12-12-2021

Platform Owner Information Capability in Digital Platform Ecosystem: An Empirical Investigation

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Short Paper

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Introduction

The prominence of complementary innovation in digital platform ecosystems has made information-driven decision-making a central concern to platform owners (Cusumano et al. 2020). There are ample successful cases such as Google Android and Tencent, while many platforms ceased due to the misunderstanding of platform complementors or misinterpreting ecosystem-related factors. For example, Atari made a huge mistake of not noticing and responding correctly to the flood of low-quality games, and thus dragged platform complementors into an uncontrollable price competition and vitally curbed complementor innovation (Miric et al. 2019; Wareham et al. 2014). In contrast, when Apple gained knowledge of third-party developers' jailbreaking iPhones, it reacted by introducing a Software Development Kit (SDK) for developers in 2008, giving rise to one of the first mobile application platform ecosystems (Eaton et al. 2015).

Given the salient importance for platform owners to sense and direct complementors' activities and scale platform ecosystem growth, we propose and conceptualize platform owner information capability (POIC) as a key instrument. Defined as *a sensing capability that allows the gathering, processing, and assessing of information in its environment and its ecosystem to derive relevant actions,* POIC connotes embedded views of organizational information processing theory (Galbraith 1974) and dynamic capabilities (Teece et al. 1997; Winter 2003) in digital platform ecosystems. This notion recognizes the platform owner's institutional obligations to recursively monitor the external environment and its ecosystem in order to respond promptly. Furthermore, POIC has the particular objective of sensing and managing the value co-creation relationship with platform complementors, to maintain the generativity and unity of the platform ecosystem (Karhu et al. 2018). As a frontier study in this stream, this research aims to uncover:

RQ1) How can platform owner information capability be conceptualized?

RQ2) What are the manifestations of platform owner information capability in managing the platform ecosystem?

To create a holistic understanding of POIC, this research has three steps. First, we derive a comprehensive definition of information capabilities in traditional organizations by relying on organizational information processing theory and dynamic capabilities theory. Second, we highlight the contextual differences of digital platforms and the complexity arising from managing ecosystems. Then, we introduce a refined definition of information capability to account for the particularities of digital platforms. Third, we conduct a multiple-case study with three platforms in the enterprise software industry comprising twelve interviews with platform owner representatives.

Drawing on information processing theory while pinpointing the complexiy of platform ecosystems, we generate the POIC paradigm as our main contribution. The paradigm reveals how POIC is implemented to tackle challenges and identify opportunities that platform owners identify from their ecosystem and its environment. Overall, the paradigm serves as a landing ground for studies investigating the underlying

mechanisms used by platform owners to manage the evolution of the platform ecosystem. Most importantly, by highlighting the peculiarities of information capabilities in operational and strategic decisions by platform owners, this research also brings significant practical value to platform practitioners. The next steps of our ongoing research effort relate to enhancing data richness with more follow-up interviews and injecting a more nuanced understanding to the proposed paradigm.

Related Work

Information Capability in Traditional Organizations

To introduce the notion of information capability, we first draw on concepts from the **Organizational Information-Processing Theory (OIPT)** of Galbraith (1974). Following OIPT, the greatest challenge for organizations is to maneuver in great uncertainty, which is rooted in the organization's environment. This uncertainty is composed of the complexity of the environment and the frequency of changes in that environment. To be able to make appropriate decisions despite this uncertainty, organizations need information (Premukmar et al. 2005). Hence, organizational decision-making and the resulting organizational performance depend on the fit between their information needs and their ability to gather and use information, i.e., their *information (processing) capability*.

Accordingly, in OIPT, the higher the level of uncertainty an organization faces, the higher its need for information. There is more uncertainty in inter-organizational environments, such as traditional supply chains, than when considering environments that are internal to the organization (Premukmar et al. 2005). Importantly, the failure to resolve a situation will result in a misfit between information need and information capability, and the organization's performance will suffer (Premukmar et al. 2005). Prior work on the topic considered IT to be equivalent to information capability. According to Premukmar et al. (2005, p. 266), information capability is defined "as the level of IT support for various activities" of an organization. However, more recently, Kulkarni et al. (2017, p. 519) defined information capability as the "ability to provide quality information with appropriate levels of detail, relevance, reliability, and timeliness." Integrating both perspectives, Wang (2021, p. 407) states that information capabilities help "to collect, process, store, and distribute information, essentially the functions of information systems." Considering these definitions emphasizing the OIPT perspective, we assert that an organization's information capability comprises the activities of gathering, processing, and assessing information about the environment (Grover and Kohli 2012).

Apart from the information processing view of organizations, studies have also described the role of information capabilities by considering **dynamic capabilities** (Božič and Dimovski 2019; Park et al. 2017). Like the information processing view of organizations, dynamic capabilities theory is concerned with the capability of the organizations to react according to cues from their environment in order to remain competitive (Teece et al. 1997). Hence, they apply sense-response cycles, sensing stimuli from their environment and responding accordingly (Overby et al. 2006).

