements, we searched for recurring characteristics in order to discover some archetypes of models. Further on, we presented the models and discussed all the characteristics and implication of the elements.
In total we identified 25 case studies of businesses based on a digital platform described in 22 papers, based on which we came up with four digital platforms business models, such as: Marketplace, Social Community, Software Ecosystem and Digital Product. These are analyzed and explained in detail in the following section. However, the number of cases per model is not divided equally.

5. Discussions

5.1 The Market place business model

The Marketplace is the first model identified with the most occurrences described by 12 cases, as seen in Table 1. This type of model belongs to companies which are a facilitator for transactions between sellers or providers of services and buyers. In the Marketplace model, the digital platform is located at the center of their business, being a facilitator of business. Through the use of the digital platforms, the companies are creating an online environment which can easily link supply and demand. That explains the numerous encounters this model due to the simplicity of creating such a company. The key resource specific to a Marketplace

type company is the digital platform. Depending on the type of strategy they want do adopt in reaching their customers, we can find seven digital platforms (these are considered to be developed in a Web format) and five mobile digital platform (platforms optimized or created for the mobile environment). The ownership of a platform can be enough for the development of the business activities, with no need of significant tangible assets. However, we can identify two cases in which the company decided to also be in charge of the delivery services, when they also own some specific delivery means – these are generally trucks, but for other needs, such as the company working in Africa, there is also a need to adapt to the existing infrastructure, thus delivery is done through motorbikes as well.

The company makes strategic partnerships with the interested providers. For mobility service providers the partners are the drivers, or taxi drivers, for other service providers there are the private companies which provide the service, and for online shopping platforms these are the sellers, whether they are local or international, manufacturers, or even game licensors. The partners are not exclusively providers – we have identified other key partners which are involved in the operations of a company, such as Universities – providing theoretical framework for the development, non-profit governmental institutions, or third-party developers – which are involved in the continuous development of the key resource of the company – the digital platform.

The customers, who are situated on the other side of the platform, are one of the main stakeholders of a company working as a Marketplace. They can contribute to the quality of a digital platform. The platform administrators can make use of the insights generated for the improvement, looking at the number of users, new users, frequency of use, duration of use, conversion rate, geolocation etc. Using insights such as these, the company can improve the customer journey, while increasing their profits as well.

Revenue streams of a Marketplace model come from the transactions made on the platform, since these companies do not have stocks on their own. The revenues can come from a transaction fee, from a percentage of the ride cost (for mobility service providers) or from a percentage of the product price established in the contract. Their revenues need to at least cover the platform maintenance and development for the company to break even, and later to be profitable.

In the Marketplace model we can very easily identify the three dimensions defined by (Ladd, 2022). The digital platforms are creating a two-faced market, bringing together the consumers and buyers, and the platform is only an intermediary for the transactions. The two parts, demand and supply are creating a co-dependent relationship, creating a network effect, in which the changes on one side can directly affect the other side. However, through the use of the digital platform, the administrators can easily adapt to changes, maintaining a balanced relationship. These interactions between sellers and buyers are creating a digital environment. This type of business model has already been studied and successfully formalized in the literature. However, focusing on the digital platform, we will consider it as a "facilitator" of business. It is the core of the business operations, facilitating offer and demand, transactions, and communication between the two groups of stakeholders.

