Journal of Engineering and Technology Management 70 (2023) 101779

Contents lists available at ScienceDirect

Journal of Engineering and Technology Management

journal homepage: www.elsevier.com/locate/jengtecman

Platform enhancers: Collaborating in the early stages of transactional platform development

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ARTICLE INFO

Keywords:
Digital Platform
Two-sided Platforms
Platform Enhancers
Transactional Platforms
Multi-Sided Platforms
Ecosystem

ABSTRACT

Transactional platforms have emerged over the last decades as a dominant business configuration, receiving substantial attention from scholars and practitioners in several fields. Despite their pivoltal role, several transactional platforms fail in the launching phase, given the difficulties of reaching a critical mass and igniting cross-side network externalities. In this study we explore how a platform provider can introduce a collaborative framework from the earliest stages of platform development, aiming to highlight the benefits and challenges of moving towards a wider ecosystem through the involvement of other players. We introduce the role of platform enhancer, who is neither a supply side or a complementor, but a specific role aiming to support the platform provider in the launch and growth of the platform. We rely a single exploratory case study based on the Italian platform for digital identity, created and managed by the Italian Government through the support of a set of companies working as identity providers. Platform enhancers collaborate with the platform provider in the launch and development of a transactional platform, generating opportunities at both the launch and development stages, yet also substantial challenges and criticalities linked to increasing complexity, which climbs with the number of enhancers involved, producing coopetitive dynamics.

1. Introduction

The scholarly interest in platforms and their impact across numerous industries continues to rise, exemplified by a growing body of literature (Kenney et al., 2021; Trabucchi et al., 2019). This interest can be attributed to the rapid and unprecedented expansion of companies like Uber and Airbnb, which operate under unique business models not seen in traditional business sectors (Täuscher and Laudien, 2018).

Various industries have been disrupted or transformed due to the emergence of platforms (Kenney et al., 2021). Some, like the taxi and hospitality sectors, underwent disruption due to the entry of players like Uber and Airbnb, while others, like retail, faced both challenges and opportunities, necessitating a shift towards new equilibria in value generation and capture.

Platform-related theories have been developed as a cornerstone in management studies. Recently, consensus has been reached within the academic community regarding the two primary types of platforms: innovation and transactional. The former, represented by products like the iPhone, can catalyse additional innovation from application developers and other entities. The latter, such as

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https://doi.org/10.1016/j.jengtecman.2023.101779
Received 24 September 2022; Received in revised form 31 July 2023; Accepted 17 October 2023

Airbnb or Uber, function by facilitating transactions between demand and supply sides (Cusumano et al., 2019; Gawer, 2021). This research paper concentrates on transactional platforms, a concept derived from economic studies and that was first introduced by Rochet and Tirole (2003) to describe a two-sided market. These markets enable transactions between two or more customer groups via a facilitator, or Platform Provider (PP), generating indirect network externalities (Katz and Shapiro, 1985).

Transactional platforms have revolutionized various industries and changed daily life of millions of people. Aside from Airbnb, Uber, and Amazon, there are numerous other examples like Booking.com, Glovo, Deliveroo, DoorDash, eBay, and PayPal. Despite the abundance of successful platforms, there are also many that have failed. Yoffie et al. (2019) investigated the primary causes of platform failure, highlighting that the initial stages of transactional platforms are especially precarious.

The inherent challenge of launching a platform was aptly illustrated by the "chicken and egg" paradox, proposed by Caillaud and Jullien (2003). This refers to the core characteristic of transactional platforms, where the value for one group is tied to the number of participants on the other side. This relationship can create cross-side network externalities that may lead to exponential growth once initiated but also highlights the sensitivity of a platform's initial stages (Muzellec et al., 2015). Consequently, researchers have examined successful platforms to understand the strategies employed to navigate this paradox (Evans and Schmalensee, 2016; Stummer et al., 2018). Yet, resolving it is only a preliminary step, and many platforms fail due to their inability to rapidly attract a critical mass of participants from both sides (Yoffie et al., 2019; Muzellec et al., 2015).

The launch and the period immediately following are still perceived as the most significant phases for a platform's survival (Van Alstyne et al., 2016). Even successful platforms, such as Airbnb, often took many years to establish their market position (Choudary et al., 2016). These narratives are commonly found among successful platforms, most of which began as start-ups that capitalized on the advantages of platform mechanisms and lean asset structures (Täuscher & Laudien, 2018).

However, increasing cases of established organizations fostering innovation through platform mechanisms are being reported (Dell'Era et al., 2021). Several of these organizations collaborate with other firms (Tian et al., 2020). This trend aligns with the open innovation paradigm (Chesbrough, 2003), but more precisely, the concept of collaborative innovation (Pisano and Verganti, 2008) underscores the potential for multiple organizations to collaborate on launching a new product or service, such as in consortiums or joint ventures.

We aim to explore collaboration mechanisms in the context of transactional platforms, where value creation is inherently outsourced to the demand and supply sides (Rochet and Tirole, 2003). This outsourcing, however, also presents significant challenges in the early phases, giving rise to the "chicken and egg" paradox (Evans, 2003). What if other entities could assist the PP during these initial stages? Which could be the critical elements and dynamics of collaboration when launching a transactional platform?

This research focuses on examining the collaborative strategies set during the initial development stages of a platform, using a single case study – SPID, the Italian platform for digital identity – which was established with the early involvement of several partners.

The paper is structured as follows: the second section provides the theoretical foundation, introducing transactional platforms' primary characteristics and the role of collaboration in previous literature. The third section outlines the research methodology. Sections four and five present and discuss findings. The final section discusses the theoretical and managerial implications of the results.

2. Theoretical background

The literature on transactional platforms is both extensive and constantly evolving (Trabucchi and Buganza, 2021). In this section, our purpose is to provide a clear overview of the topic, building our work across two main sections. The first concerns the business perspective on this kind of platform, highlighting the main opportunities and challenges. In the second section, we delve into the collaborative aspect of transactional platforms, to draw out the gap in knowledge upon which this paper builds.

2.1. Transactional platforms in the business and management literature

Although transactional platforms were first studied in economic literature for their complex dynamics concerning pricing mechanisms (e.g. Parker and Van Alstyne, 2005), because of their peculiarities they soon reached the business and management spheres (Gawer and Cusumano, 2014; Liu et al., 2021). Several scholars have explored the features of transactional platforms from various perspectives, focusing mainly on the opportunities they enable. Platforms tend offering great potential, especially once they reach their mature phase (Gawer, 2020). After achieving sufficient critical mass, platforms tend to be easily scaled up (Choudary et al., 2019), usually because of their zero marginal cost structure (Rifkin, 2014) and capacity to leverage on the consequential network externalities to reach relevant positions in an industry (Iansiti and Lakhani, 2017). These intrinsic opportunities open the doors to various streams of research where transactional platforms are considered to be a new business model with the immense potential of creating and capturing value (Amit and Han, 2017) and a great opportunity for startups (e.g. Täuscher and Laudien, 2018), as well as providing considerable scope for innovation in existing companies operating in both B2C (Dell'Era et al., 2021) and B2B (Tian et al., 2021).

Creating a platform also involves major challenges, especially during the early days (Gawer, 2020). The different stages in the platform life-cycle have been highlighted in various papers, from the "embryonic", "emergent", "growing" and "maturity" stages proposed by Muzellec et al. (2015), to the "initiating", "transitioning" and "strengthening" stages proposed by Tian et al. (2021) and the "birth", "expansion", "leadership" and "renewal" phases proposed by Teece (2017). While the labelling differs, the message is one: the early stages are critical for the survival of the platform, as they are where the greatest challenges are naturally embedded.