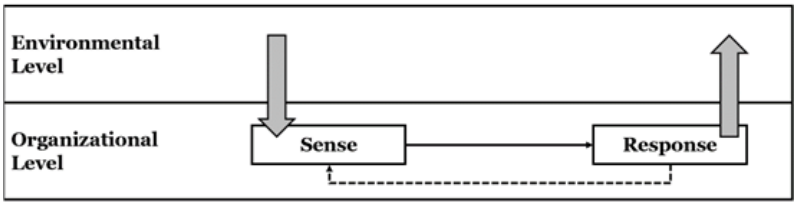

Figure 1: Sense-response cycle of organizations and their environment.

In general, dynamic capabilities theory distinguishes two basic categories of capabilities: dynamic capabilities, which are also known as higher-level capabilities, and operational capabilities, which are also known as zero-level capabilities. The dynamic capabilities of an organization are concerned with sensing changes from the environment and formulating the appropriate strategic responses (Helfat and Raubitschek 2018; Teece 2017). Hence, companies with strong dynamic capabilities are considered flexible and innovative. Examples of dynamic capabilities are the capabilities of new product development or the execution of mergers and acquisitions (Helfat and Winter 2011). Organizations must build this type of capability to achieve and maintain competitive advantages in the long term (Teece 2017). Besides dynamic

capabilities, organizations need operational capabilities. These are important for the survival of the company in the short term. Operational capabilities include skills, repetitive patterns, and routines. They are crucial for the day-to-day business operation and to execute the current production plan. However, operational capabilities on their own are not sufficient to stay competitive (Teece 2017).

Therefore, the information processing view and the dynamic capabilities theory complement each other in the sense that the information capability can be understood as a sensing capability of organizations. For instance, Teece (2007) describes the tasks of gathering, filtering, and interpreting information as foundations of sensing activities. Further, IT-enabled capabilities provide companies with the ability to sense their environment and improve their decision-making (Saldanha et al. 2017). Thus, taking a dynamic capabilities perspective, an organization's information capability represents a sensing capability, which allows organizations to respond to environmental changes.

To conclude, following the organizational information processing view and the dynamic capabilities view, we propose a framework in which an organization interacts with its environment via a sense-response cycle which is underpinned by the organization's ability to address its information needs with its information capability. To that end, we conceptualize an *organization's information capability as a sensing capability that allows the gathering, processing, and assessing of information about its environment to derive relevant actions.*

The next section introduces the notion of digital platform ecosystems and highlights the organizational challenges for platform owners through the lens of information capability as conceptualized in this section.

Information Capability in Managing Digital Platform Ecosystems

The success of digital platforms and their ecosystems is inseparable from platform complementors, who have fundamentally inversed the locus of platform value creation from inward-facing to outward-facing co-creation (Parker et al. 2017). Complementors as autonomous third parties develop software-based modules around a stable platform core creating an ecosystem around the platform (Tiwana et al. 2010). By extending the functionality of the platform, they substantially determine how useful and attractive platforms are to their intended users (Cennamo and Santalo 2019). For instance, the value users gain from using Android and Apple devices is largely driven by the multitude of available apps. While platform ecosystem strategies can yield great upsides, their design and management involve complex tradeoffs.

For instance, the platform owner is tasked with striking the balance between fueling complementary innovation in the ecosystem by increasing autonomy and maintaining control (Cennamo and Santalo 2019). Hence, the level of platform openness, the degree of complementors' autonomy, and the mechanisms installed to gatekeep platform quality all form critical concerns for platform owners when managing platform ecosystems (Tiwana et al. 2010). In addition to resolving ecosystem-related tensions to increase value co-creation, however, their environment affords additional challenges and opportunities. These challenges relate to aspects such as platforms threatening the survival and growth of rivals by competing for similar resources and demands, or envelopment attacks (Cennamo and Santalo 2013; Eisenmann et al. 2011). Besides, regulations such as the General Data Protection Regulation (GDRP) and Digital Market Act (DMA) need to be considered when designing and managing digital platform ecosystems. Platform owners also need to diversify their platform ecosystem by sensing opportunities (Blaschke et al. 2018) or even to define and shape entire markets as did Apple by introducing its App Store in 2008.

Platform Owner Information Capability

To address the challenges and identify opportunities of their ecosystem and their environment, platform owners need adequate information. However, the information needs of digital platforms differ from those of traditional organizations. As elaborated above, platform owners not only have to monitor their external environment but their ecosystem of complementors and users. Before making decisions and reacting to external opportunities and threats, information from both dimensions has to be taken into account (Hein et al. 2019; Helfat and Raubitschek 2018). Therefore, their sense-response cycles need to consider and integrate both dimensions. Consequently, we expand our conceptualization of information capabilities for platform owners to consider this distinctive characteristic of digital platform ecosystems. As a result, *a*

platform owner's information capability is a sensing capability that allows the gathering, processing, and assessing of information about its environment and its ecosystem to derive relevant actions.