Table 1. Business model #1: Marketplace

Author, Year	Publication	Key Partners	Key Activities	Key Resources	Value Proposition	Customer Relationship	Channels	Customer Segments	Cost Structure	Revenue Streams
Badran, (2021)	Telecommunications Policy	Local Sellers, Vivo energy - for seller drop-off and consumer pick-up points	Platform development and maintenance Delivery Service	Mobile Platform Trucks & motorbikes for delivery services	Marketplace - connects sellers & buyers Cheaper products than brick & mortar stores	Network effect	Digital channels Sales agents	Africa 11 countries Middle-class	Platform maintenance and development Shipping costs	Commission on transaction Value-added services fee Shipping fee
Cheng et al., (2016)	Proceedings	Drivers	Platform management	Mobile Digital Platform	For riders - customized ride, cheaper For drivers - flexibility, income generation	Network effect	Digital channels	China	Platform maintenance and development	Percentage per ride
Hermes et al., (2021)	Conference Proceedings	Chemical Sellers	Platform management	Digital Platform	Marketplace - connects sellers & buyers	Network effect	Digital channels	USA	Platform maintenance and development	Transaction fee
Hermes et al., (2021)	Conference Proceedings	Manufacturers	Platform management	Digital Platform	Marketplace - connects sellers & buyers	Network effect	Digital channels	USA	Platform maintenance and development	Transaction fee
Hermes et al., (2021)	Conference Proceedings	Complementors	Platform management	Digital Platform	Marketplace - connects sellers & buyers	Network effect	Digital channels	USA	Platform maintenance and development	Transaction fee
Hermes et al., (2021)	Conference Proceedings	Complementors	Platform management	Digital Platform	Marketplace - connects sellers & buyers	Network effect	Digital channels	USA	Platform maintenance and development	Transaction fee
Mukerji & Roy, (2019)	Australasian Journal of Information Systems	Drivers Taxi drivers	Platform management	Mobile Digital Platform	For riders - customized ride, cheaper For drivers - flexibility, income generation	Network effect	Digital Channels	India	Platform maintenance and development	Percentage per ride
Ojala & Lyytine, (2018)	Conference Proceedings	Manufacturers Third-party developers Game licensors	Platform development and maintenance	Digital Platform	Cloud Gaming services	Network effect	Digital channels	Worldwide Gamers	Platform maintenance and development	Percentage per product

Author, Year	Publication	Key Partners	Key Activities	Key Resources	Value Proposition	Customer Relationship	Channels	Customer Segments	Cost Structure	Revenue Streams
Tan et al., (2017)	Communications of the Association for Information Systems	Drivers Taxi drivers	Platform management	Mobile Digital Platform	For riders - customized ride, cheaper For drivers - flexibility, income generation	Network effect	Digital Channels	India	Platform maintenance and development	Percentage per ride
Tan et al., (2020)	Conference Proceedings	Universities Non-profit governmental agencies Private renovator companies	Platform development & maintenance, matching demand and supply	Digital Platform	Affordable and sustainable renovation and housing services	Network effect	Digital channels	Australia	Platform maintenance and development	Percentage per service
Wang et al., (2022)	Technology Analysis & Strategic Management	Sellers	Platform development & maintenance Delivery service	Digital Platform Delivery (trucks)	Marketplace - connects sellers & buyers	Network effect	Digital channels	Worldwide, 20+	Platform maintenance and development Shipping and delivery costs	Transaction fee Value-added services fee Shipping fee
Wentrup et al., (2019)	Critical Perspectives on International Business	Drivers Taxi drivers	Platform management	Mobile Digital Platform	For riders - customized ride, cheaper For drivers - flexibility, income generation	Network effect	Digital channels	Worldwide	Platform maintenance and development	Percentage per ride

Source: authors' own research

5.2 The Social community business model

The Social Community is the second type of digital platform business model identified, with 7 case studies falling under this category, as shown in Table 2. The main characteristic of a Social Community model comes from their revenue streams – they have no financial benefits, but instead the platform is adding value to a social community or creating a social community through its usage, therefore bringing social benefits.

In Social Communities, the digital platform is not involved in the activities of the firm which produce financial benefits and rather comes to create additional value for the Social Communities in which it is implemented. These value propositions vary depending on the purpose of the implementation. This way we have a platform which simplifies the volunteering process by creating a database of non-profit organizations and volunteers, offering a large range of volunteering possibilities, another platform which in the same way links trained caregivers with dementia patients, one which brings together a large number of US health care providers for the collaboration and coordination of centers and activities, one similar for Public Transport Operators, one platform which allows blind astrophysicists to continue to do their work, one which promotes thematic marine tourism destinations and one which connects elderly people, allowing them to make new connections and share experiences. These Value Propositions indeed have very little in common, besides the fact that they are created for the improvement of the quality of life of a certain social community.