First of all, it is necessary for both sides to be on board from the very beginning, although the platform's intrinsic value is null (Caillaud and Jullien, 2003). This introduces the chicken-and-egg paradox (Stummer et al., 2018), as mentioned in the introduction,

which remains one of the most common fatal issues when setting up a new platform (Yoffie et al. 2019). Moreover, bringing on board the two sides requires the ability to define a double value proposition valid for all parties involved (Muzellec et al., 2015). Although dealing with demand and supply as the two sides involved (Täuscher and Laudien, 2018), the PP needs to identify an ad hoc meaningful value proposition to predispose them towards joining the platform (Muzellec et al., 2015).

This aspect has been covered widely in recent literature. The possibility of having a viable and successful transactional platform is dependent on also having engaged and active users on both sides who participate in the value creation logic (Gawer, 2021). Among others, Laczko and et al. (2019) proposed a framework to align all platform participants and engage with them to enhance the profitability of the platform itself – highlighting the critical role of alignment among players. Their study focused on the maturity phase. Similarly, Aarikka-Stenroos et al. (2017) took a wider perspective on innovation ecosystems and underlined the need to motivate all the parties involved to create proper value. The interplay between platform and ecosystem literature (Jacobides et al., 2018) leads to the next sub-section, which concentrates on the role of collaboration in platform dynamics.

2.2. Platforms, ecosystems and the role of collaboration: the research gap

The theory of entry in the ecosystems is still nascent and in strong evolution (Bogers et al., 2019). Many studies increasingly highligh the difficulties of approaching and launching digital transformation projects (e.g., D'Ippolito et al., 2019; Correani et al., 2020; Appio et al., 2021). Platforms, and more broadly ecosystems, are often considered as a tool or an approach to foster digital transformation. Indeed, a significant stream of literature on "platform ecosystems" takes a slightly different perspective on the concept of platforms, considering how actors organize themselves around a platform (Jacobides et al., 2018; Granstrand amd Holgersson, 2020). Most of the literature on ecosystems shows that there is usually a "keystone firm" (Iansiti and Levien, 2004) or "lead firm" (Williamson and De Meyer, 2012), which sets the overall system goal and defines the ecosystem's governance and rules. In platform literature, this firm is usually referred to as the PP. Once the basic structure of the ecosystem has been defined, the actors join their respective platforms to create and capture value (e.g. Ceccagnoli et al., 2012; Huang, et al., 2013; Iansiti and Levien, 2004; Perks et al., 2017; Kapoor, 2018; Zhu, 2019). The main rationale behind this strategic decision relates to the value that can be created through inter-organisational relationships. Nevertheless, to profit from these relationships, a PP must secure the value it helps creating (Dyer and Singh, 1998).

Recent literature on platform boundaries shows that, in the maturity phase, there is a general tendency to collaborate with external players to broaden the platform's scope and explore the benefits and opportunities of being a platform (Gawer, 2020). In other words, collaboration with different players, which could form a new (third or greater) side, may: (1) offer the chance to identify new streams of revenues arising from data exploitation (Trabucchi and Buganza, 2020); (2) lead to hybrid forms whereby innovation platforms are constructed on top of a two- or multi-sided structure (Cusumano et al., 2019); (3) open the possibility of several platforms benefiting by joining up (Gawer, 2020).

This literature stream brought to light the peculiar nature of the relationship between the PP and the customers on both sides. Any player involved in a transactional platform also participates in value creation operations (Amit and Hen, 2017; Möller and Halinen, 2017), generating cross-side network externalities that enable the platform to expand (Katz and Shapiro, 1985), but also challenges to be solved. For instance, while studying a B2B platform, Zhang et al. (2021) noted that a shift towards a platform model can generate coopetitive dynamics between the PP and the participants. This means giving the PP a critical role in the management of the relationships within the ecosystem, so that all the participants can collaborate enabling the platform to grow (Bonina et al., 2021), with studies that show how the PP may be the party creating friction with participants on all sides (Chen et al., 2020).

Additionally, recent studies in the car sharing industry have shown that coopetitive behaviour among various PPs proved to be a successful strategy to overcome market resistance and increase the individual company's ability to reach the critical mass needed to be successful (Trabucchi and Buganza, 2020).

This overview has exposed the critical role of collaboration inside and outside a platform in view of properly exploiting the benefits of its transactional structure. It also emerged that a collaborative approach can help solving the challenges uncovered in the previous sub-section. Veisdal (2020) showed that a proper collaborative approach, built with the supply side, can become an effective strategy to solve the chicken-and-egg paradox when launching a platform.

Nevertheless, Veisdal (2020) produced one of the few studies that focuses on the collaborative facet in the early stages of platform development, while other works tend concentrating on the mature stages. According to Shi et al. (2021), the PPs' capabilities and activity in platform development are not yet fully understood, and they asked for more empirical evidence on how managing collaboration at the early stages so as to establish network effects, in that "*most of the studies focused on de facto successful platforms, while few focused on a longitudinal creation and evolution of a platform*" (Shi et al., 2021).

In other words, research has already shown that collaboration involving various kinds of partners at the maturity stage will lead to a set of benefits for both the PP and the platform users, while there is still scant evidence on the potential benefits of a collaborative approach when launching a platform, overcoming the chicken-and-egg paradox and reaching the minimum viable structure to operate sooner.

3. Methodology

We used a three-step approach to guide our study. Firstly, we selected a proper case study to answer our research questions. Secondly, we gathered empirical evidence on our case. Thirdly, we analysed the data extracted from the empirical evidence and built our theoretical framework.

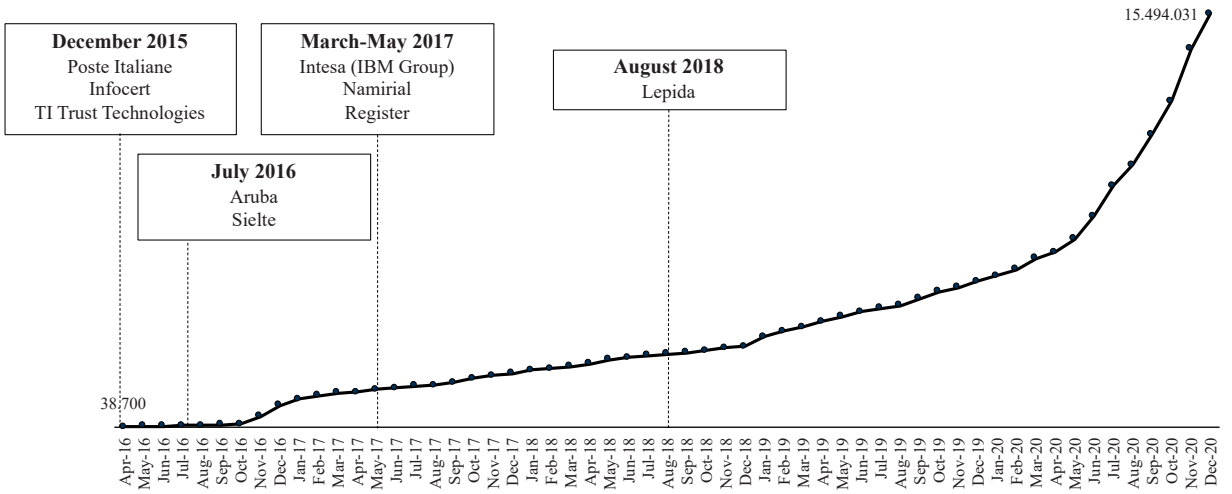

Fig. 1. IdPs over time (boxes) and identities over time (cumulative).

