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UNCOVERING THE PROCESSES OF IT VALUE COCREATION IN DIGITAL PLATFORM ECOSYSTEMS

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Research full-length paper

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Abstract

Pervasive digitization and complex business challenges encourage companies to collaborate, build innovative digital solutions, and cocreate IT value in multi-firm environments. Despite much research extensively focused on the outcome of value cocreation, emphasizing the concept of cocreating with customers, what remains under-investigated is the 'process' of IT value cocreation in digital platform ecosystems with customers, partners, and competitors. This research investigates what are the key processes of IT value cocreation in digital platform ecosystems. We draw on dynamic capabilities theory to examine value cocreation in two digital platforms to tease out key processes of IT-based value cocreation in multi-firm, complex environments. We advance a theoretical framework that helps us understand how firms manage the IT cocreation journey by sensing, seizing, and reconfiguring competencies to address rapidly changing environments. This research provides an emerging model and theoretical insights into extant literature about the nine processes involved in IT value cocreation in digital platform ecosystems, also opening up new avenues for future research.

Keywords: dynamic capabilities, IT value cocreation, digital platform ecosystems, case study.

1 Introduction

IT-based value cocreation as a concept has been around for some time and an important research area in IS and management literature (Kohli et al., 2008; Ramaswamy & Ozcan, 2018; Siaw & Okorie, 2022). But cocreation of IT value is often understood as single firms capturing benefits from individual customer input (Westergren et al., 2019) and not in terms of the new dynamics of cocreating with business partners and customers (Kohli et al., 2008; Prahalad & Ramaswamy, 2004). Ubiquitous digitization and never-ending business challenges urge firms to join forces in networks (Eisenhardt et al., 2016; Reypens et al., 2019), innovate with digital technologies (Levén et al., 2014), and cocreate IT value with other firms (Grover and Kohli, 2012). More organizations are joining digital platform ecosystems, sharing resources, and collaborating with other firms to deliver value (Westergren et al., 2019). But IT value cocreation seems intuitive but it is challenging as multi-firm cooperation increases among modern organizations (Mandrella et al., 2020). IT value cocreation refers to IT value that is generated through collaborations and a set of processes involving multiple firms (Grover & Kohli, 2012). Digital platform ecosystems involves a platform owner that establishes governance mechanisms to expedite value creating mechanisms between the platform owner and an ecosystem of consumers, partners, and complementors (Hein et al., 2019). Firms are working in digital platform ecosystems where multiple firms join forces to generate business value through collaboration, value cocreation processes, and organizational routines. Scholars have studied various types of IT-based value cocreation through multi-firm collaboration (Grover & Kohli, 2012), platform ecosystems (Ceccagnoli et al., 2012), in service-centered ecosystems (Vargo & Lusch, 2017) and digital transformation (Matarazzo et al., 2021).

Recently researchers across disciplines have been exploring how digitalization shapes the dynamic of value cocreation (Autio & Thomas, 2020). Yet, exactly how multi-firms cocreate IT value in digital platforms remains understudied (Grover & Kohli, 2012). Researchers in digital platforms claim it is important to expand our understanding of how organizations innovate when they cocreate value together in highly collaborative environments (de Reuver et al., 2018; Gawer & Cusumano, 2014; Tiwana et al., 2010; Yoo, 2010). We still have significant gap for contribution to IT value cocreation research as the process of value cocreation process in a network remains ambiguous (Kim et al., 2019). Further, most IT-value research "concentrates on the outcome of the value creation process, not the process itself, leading to a lack of insights into why and how value co-creation occurs" (Westergren et al., 2019, p. 2). Further, Grover and Kohli's (2012) research agenda call to focus on the "process" of IT value cocreation. They further suggest that while conceptually the idea of IT-based value cocreation seems simple and intuitive, the process of successfully delivering IT value cocreation poses several challenges – as well as opportunities. They therefore ask key fundamental questions, which are "How do firms select partners?" And "How do relationships evolve?" (p. 231). What are the intangible inputs to cocreate tangible value; and lastly, "…are there stages that need to be followed that articulate the necessary conditions that must be in place before moving to the next stage? (p. 231). We focus on the "process-based" question by employing a dynamic capabilities theoretical lens to tease out the IT-based value cocreation processes involved between firms that are participating and co-building in digital platform ecosystems. Therefore, to better understand the nuances of IT value cocreation between firms, it is important to capture key processes and the business outcomes in digital platforms. We therefore draw on dynamic capabilities theory (Teece, 2018; Teece et al., 1997) to examine value co-creation in two digital platforms to tease out key processes of IT-based value cocreation in multi-firm, complex environments. Teece et al., (1997) refers to "Processes" as managerial and organizational processes, "the way things are done in the firm" (p. 518). Thus, we aim to answer the following research question: *How is IT value cocreated in digital platform ecosystems and what are the processes that emerge?* To answer the research question, we conducted a multiple case study involving two digital platforms, which include six firms in total (two platform owners, two customers building digital products & services on the platforms, and two systems integrators), analyzed how they build joint digital solutions, and identified processes to cocreate IT value in digital platform ecosystems.