The key activities of the Social Community case studies are the platform management, development, and maintenance. To this recurring activity we can notice the matching of demand and supply for one case and algorithms update for another case. For the first case, there is a need of a medical opinion for the matching of caregivers with the dementia patient, so the matching is made by the doctors overseeing the platform, it is not the customers' option since they do not possess the professional capabilities, making this an indispensable activity for the platform. In the second case, there is a need of reviewing the algorithms used for the understanding of information from Space Physics Data Facility, due to the fact that the targeted astrophysicists can input new data, modify the existing one, improving it or making new calculations. Regarding the key partners, there are a multitude of firms and organizations which are involved on the creation of digital platforms such as these. They can have the role of resource providers - public primary care services provide the trained caregivers, or information providers – Non-profit organizations provide information about their social cases, US health care providers are creating a sharing environment with information about practices and resources.

Table 2. Business model #2: Social communities

Author, Year	Publication	Key Partners	Key Activities	Key Resources	Value Proposition	Customer Relationship	Channels	Customer Segments	Cost Structure	Revenue Streams
Carida et al., (2022)	Creativity and Innovation Management	Non-profit organizations, Volunteers	Platform management	Digital Platform	Connects volunteers with non-profit organizations	Network effect	Digital channels	Italy	Platform maintenance and development	Non-profit
Farshchian & Thomassen, (2019)	Computer Supported Cooperative Work (CSCW)	Public primary care services	Platform development & maintenance Matching demand & supply	Digital Platform Trained caregivers	Mediator for dementia care work	Network effect	Digital channels Referrals	Norway +65 dementia patients	Platform maintenance and development	None, just mediator
Furstenau et al., (2018)	Electronic Markets	US health care providers	Platform development & maintenance	Digital Platform	Open Innovation for healthcare system Coordination	Network effect Customers can be contributors Co-creation	Created for community – direct access	Users are also partners	Platform maintenance and development	None, sponsored
Garcia et al., (2019)	EPJ Web of Conferences	NASA	Platform development & maintenance	Digital Platform	Blind Astrophysicists can input information from Space Physics Data Facility	Network effect Customers can be contributors Co-creation	Created for community – direct access	USA, blind astrophysicists	Platform maintenance and development	None, sponsored

Author, Year	Publication	Key Partners	Key Activities	Key Resources	Value Proposition	Customer Relationship	Channels	Customer Segments	Cost Structure	Revenue Streams
Ofe & Sandberg, (2019)	Conference Proceedings	Public Transport Operators (PTO)	Platform development & maintenance Algorithms update	Digital Platform	Third party developers and share complete PTO data Provide up-to-date info about public transport	Network effect	Digital channels	Sweeden	Platform maintenance and development	None, EU programme
Pranita, (2018)	KnE Social Sciences	Tourism destinations	Platform development & maintenance	Digital Platform	Create digitized thematic tourism products	Network effect	Digital channels	Worldwide 20+	Platform maintenance and development	None, created by Ministry
Spagnoletti et al., (2015)	Journal of Information Technology	Universities IT company End-user companies	Platform development & maintenance	Digital Platform	Improve elderly social communication	Network effect Customers can be contributors Co-creation	Digital channels	Europe 60+ elderly	Platform maintenance and development	None, EU programme

Source: authors' own research

Another general function of these digital platforms is to facilitate communication; thus, the users find it naturally to create a network effect. In the case where the main functionality of the platform is a shared database (for astrophysicists), a blog (for elder individuals), or both (for US health providers), all the users produce value co-creation for the platform, by adding new information and insights from the specific community. The customer segments are the main reason in the creation of a Social Community Model for digital platform. Generally, they refer to a social group or to a country. Another shared trait for the Social Communities is that they are created by non-profit organizations, Ministry, sponsored or created as part of an EU program. In this case the profits are not the target, so the platform maintenance and development costs are covered by the institutions which are financing the considered case studies in full. This type of digital platform business model has not been identified in the literature and provides a framework for future research on the subject.