Our objective was to conduct an exhaustive investigation into the early stages of platform development. Thus, we deemed an individual case study appropriate to answer our research questions (Yin, 2008). In particular, we followed the approach suggested by Siggelkow (2007), considering our case as a "talking pig", and pushing towards a single case study.

This paper builds on the case of SPID, which has been launched through the help of many established firms that joined the platform launch not as a supply-side (or neither as a complementor), but literally as a partner (later defined as Platform Enhancer) with the purpose of facilitating the diffusion and take off of the platform.

The peculiarity of the case, being different from any other case previously seen in the literature, encourage the development of a single case study.

3.1. The case of SPID: case selection

We analysed Italy's Public Digital Identity System (SPID[1]), a platform developed in 2014 by the Italian Digitalisation Agency (AgID[2]). The SPID is an ideal case for addressing our research questions for the following reasons.

Firstly, the system creates a unique and secure digital identity potentially for every Italian citizen, enabling people to place full trust in authenticating and accessing online services offered by public and private entities (Service Providers, SPs), which will be labelled as the supply-side. The SPID is thus a platform that matches citizens (the first side) who need a unique set of credentials to access different online services seamlessly, with the providers of these services (the second side) who are trying to expand their customer base and manage it through a highly secure and frictionless authentication method.

Secondly, the SPID slots into an ecosystem where various actors gave their active support to AgID in developing the platform. AgID involved many companies in this process in order to speed up the work to complete and launch the platform and expand its usage (Fig. 1). These companies act as Identity Providers (IdPs) and (1) issue digital identities to citizens on the behalf of AgID, handling all aspects associated to their formal recognition, and (2) manage all phases in the authentication of citizens who access the online services offered by affiliated SPs.[3] By law, all Italian public administration authorities must provide their online services through the SPID system. Private SPs can choose whether to join the SPID and, if they do, they too can benefit from the IdPs' investments to ensure that the platform abides by the latest European privacy and security policies and regulations on digital identity management. The IdPs see the SPID as a business opportunity, even though digital identities are allocated at no cost to Italian citizens and public authorities do not pay for their online services to be authenticated. In practice, the IdPs can sell further services that complement those provided by the SPID (e.g. digital signatures), and are reimbursed for handling the authentication process for private SPs, who can thus free themselves from proprietary systems and the need to invest in their upgrades.

The SPID was thus launched and is managed through an intense collaborative configuration involving several actors, all interested in the platform's success. The case is particularly interesting because, since 2017, the AgID has been supported in the SPID's development by the Digital Transformation Team (DTT[4]), another technical government agency that acts as a complementary PP and whose dynamics also need investigations.

[1] SPID stands for "*Sistema Pubblico per l'Identità Digitale*". For further information: www.spid.gov.it.

[2] AgID stands for "*Agenzia per l'Italia Digitale*". AgID is a technical agency responsible for the implementation of the Italian digital transformation policy under the oversight of the country's Presidency of the Council of Ministers. For further information: www.agid.gov.it.

[3] See World Bank (2018) for a detailed description of these phases.

[4] For further information, go to https://teamdigitale.governo.it

Table 1
List of interviewees.

Typology	Organisation	Role of the interviewee	N° interviews
Identity Provider (IdP)	Poste Italiane	SPID project manager	2
	Infocert	SPID project manager	2
	Sielte	SPID project manager	1
	Aruba	SPID project manager	1
	Register	SPID project manager	2
Platform Provider (PP)	AgID	Agency director	1
		Head of the SPID project	2
	DTT	Head of the SPID project	2
Private Service Provider (SP)	Acquirente Unico	Head of Strategic Development	1

The coordination and alignment of all these actors were the aim of periodic technical meetings, initially held every two months, which brought together the government bodies (AgID and DDT), responsible for the regulatory and strategic development of the SPID platform, and the IdPs, focused on its technological development, on initiatives to enhance its diffusion, and on relations with end users.

The IdPs are also important players in the market of trust services designated by the European eIDAS regulation,[5] such as electronic signature and seal, with which the SPID digital identity is strongly synergic. For these players, the SPID identity is the complement to this value proposition, enriching the portfolio of services offered to their customers and allowing them to exploit synergies in the provision of digital identity, thanks to the exploitation of the secure user identification carried out to provide other trust services.

Owing to the joint effort between AgID, the TTD and all the IdPs, the overall distribution of SPID identities is steadily increasing.[6] As of July 2023, more than 14,000 SPs have affiliated with SPID and more than 35 million digital identities have been released (approximately equal to 58% of Italian population).

Summarizing, SPID has a classical transactional structure with end-users (the citizens) on the one side, and service providers on the supply-side. Still, to launch and let it grow, the PP (AgID and DTT) decided to involve other companies (IdPs) to externalize some of the activities conceptually managed by the platform (the check of the identity) and to facilitate the launch of the platform itself (since many IdPs as a broad, physical, and diversified network of users). The IdPs are not complementors (e.g., they are not fostering innovation on top of a technological platform, developing their own software or apps to deploy a different service that would enhance the overall value of the platform for the end-users, as defined by Gawer and Cusumano in 2014). They are partners that are collaborating with the PP to launch the platform and enable its basic work. This type of relationship has not a definition in the literature, it is not coherent with the definition neither of supply side neither of complementors, making this kind of relationship a “talking pig” that worth exploration to understand something more about the launching strategies of transactional platforms (Siggelkow, 2007).

3.2. Data collection and data analysis

Following the suggestions set out in the literature, this research drew on several sources of data (Eisenhardt and Graebner, 2007). Significant information was initially collected from secondary sources, such as institutional and provider websites, news items, blogs, etc. Subsequently, between May and October 2019, we conducted 14 interviews with key SPID platform actors, each lasting over one hour on average (see Table 1). Regarding IdPs, we involved in the analysis the players with the highest number of SPID identities issued and the SPID project managers most active in technical meetings with the government agencies involved (AgID and DDT). Then we included both AgID and DDT and the first private SP that joined the platform, to collect the different perspectives of this ecosystem. We continued to recruit informants until achieving theoretical saturation (Strauss and Corbin, 1990).

The interviews were designed following a common protocol that evolved systematically during the research process (Eisenhardt, 1989).

Potential informant bias was addressed by collecting both real-time and retrospective longitudinal data (Ozcan and Eisenhardt, 2009), with open-ended questions to give informants more scope to relate the facts and express concepts in the way they chose to (as suggested by Koriat and Goldsmith, 2000).

In particular, the informants have been selected aiming to eliminate subjectivity and other biases. Indeed, we triangulated the responses by having more respondents within the PP organization and talking with various IdPs, which played exactly the same role within the system, giving us a chance to compare their answers. The different dimensions of the various IdPs brought to different sentiments of the experience in the launching process, which emerged during the interviews. The goal of our study was to understand the dynamics of collaboration. Hearing different types of sentiments gave us the chance to reinforce the robustness of our findings, which focus on exactly these dynamics.