Platform owners employ their information capability to react to changes in their environment and their ecosystem alike. Importantly, the changes and the reactions differ for the environment and the ecosystem as the platform owner has greater influence over ecosystem participants than its environment.

Research Approach

This study builds on a multiple-case study to explore the role of POIC when designing and managing their digital platform ecosystems (Eisenhardt 1989; Yin 2014). Case study research is particularly suitable to investigate newly emerging phenomena like digital platforms and the associated challenges such as creating and making sense of environmental and ecosystem information and deriving adequate actions. We choose three digital platform ecosystems in the cloud-based business-to-business (B2B) software industry. The complexity, dynamics, and competitive pressures present in this industry represent a suitable context to uncover the mechanisms and strategies of POIC that are fundamental to their decision-making.

We rely on qualitative data from three different digital platform ecosystems in the B2B software industry, namely *CRM-P*, *Process-P,* and *Workflow-P* with ecosystems of more than 3000, 250, and 1000 partners respectively. To that end, we conduct 12 expert interviews (IP1 to IP12) with platform owner representatives in the roles of partner managers, account executives, or alliance managers with various levels of responsibility. Our data are first-hand accounts of the challenges associated with strategic and operational decision making (i.e., platform information needs) and the mechanisms applied to gather, process, and exploit the information necessary to address these information needs (i.e., their information capabilities). The average interview duration is 49 minutes. We augment our primary data with secondary data for each case to triangulate our findings. We obtained case-specific documents such as white papers, blogs, websites, and publicly available information including data on the platform's partner programs. The partner programs proved to be a particularly valuable source of information concerning our understanding of information capabilities on the ecosystem level, as they are the blueprints for rules, relevant metrics, and consequences (i.e., platform owner actions) for complementors when engaging with platforms.

For the preliminary data analysis, the research team transcribed the interviews and conducted a qualitative content analysis (Miles and Huberman 1994). During the analysis, we initially focused on the themes of information needs, informed decision-making, and the distinctions between environmental and ecosystem-related information. Further, we considered emerging topics such as tool support, metrics, and Key Performance Indicators (KPIs).

Preliminary Results, Discussion, and Future Work

Based on our preliminary analysis of the data, we develop an initial understanding of POIC in digital platform ecosystems and the implications concerning platform owner decision-making. The framework comprises POIC to sense the environment and the ecosystem. The insights acquired through their information capability, influence the strategic or operational decision-making and consequently the platform owner's response to uncertainty. The responses may induce changes in the environment and/or the ecosystem. Figure 2 presents the framework summarizing our preliminary understanding in accordance with our theoretical conceptualization.

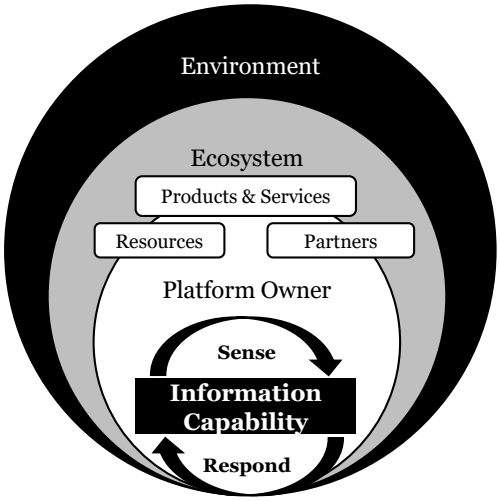

Figure 2. A preliminary understanding of platform owner information capability

Information Capability – Sensing the Environment

Our data suggest that POIC is leveraged to gather, process, and assess information about their environment. It addresses information needs such as **technology and market trends** or screening for **potential partners**.

First, concerning the identification of **technology trends**, platform owners monitor the environment and respond by integrating important trends into their technology. For instance, *CRM-P* "brings innovation, […] things like AI, or any kind of other improvements" to the platform regularly (IP4). Platform owners also observe how other platform companies run their businesses. IP11 mentioned that "from a contractual perspective, Microsoft rarely works directly with customers, but always via partners". In addition to technology and competition-related aspects, information on potential customers is deemed important,

> *especially in […] the public sector. Because you can imagine that there are, of course, certain predefined bidding processes to which we have to adhere (IP11).*

Second, platform owners collect information about **potential partners**, to expand their ecosystem strategically. A manager of *CRM-P* described the following situation.