5.3 The Social software ecosystem model

The third identified digital platform business model is the Software Ecosystem, in which the key resource is the digital platform, which serves as a center of gravity for the ecosystem. In the cases of software ecosystems (included in Table 3), we have considered one of the key resources is also the hardware, the devices which are used for the access of the platform and the coding, but in our case studies we couldn't find that explicitly written. However, we will consider these resources being implicit since the piece of software cannot be developed without it.

The key activities of the Software Ecosystem case studies are the platform development, and maintenance. As the owners of the platform, they can also work on the development of the platform, but the scope of developing an ecosystem is to get the development from the other actors involved. The work of the platform administrators is to integrate all the developments as to make part of the whole, and to facilitate their sharing with the other parties interested.

The developers are normally the most important partners in the Software Ecosystem model. The unique trait of a model like this is that most of the consumers of the code products are also the developers. In the first case study identified there are also selling partners which will be in charge of promoting the platform and its products on to a larger variety of people, and service providers which will enrich the finite products with some value-adding services. However, they are in charge of their own activities and will the additional fee for their services. The way in which the companies from the case studies keep their customer relationships is by creating a network effect in-between the users. The customers, being contributors to the platform, most of the times they are developers as well.

Table 3. Business model #3: Software Ecosystem

Author, Year	Publication	Key Partners	Key Activities	Key Resources	Value Proposition	Customer Relationship	Channels	Customer Segments	Cost Structure	Revenue Streams
Blaschke et al., (2018)	Conference Proceedings	Contributors (build partners) Sell partners Service partners (end-user implementation)	Platform development & maintenance	Digital Platform	IT infrastructure for building new and existing applications in a secure cloud-computing environment	Network effect Customers can be contributors Co-creation	Digital channels	Large enterprises (multinational)	Platform maintenance and development Costs for services	Fee for applications Fee for services
Esposito de Falco et al., (2017)	Production Planning & Control	Developers	Platform development & maintenance	Digital Platform	Open Innovation for value chain Offers IT infrastructure for developers	Network effect Customers can be contributors Co-creation	Digital channels	Italy	Platform maintenance and development	Transaction fee
Hilbolling et al., (2020)	Journal of Product Innovation Management	Developers	Platform development & maintenance	Digital Platform	Open innovation, updating and enhancing apps Co-creation	Network effect	Digital channels	Worldwide 20+	Platform maintenance and development	Percentage per product

Source: authors' own research

The channels for reaching the desired target marked are exclusively digital, since there is no need for any physical or direct contact in the IT industry. The customer segments are determined by the desired state of the digital platform, or by deciding the desired origin of the actors involved. For the first case, the Software Ecosystem is targeted for the large multinational enterprises. The revenue streams come from the sale of the physical product and the application which adds to it. We can conclude that this model is indeed creating a software ecosystem, since it aligns with the literature on this subject, but there is no evidence in the business model literature of anyone trying to formalize this archetype, because it links partners with different business models.

5.3 The Social digital product model

The fourth and last archetype identified is the Digital Product business model. As we have observed in this analysis, the digital platform is the software product which is being sold by the company, or at least a part of the final product sold. For this final model we have selected 3 of the 25 case studies which were analyzed (as seen in Table 4).

We will first address the key partners of a digital product modelled company. Two out of three cases do not have any partners. That is due to the fact that these companies are handling the creation of the digital platform and its functionalities since it's their business purpose. For the third case study considered in this model, there is a more complex product, in which the developers are partners, and the original company is an agriculture one, and sets its purpose to improve cultivation and digitalize the process.

From all three case studies we can extract the Digital Platform as the key resource of the company. Besides the human resources involved in the development of the platform, there is no need for any other resource if the sold product is the platform itself.