After having transcribed each interview verbatim, a coding procedure was performed. We adopted an inductive and iterative methodology to examine the case study. This entailed analysing the resulting data repository in accordance with the approach delineated by Miles & Huberman (1984), who propose that, within a body of evidence, one can initially discern varying patterns that

[5] For further information: https://www.enisa.europa.eu/topics/trust-services
[6] For an update on SPID diffusion, check https://avanzamentodigitale.italia.it/it/progetto/spid (in Italian).

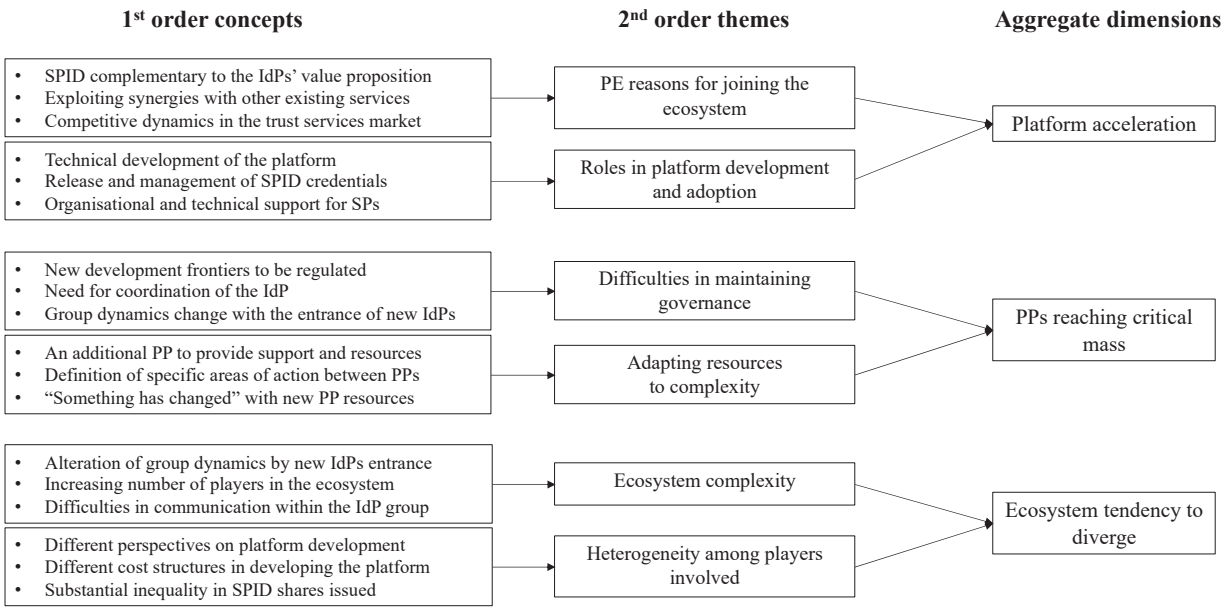

Fig. 2. Data structure of the coding procedure.

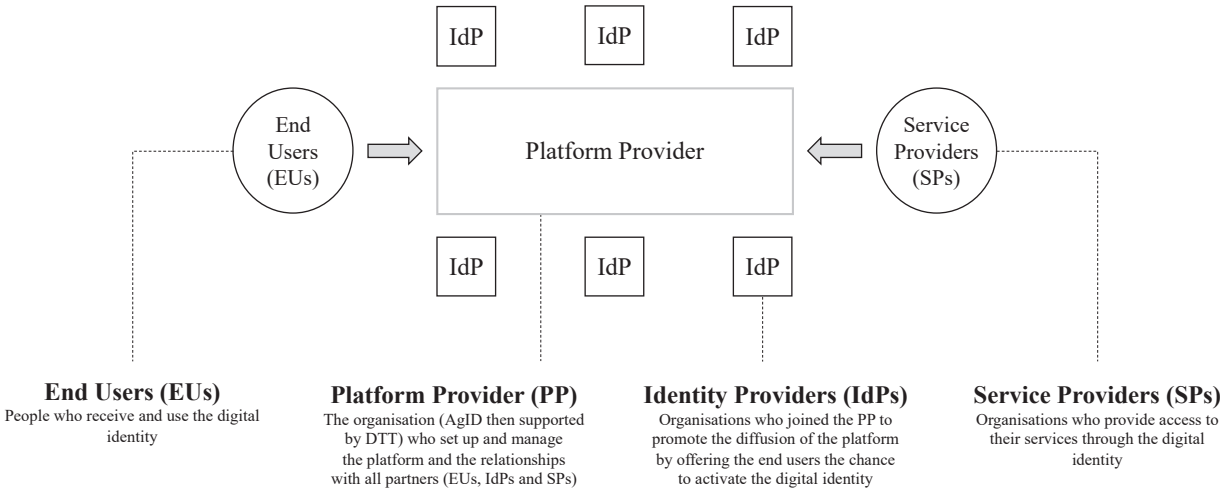

Fig. 3. SPID structure and players.

highlight both similarities and disparities across categories, and subsequently identify patterns of processes which reveal linkages in terms of time and space within a defined context. Therefore, the first step of data analysis involved categorization, followed by contextualization. The categorization process sought to dissect the information, spotlighting key components related to the mechanisms of transactional platforms. In the first part of this analysis, specific labels were assigned to the salient points emerged, sometimes applying the same words used by the interviewee to remain faithful to the empirical evidence. Subsequently, a second order analysis was run on this first set of labels, in order to categorise and group them, according to their sphere of pertinence.

In the subsequent analysis, we circulated between the emergent theory, case data and literature, to refine the emerging construct definitions, abstraction levels and theoretical relationships, linking them with literature of transactional platforms (Gilbert, 2005). In order to converge on a parsimonious set of constructs, we focused only on the most robust findings. Fig. 2 shows the data structure of the coding procedure.

4. Results

The SPID is Italy's Public Digital Identity System, which was developed by the Italian Digitalisation Agency (AgID) with the support of the Digital Transformation Team (DTT). AgID and DTT together are the Platform Provider (PP), which is in charge of managing

relationships with the two sides, the evolution of the platform and all the other tasks that fall under the responsibility of the central player in a transactional platform.

To provide a clear and simple understanding of the case, please note that, as reported in Fig. 3, the demand side is represented by the end users (EUs), who need a digital identity to access digital services. On the supply side are the Service Providers (SPs) who decided that joining the SPID would offer a secure and unique access to their digital service.

As briefly mentioned above, the SPID represents an extreme case which can be used to answer our research questions, in that, from the very early days, it has been in a collaborative relationship with a group of companies, known as Identity Providers (IdPs), which do not belong to either the demand or the supply side, but have been playing an active and critical role in disseminating the platform. The IdPs issue digital identities and manage the authentication process, and include, among others, companies like Poste Italiane (the Italian postal service) and TIM (a leading Italian telecommunications player). Giving citizens widespread access to these organisations has significantly increased the usage of the SPID, as will be described in the next sections. For this reason, studying the relationship between the PP and the IdPs is a relevant case that can provide answers to our research questions.

The IdPs are mainly accredited trust services and IT solution providers that consider the SPID to be complementary to their value proposition and a synergic platform for the services already in their portfolios. Especially at the early stages of platform development, systematic coordination among the IdPs was essential for its diffusion. For this reason, the PP organised (and organise) periodic meetings with the IdPs to discuss technical standards and strategic developments for the SPID. The outcome of these meetings is to prepare updated guidelines to improve the platform, which are then adopted uniformly by the IdPs. In addition to technical development, the IdPs play a pivotal role in SPID adoption.