Next section reviews the literature on IT value cocreation, cocreation in digital platforms and the role of dynamic capabilities in value cocreation. Then, present our research design and main findings. We close the paper with discussion of results, conclusion, and opportunities for future work.

2 Theoretical Foundations

Our theoretical foundation is anchored on IT value cocreation in digital platforms ecosystems and the theory of dynamics capabilities. Value cocreation is not a novel concept and it is a well-established concept in IS literature in contexts where firms and customers cocreate value (Prahalad & Ramaswamy, 2004), as well as IT-based value cocreation in multi-firm environments (Grover & Kohli, 2012). We adopt Kohli & Grover's (2008) definition of IT-based value cocreation, which encompasses three elements: (1) IT value cocreated through actions and processes of multiple firms; (2) the value cocreation is driven by strong collaboration and relationships between firms; and (3) the structures and incentives that are established so that there is equitable returns and rewards for all firms involved (p. 28). Based on Dyer & Singh's (1998) seminal paper, Grover and Kohli (2012) introduced the Cocreating IT Value framework, which encompasses four determinants of value: specific assets, knowledge-sharing, complementary resources, and lastly, is governance, which is the layer that is viewed as the glue that integrates the other three layers. Across industries more firms are establishing alliances with one or more organizations to create value (Sarker et al., 2012). In the digital platform domain, relationships among digital platform providers and product owners has morphed from a digital platform provider-to-customer arrangement to closer, arm's-length partnership arrangements (Ghazawneh & Henfridsson, 2015; Jimenez & Arenas, 2021). Prominent examples of coopetitive relationships between Dell Computers and IBM and SAP with Oracle (Walley, 2007) – including modern coopetitive relationships between Microsoft and Snowflake or Netflix and Amazon Video. The relationship between Netflix and Amazon have nurtured an arm's-length partnership while competing in the video space over the years (Jimenez & Arenas, 2021). Therefore, platform owners outline appropriate governance processed as the ground rules to orchestrate multi-party interactions in digital platform ecosystems (Hein et al., 2019). Previous studies concerning IS value explored value cocreation in the context of transaction costs (Kim et al., 2019), the implications on exploitation or exploration (Reypens et al., 2016), or how value cocreation enables and facilitates innovation (Ceccagnoli et al., 2012). A focus on IT value cocreation is needed (Grover & Kohli, 2012) and developing an understanding of key processes that facilitate IT value cocreation would provide better insights of how firms cocreate value in complex digital platform ecosystems.

Second, digital platform ecosystems play a key role in our study particularly when multiple firms join forces to cocreate IT value enabled by digital platforms. Organizations are adopting digital platforms to maintain and gain a competitive advantage in the market and enhance firm performance (de Reuver et al., 2018) while enjoying the vast benefits of platform-based ecosystems due to creation of strong network effects (Gawer & Cusumano, 2014). Put simply, greater platform adoption in the ecosystem results in generating more value by everyone involved, including the digital platform owner, third-party developers, and its user community. Take for instance iTunes or Microsoft Azure; both are different types of digital platforms that incentivize a global community of third-party developers to co-build digital solutions on their technology stack. To further clarify how value is measured in IT-based value cocreation, we employ (Amit & Zott, 2001) considerations of how value is categorized: efficiency (cost reduction and offering higher benefits to customers), novelty (novel and innovative solutions), complementarities (bundling different products and services), and lock-in (reducing customer churn, sustaining lasting and 'sticky' relationship with customers), complementarities (offering bundles of products, services).