The key activities of the digital product case studies are the platform creation, development, and maintenance. They are handling all the maintenance and future developments made on the platform, with the clients being only users. However, the developers need to keep up with the feedback from the clients, with the technical developments of the devices, or fix existing problems, therefore they need to constantly work on the quality of the digital product offered. The upgrades are sent and can easily overwrite the modified modules of the platform. The key activities are providing a clear overview of the costs incurred by the company. Their cost structure will include the creation, development and maintenance of the digital platform. The last clear characteristic of the Digital Product Model is that all the considered case studies are using digital channels to reach their users, there is no need for physical interaction between them. From this point on, there is no other common element which can contribute to the formalization of the Digital Product Model.

Table 4. Business model #4: Digital product

Author, Year	Publication	Key Partners	Key Activities	Key Resources	Value Proposition	Customer Relationship	Channels	Customer Segments	Cost Structure	Revenue
Bellini et al., (2016)	Lecture Notes in Business Information Processing	-	Platform creation, development and maintenance Implementation services	Digital platform	Facilitate processes and systems through platform of advanced services	Self-service	Digital channels	Italy SMEs and professionals Construction & consulting companies Small offices	Platform creation, maintenance, development Costs for services	Yearly fee
Mancha et al., (2018)	Journal of Information Technology Case and Application Research	-	Platform creation, development and maintenance	Mobile Digital Platform	Instant communication platform with location-based services Money management	Community	Digital channels	Niches Places with events, concerts, restaurants	Platform creation, maintenance, development	Ads
Zamora-Izquierdo et al., (2019)	Biosystems Engineering	Manufacturers Third-party developers	Platform creation, development, maintenance, and update	Digital Platform Soil sensors	Create soil moisture profiles for regions Create personalized cultivation program	Network effect Customers can be contributors Co-creation	Digital channels	Spain Cultivators	Platform creation, maintenance and development	Product price

Source: authors' own research

6. Conclusions

The purpose of this final work was to observe the mostly used business models of digital platforms, whether they are the facilitator of different activities, or the product itself. In order to identify these models, we scanned the existing literature on digital platforms, focusing solely on papers which described at least one case study analysis. The theoretical framework for the business model analysis was the Business model Canvas, using its elements as criteria for extraction: Key Partners, Key Activities, Key Resources, Value proposition, Customer relationships, Channels, Customer segments, Cost structure and Revenue streams. Only the case studies which had identifiable canvas elements were included.

After the creation of a database for case studies, we have been able to identify four different archetypes for business model platforms, looking for similar uses of the digital platform: Marketplace Model, Social Community Model, Software Ecosystem Model, Digital product model.

The first model identified is using the digital platform as a facilitator for the creation of a marketplace, linking providers/sellers and users/consumers. These types of companies do not own any resources besides the platform, and do not get engaged in any of the selling activities. Their revenue comes from the fee on transactions or value-added services (delivery). The second model is using the digital platform to create benefits for social community, generally having no financial gains. In many cases these companies are part of a national or European development program. The third model is focusing on creating an ecosystem around the software platform. The characteristic of interactions between the actors and the platform owners is the co-creation of value. The last identified model is working as a standard company, except their product is the digital platform. They generally only need to manage the maintenance and development of the platform, together with the insights form the users, removing the need for tangible assets and manufacturing costs.

Based on the considered literature, we can conclude that two of these cases have already been studied in the business model literature: the Marketplace and the Digital Product. The Software Ecosystem model is studied from an Information Systems paradigm but has never been conceptualized from a business model perspective, making this a relevant future research opportunity. The Social Community model has also not been identified in the literature. The last two mentioned models represent 40 per cent of the total identified case studies, thus giving us clear indications of their relevance, and are providing us with possible future research on the topic of business models. The novelty of this study comes not only from creating a multiple-case study of the digital platforms and their role in the companies' business models, but also identifies two new Digital Platform Business Models.

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