AgID initially decided to bring in, as IdPs, big players who were already operating in the trust services market. But within a few months after the platform went live, many other smaller players decided to join the ecosystem:

> *"Other smaller and more agile IdPs are there because they believe in the mission of digitalising our country."* (PP_2 manager)

Less than a year after its launch, five accredited IdPs were already involved in the SPID ecosystem and they immediately started to bring in their users on both sides of the platform. Several IdPs started to bring out initiatives to encourage public SPs and end users to adopt the SPID. As they were already providing IT solutions to some public entities, they promoted their projects to migrate PA proprietary credentials to the SPID and provided continuous support in training staff and raising awareness among end users. As an IdP manager explained:

> "*We've launched several initiatives with central and local public SPs. For instance, we offered to help the City of Milan and the Region of Tuscany with the digital identities of users wanting to use their services. We're also running events on this subject and providing assistance to front-end operators*." (IdP_1 manager)

These first two quotes let emerge how some partners have been searched by the PP, while others joined the project throughout believing in its mission and economic potential. Second, the IdPs played a critical role in creating awareness around the project.

Alongside these projects, central government ran initiatives with special offers (including monetary ones) and services only available through the SPID, to drive its adoption further.

As a result of all these initiatives and synergies, the SPID grew by 48% in 2018, while its 2019 growth rate was about 61%, with 15 million digital identities issued by December 2020 and 35 in July 2023.

To understand how the platform evolved up to this point, it is important to analyse the continuous interplay between the PP and the IdPs and the evolution to the SPID ecosystem.

4.1. Critical mass of the platform provider

During the launch phase, the Government promoted the platform through incentives offered to teachers and young adults. At the same time, public SPs were starting to join and provide their services through the SPID. The platform was used by 1 million citizens as of January 2017.

At this point, the context was becoming complex. As the SPID is a platform, it was necessary, on the one hand, to act on the SPs to channel them towards adopting the SPID and, on the other, to try and bring more citizens on board. Moreover, new IdPs were joining the ecosystem and their group was swelling with a heterogeneous array of new actors.

In addition, considering that the platform was continuing to grow and new types of services and possible extensions to existing ones were on the horizon, it was necessary to regulate these aspects effectively and rather quickly. Lastly, AgID has also been called upon to maintain relations with the European Commission concerning international tables on digital identity.

The development of the platform and coordination of the IdPs group were beginning to be negatively affected by the AgID's saturation problem and its lack of time and resources.

It was becoming impossible for the PP to carry out projects or to regulate the use of the SPID, for lack of time and dedicated material resources:

> "*So, the problem is always that when we propose things, the answer is always: "It's not our job, we don't have enough resources to do it, we have a lot of work to do"*. (PP_2 manager)

Furthermore, the meetings with the IdPs to define the platform's strategic and technical aspects were becoming progressively less frequent. As pointed out by an IdP manager regarding the meetings calendar:

> *"At the early stages of platform development, AgID held a meeting every two months, but then it became about once every six months. There has been a significant drop in frequency."* (IdP_1 manager)

Doubts began to surface about the business model among the IdPs, which until then had continued to invest without seeing any return, especially as they were required to provide people with a digital identity for free, a stipulation that initially was to be in effect for the first two years of the platform's life, but was subsequently prolonged. The IdPs had seen no return in the short term and, additionally, leadership in the platform was becoming increasingly blurred. As reported by an IdP manager:

> "*We used to have technical meetings every month, now they are only once in a while. Let's say it's more of a check on work progress than any sort of decision-making coordination. There are very few occasions for taking decisions, actually there are none at all."* (IdP_2 manager)

To address the growing complexity in managing the context and the constant opening of new fronts of work for the SPID, the Government established the Digital Transformation Team, DTT, as support to the AgID, which it joined in February 2017.

The entry of the DTT was beneficial in the development and spread of the platform, introducing a new perspective on the SPID and its evolution. As pointed out by an IdP manager:

> *"The DTT is much closer to what the SPs and the end users are doing than the AgID, so it is much more sensitive to aspects of simplification and digital transformation within organisations."* (IdP_1 manager)

This matter was also raised by the AgID manager, who defined the perimeters of their respective spheres of action in this way:

> *"The DDT is working hard to provide support to public SPs, so that their services can be accessed* via *the SPID. This is a very important job and we cannot carry it out, as we are already overseeing the governance of the platform and wouldn't have enough resources to do both." (AgID manager)*

Another factor impacting on the platform's evolution was the work to coordinate and standardise the input of individual IdPs, steering them all in the same direction. The DTT identified critical issues and proposed new strategic and technical solutions, consistent with the different SPID use cases and market requirements. Here is the viewpoint of an IdP on this subject:

> *"The DDT brought in new energy to boost development, proposing new solutions for the SPID in line with market requirements and the most advanced technological standards. The IdPs greatly appreciated this shot in the arm, especially the more innovative which are particularly sensitive to these issues."* (IdP_1 manager)

This aspect is worth noting to understand how the role of the PP was evolving. Initially, when the SPID ecosystem was not so complex and the actors to coordinate were few, the PP was in dialogue with each single IdP to define how the platform should evolve. As the number and heterogeneity of the IdPs increased, it became to complicated to keep up dialogue, so coordination shifted to the definition of technical standards and a shared strategic development roadmap. As summarised by another IdP:

> *"Ever since the DTT has been involved, with its more "technical" speak, something has changed."* (IdP_4 manager)

Summing up, at the early stages in SPID development, the number of IdPs involved in the ecosystem was small enough to be managed by the AgID alone. However, as the complexity grew, there was the need for additional resources to control and manage the SPID to avoid an impasse. Therefore, the DTT was ushered in to support the AgID, and it brought a new perspective on the technological and strategic development of the platform, and enabled its ecosystem to be managed more effectively.

4.2. Number and heterogeneity of identity providers in the platform ecosystem

Despite the steady growth of the SPID, problems began to arise within the group of IdPs, as now increasingly different positions were emerging during the technical meetings. Some of the later joiners were smaller than the first IdPs and had come from markets other than the trust service sector. Many interviewees showed how this profusion of IdPs was strongly influencing their relationships within the ecosystem.

> "*In the past when we were few, there was stronger coordination among IdPs, but it was stifled when smaller businesses entered the scene*" (IdP_2 manager)

This point can be traced back to two factors, the situation regarding the diffusion of the platform and the growth in number of IdPs involved in the process. As an IdP manager explained:

> "*Afterwards, when the others had joined, especially latterly, either because there were now more IdPs, or because the system had then gone live, there was no longer the sense of togetherness of the initial group. We were not "in tune" anymore."* (IdP_1 manager)

Over time, interaction and communication had reduced significantly and what there was, was limited to institutional and formal contexts, and their relationships had cooled. An IdP manager explained:

> "*Talking about coordination and communication, there are periodic meetings organised by the AgID to review work progress. We communicate less and less between ourselves, except on those occasions, and decisions are discussed at those meetings in a very formal way*." (IdP_1 manager)

As highlighted in the interviews, the causes of this "estrangement" were mainly due to two factors. Coordination had become less urgent, because at that time the platform was growing and, at the same time, coordination had become increasingly difficult, because different and often little-known actors were joining the group. This change was clearly visible even from the PP's privileged viewpoint:

> "*It is extremely difficult to coordinate the different IdPs, as they cannot organise themselves to align with each other on the topics of concern. There is an IdP that [.] has many identities, and other smaller and more agile IdPs which believe in this type of mission, but we can't get them to work together properly.*" (PP_2 manager)

As a result, the situation became such that, whenever it was necessary to decide on SPID matters at technical meetings, it had become complicated and laborious to reach a common position.