Third, dynamic capabilities (DC) is employed as a theoretical lens to examine digital platforms and value cocreation research (Haim Faridian & Neubaum, 2021). We employ DC as a theoretical lens to delineate the processes of value cocreation and capture the exchanges between firms involved in value cocreation in open sources and digital platforms (Siaw & Okorie, 2022). DC are defined as "the ability to integrate, build, and reconfigure internal and external competencies to address rapidly-changing environments" (Teece et al., 1997 p. 517). DC can be "disaggregated into the capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through

enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets" (Teece, 2007, p. 1319). Managerial and organizational processes are distinctive routines or patterns and the way things get done in the firm (Teece et al., 1997). According to Teece et al., (1997), organizational processes play three roles: coordination/integration (efficient/effective internal coordination), learning (a process of repetition/experimentation enables tasks to be performed better/faster), and reconfiguration (ability to sense the need to reconfigure the firm's asset structure). DCs are imperative for organizations because firms win or lose their competitiveness in high-velocity and fast changing environments (Sunder et al., 2019). Researchers (Siaw & Okorie, 2022) suggest research is needed to establish the processes through which firms develop intrapreneurial capabilities on their platforms to enable value cocreation with other firms. Teece (2018) offers a simplified DC framework but does not go into any detail on how dynamic capabilities are important for platform leaders, the types of DC firms require, or how DCs enable firms to create and capture value (Helfat & Raubitschek, 2018). Prior studies examined which DCs critically underpin value creation and capture by platform leaders or to the platform orchestrator and ignore other actors on the platform who may play a role in the value capture and cocreation process (Haim Faridian & Neubaum, 2021). Therefore, a research gap is present, and we build on Teece (2018) and Grover and Kohli (2012) and prior studies to identify the processes of IT-based value cocreation in digital platform ecosystems.

3   Research Design

To achieve the research objectives, we conducted a multiple case study where each case corresponds to a digital platform where firms committed resources to develop novel IT-based digital solutions. Case studies are widely used in IS research disciplines (Arenas et al., 2019) and well-suited when investigating such how questions due to the descriptive environment (Yin, 2013). Also, highly collaborative value cocreation initiatives are rich research settings for capturing emerging anecdotal evidence (Graebner & Eisenhardt, 2004). Scholars have employed case study design to further explore IT value cocreation topics across several disciplines (Arenas et al., 2019). We developed an interview questionnaire based on Grover and Kohli's (2012) cocreating IT value framework and used it as a baseline for data collection through semi-structured interviews with informants from the participating organizations (see Table 1).

The research setting involved two digital platforms, one per case, and a total of six firms (two digital platforms, two customers, two system integrators). Below we provide brief descriptions for each case. The chosen digital platforms are global firms and recognized as leaders within their market segment. We pseudonymized the names of these companies.

Case 1: Developing a SaaS on a cloud platform. The firms involved in Case 1 are as follow: product owner (customer), digital platform (cloud provider), and the system integrator (professional services firm). The project objectives were the following: 1) migrate an on-premises collaboration platform to the cloud provider's infrastructure; and 2) design and develop a cloud-native software-as-a-service (SaaS) to manage and monitor vulnerable security data. The customer relied on the professional services firm for cloud computing expertise and to expedite the cloud migration. The cloud provider also committed resources with decades of experience in migrating workloads to the cloud. This collaboration and value cocreation generated organizational confidence, reduced business risk, and achieve the desired business objectives at a much faster rate.

Case 2: Automating processes in a business process management (BPM) platform. The firms involved in Case 2 are as follow: product owner (customer), digital platform (SaaS platform), and the system integrator (professional services firm). The project objectives were the following: leverage robotics process automation and intelligent case management capabilities to streamline and automate the customer's data center and network operations. The customer partnered with the SaaS platform and a system integrator to bring the necessary software and technical skills to speed the project.