> *We would always be looking, depending on the industry, let's say, financial, services, manufacturing, automotive, and so on, […] for specific partners in these industries and kind of figure out which partner would be the biggest […] benefit to us (IP4).*

Information Capability – Sensing the Ecosystem

Our preliminary analysis suggests that platform owners place a strong emphasis on their information capability about their ecosystem regarding usage of platform **resources**, **partners,** and their **products & services**. Importantly, platform owners develop and utilize different metrics and KPIs as part of their information capability as "numbers help to understand where there might be an issue" (IP5). Hence, platform companies have different metrics in place to process and assess information about the ecosystem. IP6 mentions metrics such as the number of opportunities sourced from customers or the level of certification to determine the health of individual partnerships "for seeing how invested they are and how much time and money they are putting into the partnership".

First, platform owners used their information capability to sense partners' usage of platform **resources** via self-assessment tools for partners but also personal conversation. As IP1 states:

> *It's about how do you use our technology? […] We can figure this out by ourselves, because with our platform, we can research who is doing what and utilizing which of our technology offerings.*

Second, platform companies stay in close contact with their **partners** and build relationships. IP5 explains that *Process-P* does planning sessions with its partners to create information and derive relevant actions:

> *You take a step back and you see, okay, where do we stand? What did we do together? What worked? What didn't work? It's really about trying to pinpoint the things that we can both do better. Is it a problem of communication? Are we talking to the right persons? Do they have enough power internally to move things forward? Are they aware of their colleagues' initiatives ? It's trying to dig deeper into the reasons for the success and also of what does not work and have a bigger overview of how many opportunities did we have?*

Third, platform owners also produce information on the products and services offered by complementors within their ecosystem. Hence, their information capability allows them to assess the satisfaction of their customers with platform complements (IP1). Additionally, important information relates to the number of downloads from the app marketplace (IP3). In essence, platform owners aim to identify successful complementors: "So we can measure the success basically by the number of downloads or amount of revenue" (IP3).

Implications for Strategic and Operational Responses

During the preliminary study on POIC, the research team we found that the information on the environment and the ecosystem is being utilized to develop concrete responses. Particularly, this information can have implications for decision-making on an **operational or strategic level**.

First, POIC has implications for **operational** decision-making. For instance, the regular assessment of partners has implications for the resources that each partner will get in the subsequent period. The assessment procedures are a core task of partner management, with the platform partner program predefining the metrics. Hence, similarly to *CRM-P* and *Workflow-P, Process-P* divides its complementors into three partnership levels that are "re-calculated at the end of every fiscal year" (IP5). Platform owners regularly perform marketing activities, which are based on verified success stories from the ecosystem.

> *We do a lot of marketing campaigns and sometimes you would mention [...] partners as being a strategic component in a project with a specific customer, so it makes a customer success story (IP3).*

Second, POIC is a critical component when developing **strategic** roadmaps for the platform and its ecosystem. Identifying potential partners in the environment and motivating them to join the ecosystem is but one mechanism where information capability plays an important role. IP4 explains that for some companies, they "would approach them from a quality point of view and say: let's partner together". For example, *CRM-P* scans their ecosystem for white spaces in which they do not offer a solution for their customers and recruit partners based on those insights:

> *We are always looking for specific partners that extend our capabilities and who are also market leaders [...]. In the sense that we can offer them a white space where we do not have solutions, just, again, from the perspective of offering the best and most comprehensive solution for our customers (IP4).*

In other cases, the platform owner even decides to invest in an external company (IP2) or to acquire them (IP1).

Contribution and future work

In our ongoing research, we developed the concept of POIC. We do so by integrating the organizational information processing view and the dynamic capability view to derive a definition for information capability for traditional organizations. We then expand the definition to account for the particularities of digital platform ecosystems, namely the necessity to not only sense the environment but also the ecosystem around the platform and integrate information from both sources. Based on a multiple-case study, our preliminary findings illustrate and emphasize that a platform owner's operational and strategic decision-making depends on their information capability. Hence, with our study, we contribute to research on digital platforms and platform ecosystems by introducing the concept of information capability, answering recent calls for further investigation (Kapoor et al. 2021; Wang 2021). Our preliminary results highlight the role of sensing mechanisms to create the information necessary for platform owner's design and governance decisions. That way, our study provides a much-needed complementary view on platform design and governance and sheds additional light on their dynamics (Cennamo and Santalo 2019; Huber et al. 2017).

To that end, we are planning to deepen our data analysis to uncover the concrete mechanisms underlying information capability and their respective influence on operational and strategic decisions. It would be particularly interesting to investigate the effects of environmental sensing on ecosystem-related decision-making and vice versa. Hence, we are planning to expand our data collection to include platform owner representatives in more diverse positions.

Acknowledgement
The third author acknowledges that their work was supported by the Engineering and Physical Sciences Research Council (grant number EP/T022566/1). DIGIT Lab is a Next Stage Digital Economy Centre.

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