The dynamic nature of these relationships as they shifted over time is another point to consider. With the arrival of new actors, relationships changed, communication became increasingly formal and less frequent. Strategic coordination consequently failed just at the time when the profusion of actors made it all the more necessary:

> "*There are some small and agile IdPs that are willing to do certain things because they see themselves as essential to improve the system. Some are willing to do other things, perhaps even bigger things, because they have a return on other projects, and there are others still that just stay put and offer their services to the larger IdPs. So, the IdPs' opposition changes depending on the topics covered, because their specific interests diverge, do not always match.*" (PP_2 manager)

As the PP_2 manager explained, any time a proposal is made, there will be opposition and the IdPs will split along two lines, with one group supporting the PP's proposals and another group thinking differently. This lack of agreement between the IdPs' positions, therefore, depends on more than simple numerosity, and must also factor in the tendency to diverge shown by the actors in the second group.

To investigate this point further, the informants were asked to provide more information. As already mentioned, there was a considerable imbalance among the IdPs in the market shares of SPID digital identities issued, as explained by an IdP manager:

> "*The market shares are really unequal, so, in many cases, it is hard to find a common position.*" (IdP_2 manager)

On analysing how this imbalance impacts on the dynamics within the ecosystem, a point to consider is that, at meetings, the smallest IdP has the same clout as the largest because voting runs according to "one member one vote". For these reasons, in many cases, the IdPs were unable to get their individual positions to converge at technical meetings with the PP. When also considering the above dynamics, it is possible to understand how this situation could polarise the IdPs' position towards a majority worried about the business model. The outcome was to slow down the SPID's development, to the benefit of this group of IdPs compared to the few inclined to invest further. Therefore, we can conclude that the strong disparity between the market shares in the SPID platform, combined with the voting mechanism, can be considered a key variable in explaining the ecosystem's dynamics.

Going on, another rift within the IdPs group was highlighted by an IdP manager:

> "*At meetings, we have moved from an optimistic to a pessimistic approach because of the small IdPs wrongly fixating on the return on their investment in the short term, rather than seeing this as the opportunity to acquire future customers for other products/services.*" (IdP_2 manager)

This outlook produced two groups. Some IdPs had a longer-term vision, which led them to take a proactive approach to developing the platform in order to create value in the SPID ecosystem. Other IdPs, instead, mostly tried to avoid making further investment in the SPID and steer the dialogue towards decisions based on a short-term perspective. As observed by another IdP manager:

> "*The fact that the initial proposals change and evolve is just because the requests that come from the AgID, DTT and public SPs [public authorities] are typically unbalanced towards the IdPs. So, it is clear that the IdPs collectively, except in a few cases, will propose changes or solutions that can lead to economic returns in the short or long term.*" (IdP_1 manager)

The PP confirmed the fact that many positions were being taken, and, from its viewpoint, it was finding it increasingly difficult to coordinate the divergent opinions:

> *"Let's talk as an insider at these strategic meetings. This is when an initiative will be presented, a request made, a discussion proposed, a development considered. The outcome is that the biggest IdP says what it thinks, then another gets up and says: 'For us, this thing cannot be done until there is a return on our investment'."* (PP_2 manager)

The same situation was described from the viewpoint of an IdP:

> "*Whenever we are at a technical meeting, it's the occasion to bring out all the problems and things that aren't happening, rather than looking for solutions. Instead, we pull out our grievances and never reach an agreement. You spend hours and hours at meetings and then you always end up with solutions that are never the best, they are just making do, to try and develop as little as possible*." (IdP_4 manager)

In these statements, we see other serious differences between the IdPs, and their impact on the platform, and the work of trying to coordinate all the actors in the ecosystem. Lastly, we can conclude that the different visions of the SPID project can be considered as a key variable to explain the dynamics in the ecosystem.

In summary, we have presented the different physiological facets of the IdP ecosystem from the viewpoints of both the PPs and the single IdPs. We first set out the coordination problem. Then we found its roots, starting from the most evident, the numerosity of the IdP group. We went on to investigate further, finding that the IdP group is also riven by other key factors, i.e. the imbalance in market

shares and the different visions for the SPID platform's investment. These two intrinsic characteristics, which are the result of the profound heterogeneity among the actors in the IdP group, caused divergency within the group over time, a fact that emerged during the meetings, with a negative impact on IdP coordination.

5. Discussion

5.1. Introducing the platform enhancers

The first part of the answer to our research questions lies in our analysis of the role of the IdPs. The empirical case shows that several IdPs were involved from the early days to help launch and disseminate the SPID platform. Various papers cover the concept of platform ecosystems (Jacobides et al., 2018; Bonina et al., 2021) and, remaining on the topic of the specific roles that come into play with transactional platforms, the literature has focused on PPs, also known as keystone firms, and the two or more sides (Iansiti and Levien, 2004; Täuscher and Laudien, 2018; Trabucchi and Buganza, 2021).

These players, however, are not like the other two sides in that they are not demanding or supplying the platform's core service (i.e. accessing a service through a digital identity), therefore cannot be considered demand or supply sides (Täuscher & Laudien, 2018). Moreover, their presence does not generate indirect externalities for the other players, as the usefulness for end users to join the platform still depends on the SPs alone and, vice versa, IdPs are not generating indirect cross-sided network externalities (Rochet and Tirole, 2003). At the same time, they are not even complementors as mentioned in the methodology section, because they are not fostering innovation on top of a foundational technology developed by the PP (Gawer and Cusumano, 2014).

These players are literarily enabling the main service of a transactional platform by collaborating with the PP in the deployment of the service (providing the verification for the digital identity) and playing a key role in the launch and dissemination of the platform.

To the best of the authors' knowledge, this role is new in platform literature and therefore needs a clear definition to highlight its differences with the other key roles mentioned (i.e., demand and supply sides, and complementors). We have defined it as Platform Enhancer (PE).

A PE is an organization that cooperates with the PP to launch a new platform, helping it to disseminate and so get one or more sides on board. PEs do not generate network externalities for any of the sides, but, through their assets and resources, they make the platform accessible. Their relationship with the PP is based on a defined value proposition founded on collaboration, even if they do not own the platform.

When another kind of player enters the system – the PEs – this reduces the distance between two-sided platforms and the broader world of platform ecosystems (Jacobides et al., 2018), while the PP has the role of keystone firm orchestrating a more complex set of relationships (Iansiti and Levien, 2004). Interestingly, in recent literature, platforms are considered to be "meta-organisations" like "organisations of organisations", with a less hierarchical structure (Kretschmer et al., 2020), while our SPID case shows a hybrid situation, where a two-sided platform is pushing towards a more formal structure with the introduction of a new role. In the remainder of this section, we will discuss the advantages and disadvantages of leveraging on PEs to launch a platform.

5.2. The benefits of leveraging on platform enhancers during the early stages of platform development

The rationale behind having a PE during the launch stage can be linked to many benefits that can compensate for some of the traditional challenges experienced by platforms in their early days.

Many of the strategies and tactics to overcome the chicken-and-egg paradox have been highlighted in previous literature (Caillaud and Julien, 2003; Stummer et al., 2018). The involvement of PEs seems to help platforms overcoming the paradox. For a platform, having a number of existing companies on board as PEs means the near certainty that they will also bring on board at least a portion of their users, and they may even decide to act as players on the supply side. In other words, the bringing on board of PEs denotes a hybrid version of the two-step strategy (which would require bringing one side on board first to convince the other) and the marquee customer strategy (where one influential customer must be brought on board on the one side to convince others to join) proposed by Choudary et al. (2016).