We used grounded theory and analyzed the data in an iterative manner (Gioia et al., 2013; Strauss & Corbin, 1990). We employed a qualitative abductive analysis to compare the multiple case studies with existing frameworks and develop theoretical insights (Locke, 2007). Timmermans and Tavory (2012) refer to the abductive analysis method as a development of unusual and surprising empirical findings

against "a background of multiple existing sociological theories and through systematic methodological analysis" (Timmermans & Tavory, 2012, p. 169), and is recognized as a valid approach to examine management phenomena (Behfar & Okhuysen, 2018). We approached our study with the theoretical background of dynamic capabilities framed by Teece et al., (1997), and analyzed our data findings from established theories. The primary data we collected was coded for analysis using NVivo, which included capturing interview transcripts and audios transcribed into texts. To maintain consistency and clarity we constantly compared audios and transcripts throughout the analysis phases. Further, data were examined through a process of three rounds of coding, employing and following the guidelines of Gioia, Corley, & Hamilton (2013) to strengthen and guarantee rigor in our research. We also paid attention to any contradictory statements within the same transcript, performing constant comparison (Strauss & Corbin, 1994) and reaching theoretical saturation (Glaser & Strauss, 1967). Gioia et al (2012) suggests that at this stage it is normal to feel "lost" and that is precisely what occurred to us as we had a large sheer number of categories which became overwhelming. As Gioia et al (2012) refers to getting "lost" in the data, forcing us to continuously and rigorously think about how the data and the different categories relate to each other, and bring to light more theory-generating questions (Myers, 2013) based on the theoretical themes and concepts that emerged from the data analysis. We conceptualized the second-order codes into aggregate dimensions, resulting in processes relating dynamic capabilities. Figure 1 illustrates the data structure emerged from our data analysis, following Gioia et al.'s (2012) guidelines.

Organizations	Job Title of Informants	Avg. Interview Time
Case 1, Firm A: Customer -Product Owner (PO)	PO1, Firm A, Senior Engineering Manager, Collaboration Platforms; PO2, Firm A, Program Manager; PO3, Firm A, Technical Program Engineering Manager;	42:24
Case 1, Firm B: Platform Owner (CP) - Cloud Provider	CP1, Firm B, Independent Software Vendor (ISV) Sales and Business Development Manager; CP2, Firm B, Solutions Architect; CP3, Firm B, Partner Solutions Architect; CP4, Firm B, Partner Manager; CP5, Firm B, Partner Cloud Architect; CP6, Firm B, Senior Technical Program Manager.	44:03
Case 1, Firm C: System Integrator (SI)	SI1, Firm C, Global Enterprise Services Manager; SI2, Firm C, Partner Development Manager; SI3, Firm C, Enterprise Support Leader; SI4, Firm C, Technical Program Manager.	36:16
Case 2, Firm D: Customer - Cloud Provider (PO)	PO1, Firm D, Senior Product Manager; PO2, Firm D, Director of Operations; PO3, Firm D, Program Engineer; PO4, Firm D, Director; PO5, Firm D, Sales Operations Manager; PO6, Firm D, Technical Program Manager;	45:23
Case 2, Firm E: Platform Owner - SaaS Provider (SP)	SP1, Firm E, Solutions Consultant; SP2, Firm E, Customer Success Manager; SP3, Firm E, VP, Robotics Process Automation;	45:11
Case 2, Firm F: System Integrator (SI)	SI1, Firm F, Business Architect; SI2, Firm F, Lead System Architect; SI3, Firm F, VP, Professional Services;	36:10