Of course there are some distinctive aspects. Firstly, there are two steps, 1) the involvement of the PEs followed by 2) the easier involvement of the two sides, owing to the coordinated action of the PP and the PEs. Secondly, the role of the marquee customer here is not to convince one of the two sides to join, but to ease access to the platform, and get closer to an existing customer base.

In other words, the opportunity to rely on PEs reduces the impact of the chicken-and-egg paradox, while the PEs also act as catalysts to reach a critical mass and enjoy the typical benefits of two-sided platforms in their mature phase (Cusumano et al., 2019; Gawer, 2020).

This is possible since PEs can benefit from the existence of a defined market position, having resources and assets that newly established platforms can exploit. In other words, even if the PP has not had a previous role in the market, it can exploit the benefits of pre-existing assets through the involvement of PEs, just as when established companies try developing platforms (Dell'Era et al., 2021). Established businesses often forgo the chance to create a platform from various kinds of business myopia and an overestimation of the current market (Henderson & Clark, 1990, Leonard-Barton, 1992; Libert et al., 2016). The chance to collaborate with an external PP to create a platform may transform the hesitancy and risk of creating a platform into a business opportunity to be leveraged on.

Lastly, the chance to have on board a set of partners - potentially from a range of industries or sectors - from the earliest days may influence the PPs' future evolution in terms of expanding their services, facilitating their progress towards a multi-sided structure.

5.3. The challenges of leveraging on platform enhancers during the early stages of platform development

So far we have discussed the main outcomes that could result from collaborative work in the early stages of launching a transactional platform. However, the statements quoted in the previous section, as well as the coding analyses, have brought up another relevant consideration. The PP reported on the new IdPs wishing to join the system because they believed in the mission, and, by collaborating, have helped the platform to accelerate. This point reveals another set of benefits related to the involvement of PEs. Although this kind of player is not developing the classical cross-sided network externalities that are typical of transactional platforms (Katz and Shapiro, 1985), they are still developing a reinforcement loop that generates network effects, such as in the coopetitive dynamics that help a platform to emerge, as recently highlighted by collaboration between different service providers (Trabucchi and Buganza, 2020). This recent evidence reinforces the value of collaboration in the early stages of platform development. The same quoted statement observes that the newly joining partners "believe in the mission", reinforcing recent literature that highlights the need for alignment among platforms' players (Laczko et al., 2019).

While the presence of PEs leads to various benefits, mentioned previously, the empirical evidence gathered also informed us on the possible downsides related to, on the one hand, a divergent view on the role of IdPs (PEs) in the system and, on the other, a strong need for coordination (that was lacking according to the words of various IdPs managers).

We said in the introduction that many transactional platforms fail in the early phases (Yoffie et al., 2019), mainly for their inability to reach a critical mass that activate the externalities. On the one hand, we have seen how PEs can play a key role to avoid this, supporting the PP in the creation of the critical mass. At the same time, a second common reason behind the failure of transactional platforms is the value proposition design (Muzellec et al., 2015). Indeed, a transactional platform is a complex system that require dedicated value propositions for each side, to be compelling and interesting for all the customers joining it (Trabucchi et al., 2020).

Our findings show that also PEs requires a dedicated value proposition. In other words, why should they join the system? Therefore, the presence of PEs is on the one hand helping the PP in launching the platform, on the other is adding complexity in the business model design.

Looking at the data we gathered, a second challenge is emerging from the existence of PEs. If the coordination between demand and supply side is the natural mechanism of matchmaking enabled by the transactional platform (Evans and Schmalensee, 2016), this is not true for Pes, who are partners collaborating with the PP to launch and let grow the platform. PPs' actions must be continuously aligned through a proper governance system and our findings highlight the several issues of not having a clear alignment system, especially once the PEs start growing in numbers. Coherently with the agile literature, the ecosystem around a transactional platform that is adding PEs requires continuous alignment to have the chance to collectively react to the evolutionary forces of the ecosystem (Bäcklander, 2019).

To summarize, a platform tends to manage the complexity of involving two or more sets of users at the same time, but the involvement of PEs also enhances this aspect. The PP has to manage a paradoxical complexity (Clegg et al., 2002) between two fundamental tensions that govern the dynamics within the entire ecosystem. This literally makes the ecosystem of PEs and PPs oscillate, leading them to cooperate and compete at the same time (Sytch and Tatarynowicz, 2014; de Rond and Bouchikhi, 2004) in a divergent way, pushing the resulting platform to live on the "edge of chaos" (Davis et al., 2009). This is, once more, pointing to the relevance of alignment between all the parties involved in the platform, as recently emerged in platform literature (Laczko et al., 2019). At the end, the two tensions experienced by a single PE trigger a vicious circle of dynamics in the ecosystem, which lead over time to growing complexity in coordination.

The existence of PEs forces the PPs to dedicate energy and effort to orchestrating this additional group of actors. After the challenge of designing an ad-hox value proposition, they also need to coordinate, align and manage this supplementary group of stakeholders. As in the case of collaborative innovation, the specific governance structure and the degree of openness need to be set, which, in this case, is similar to a consortium (Pisano and Verganti, 2008). The meta-organisation of a two-sided platform evolves towards a slightly more hierarchical structure, with closed governance where the PP takes the final decision, while relying on closed participation, by inviting and selecting the PEs.

5.4. The role of complexity and coopetition: a balance approach toward the PEs

Two main results emerged concerning the role of Pes. On the one hand, their presence facilitates the launch of transactional platforms, solving (or at least softening) traditional challenges and generating a positive buzz around the platform itself, which could bring in new enhancers. On the other, as soon as the platform's dimension increases, the newer challenges arise. What had been a purely collaborative effort on the part of the enhancers becomes a coopetitive dynamic that happens "within" the heart of platform management. Therefore, the number of PEs to be involved in the platform should be guided by balancing the trade-off between the potential benefits brought by their presence in terms of technical support and platform acceleration, and the degree of management complexity introduced.

The evolution of the mood and type of contributions reported in the statements quoted reveal that, in the early days, meetings were frequent and productive, even including new players who wished to join. Over time, the meetings became less frequent and more challenging, due to the increased complexity of the system and the difficulty to maintain the proper alignment between all the PEs and the platform's goal presented by the PP.

Inspired by previous research on service development and stakeholder management (Pellizzoni et al., 2020; Lievens and Blažević, 2021) and on coopetition dynamics in platform development (Trabucchi and Buganza, 2020), we are proposing a two-phased approach that may help to manage the introduction and exploitation of PEs.

Table 2
Simple platform ecosystem VS Complex platform ecosystems.

Level	Phase 1 – Simple platform ecosystems	Phase 2 – Complex platform ecosystems
Platform Enhancer (PE)	• Limited number • Relative homogeneity • Alignment of interests • Low coordination efforts • Cooperative dynamics	• Medium-high number • Increasing heterogeneity • Divergent interests (opportunism) • Coordination struggles • Competitive dynamics
Platform Provider (PP)	• High control of platform development • High bargaining power • One-to-one relationships with PEs • Shared definition of platform evolution • Critical mass of platform sides	• Low control of platform development • Low bargaining power • Definition of common standard • Sharing of guidelines for strategic roadmap • Critical mass of PP and sides

In the first phase (*simple platform ecosystem*), from the launch of the platform to the point of reaching critical mass (Gawer, 2020), it is essential that the PEs involved are homogeneous to ensure simple coordination and rapid development of the platform, working towards quickly achieving strong alignment between the parties (Laczko et al. 2019).

Although this limits the pool of expertise bringing innovation to the platform, it ensures that the start-up phase can be weathered efficiently, avoiding an initial stagnation that could trigger a vicious circle of divergent interests and opportunistic behaviour.

Once the critical mass has been reached (Muzellec et al., 2015), the competitive dynamics between the PEs may tend to overcome their attempts to offer a fruitful collaboration, requiring a shift in procedure. A second phase may begin (*complex platform ecosystem*). The PEs already present on the platform will seek a return on their investments, while new players will be interested in getting on board to capture part of the value generated by the interactions of the two sides on the platform. A wider organisational structure is needed to properly manage the complexity typical of this phase, possibly differentiating among the PEs that joined in the early days and the ones that joined later on, considering the differences in the motivations that moved them (Aarikka-Stenroos et al., 2017). The double value proposition that traditionally characterises transactional platforms (Muzellec et al., 2015) must become multi-faced also at the PE level, considering various subgroups. Concerning the first group of PEs, a homogeneous set which had joined the platform a long time beforehand, the PP must ensure a return on their investment by enabling them to secure part of the value generated by the interactions on the platform. Concerning the second group of heterogeneous PEs, which had recently entered the ecosystem, the main proposition is the opportunity to exploit synergies with existing business, exploiting the interactions on the platform already launched. Table 2 depicts these reflections.

6. Conclusion

In this study, we have analysed the case of a transactional platform that relied on a work of collaboration with external partners in the early stages of platform development. This brought us to the definition of a new role in the field of transactional platforms: Platform Enhancers (PEs). PEs have been analysed to identify their benefits and challenges and propose an overall balanced approach to their engagement.

6.1. Theoretical implications

From a theoretical perspective, our research has a first main contribution, which deals with the identification and the characterisation of PE, as a new type of players that can define the taxonomy of transactional platforms (Täuscher and Laudien, 2018; Trabucchi and Buganza, 2021). The inclusion of PEs and their identification contributes to and broadens the discussion on platforms from several viewpoints. This new finding expands the work on coopetition dynamics in platform development (Ritala et al., 2014; Muzellec et al., 2015) and significantly reinforcing the role that alignment (Laczko et al., 2019; Bäcklander, 2019), motivation of the parties involved (Aarikka-Stenroos et al., 2017) and multiple value propositions (Muzellec et al., 2015) play in the platform development process, setting out these concepts from the perspective of PEs.

The definition of PEs, from a theoretical perspective, enlarges the sweet spot between platforms and ecosystem research. In particular, on the one hand, platforms look like ecosystems due to their multi-stakeholder nature, at the same time, platform literature tends to highlight specific roles (Jacobidies et al., 2018). The fact that PEs are neither supply-side players nor complementors, open up the space for a relevant theoretical implication seeing how the ecosystems of transactional platforms can welcome players that are not usual “sides” but may nurture the launch of the platform while generating other implications (and duties) for the PP.

6.2. Managerial implications

Moving the summary to a practical dimension, the contribution of the SPID case is twofold. On the one hand, it gives a vivid representation of the practical role that PEs may have in platform development, potentially inspiring other transactional platforms whose developers may wish to base them on a work of collaboration in the development process. The second contribution comes from the evolution of PEs in the SPID case. Their involvement is clearly beneficial for the platform launch, development and growth, but it does not come at no cost. Many of the statements quoted reported show that the PEs appreciated and acknowledged the role played by

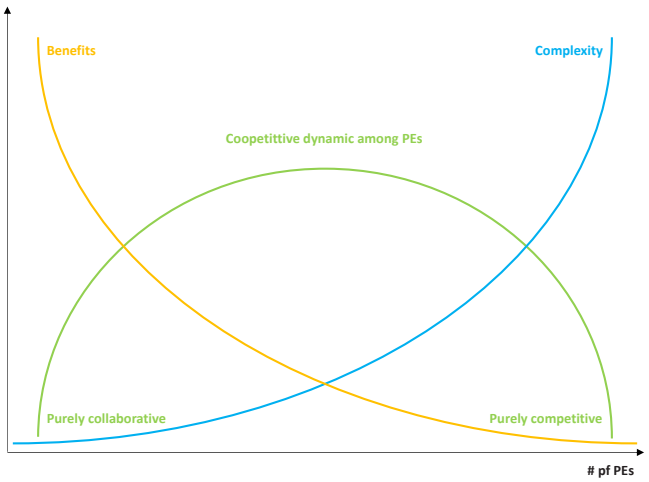

Fig. 4. The impacts of Platform Enhances.

other IdPs, but they also were disadvantaged by the complexity that this creates. This study shows that PEs come with various attributes in a trade-off that needs to be properly managed through a clear organisational structured designed and managed by the PP. Fig. 4 shows that various dynamics taking place at the same time. The coopetitive nature of the PEs may shift from being mainly collaborative to competitive as the number of PEs goes up. The growing number of PEs also generates an inversion, over time, between the benefits and the complexity brought to platform dynamics. The suggestion emerging is to set in place a governance and organisational structure able to retain a positive trade-off between all the variables, while working on the alignment and motivation of the PEs to maximise their beneficial effect on the platform's development.

6.3. Limitations and future research

As all empirical studies, this is not free from limitations, which may open opportunities for further research. The first is related to the generalisability of the achieved results. As mentioned in the method section, we conceive this case a "talking pig" that justify our single-case study approach (Siggelkow, 2007). Still, this approach brings to various limitations. First of all, we do not have a clear view of the generalizability of the results, we found other examples that seem to have applied a similar approach but were not part of the study. For example, Lybra, the digital coin project launched by Facebook a few years ago, announced many companies (like Spotify, Uber and many others) as launching partners, which seem coherent with the definition of PEs, even if the project was closed before the actual launch. Morevoer, the focus on only one type of platform, a digital identity configuration, in one particular context (in this case, a country-specific arrangement in Italy) could lead to "idiosyncratic phenomena" (Eisenhardt, 1989), which means that it could become difficult to generalise the findings to other contexts or types of platform ecosystems. Two further developments could fill this gap. Firstly, it would be extremely useful to combine the interpretative-oriented methodology used in this paper with a more inductive and quantitative-oriented research study. Secondly, progressively extending the constructs that emerged to other digital identity systems and, more generally, examining platforms where external partners are involved could be highly beneficial in a cross-case analysis (Eisenhardt, 1989).

In could be interesting to also use other methodologies, shifting to Mode 2 research, and possibly apply action research or collaborative management research (Shani and Coghlan, 2018) to directly explore the involvement and management of PEs in launching a transactional platform.

The second limitation is related to the impossibility of analysing, within the case study presented, the dynamics of innovation brought to the platform by the PEs in the ecosystem. In particular, this research does not explain how the involvement of external partners in the platform contributes, consistently with the legal regulations and the infrastructural configuration of the same, to its generativity (Blaschke and Brosius, 2018). For this reason, a further avenue of research could be to study the innovative drive brought about by the PEs in the platform. One suggestion could be to correlate the innovation brought to the platform by the PEs with the significant variables in the PE group itself, to examine, for example, how their number and heterogeneity play a significant part in such innovation.

Data Availability

Data will be made available on request.

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