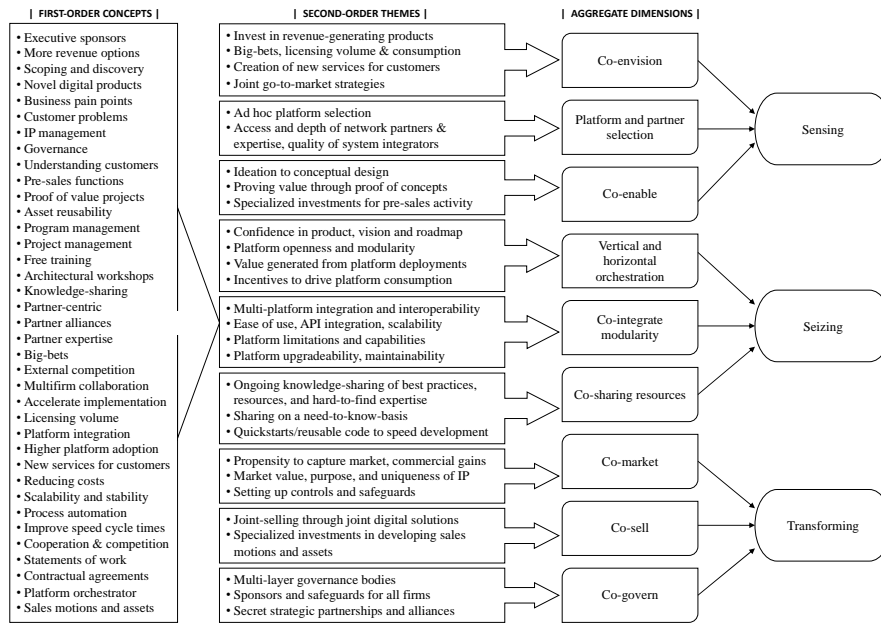*Table 1.   Participant organizations and informants.*

Figure 1.   *Data structure summarizing the data analysis (aggregated dimensions).*

4   Results

In the following sections, we implement the dynamics capabilities (DC) view (Teece, 2018) describing key processes that emerged when firms cocreate IT value in digital platform ecosystems under each DC dimension: sensing, seizing, and transforming. We initiate with key value drivers that motivate IT value cocreation activity and conclude with several business outcomes.

4.1   Value Drivers

Teece (2018) suggests that a step for the innovating organization is "sensing the existence of customers with unmet needs who are willing and able to pay for a product or service that can rectify their predicament" (p. 45). Adopting Teece's sensing argument coupled with value drivers (Amit and Zott, 2001), the following examples offer the drivers that motivate and fuel IT value cocreation. For instance, this example suggests an efficiency value dimension as the driver for the customer to cocreate value enabled by the SaaS platform, as described by a senior product manager: *We're striving to achieve a two percent enterprise reduction, to the-dollar-saved for retention and see laser credits and adjustments as we just throw money to throw money at problems [PO1, Firm D, Senior Product Manager].* We found that the firms collaborating and cocreating IT value are driven by key incentives but also gain significant value from the collaboration and trusting relationships between parties. Each firm has an incentive to devote resources and specialty experts and bring all the know-how to the alliance. A customer's (Firm A) highlights the improvement of the bottom line (revenue) and cost reduction as primary value drivers from their IT value cocreation alliance with the cloud provider, *It improves [Customer] bottom line with reduced overall support cost, keeping the people only for specific, unsolvable, complex, high value problems they need to get on with [PO1, Firm A, Senior Engineering Manager, Collaboration Platforms].*
In Case 2, efficiency and productivity appeared to be a primary driver and a valued tenet. Informants noted how managers are chartered to focus on automation and speed to market on operational functions. These global operational processes are crucial to the customer in keeping and maintaining their global infrastructure. Should anything go wrong with any of their infrastructure services, it would impact millions of customers and users across the globe. As one director of operations explains, *"We are building some automation in-house to do things faster. So, but those, this is like what I call operational side of things" [PO2, Firm D, Director of Operations].* Budgets are kept static and often reduced, therefore, the customer needs to explore digital solutions to address legacy processes and siloed applications.

4.2   Sensing

Sensing is about identifying opportunities by constantly engaging in scanning, searching, and exploring across technologies and markets, including probing of customer needs and technological possibilities (Teece, 2007, p. 9). From our data, three processes related to sensing emerged: partner and partner selection, co-envision, and co-enable.

Platform and partner selection. Grover and Kohli (2012) ask two fundamental questions, which are *"How do firms select partners?"* And *"How do relationships evolve?"* (p. 231). Selecting partners and platforms and forming trusting relationships when multiple firms come together to cocreate IT value enabled by digital platforms requires time and mutual commitments from all parties involved. In case 1, a Firm B's sales and business development manager explains the value of their ecosystem and filling gaps in their digital solutions catalogue by partnering with other vendors, including their direct competitors, *"Some customers prefer to use other products and having a broad ecosystem or as we prefer to call it these days, a broad partner community, enhances the value of [Cloud Provider]. The combined value of our ecosystem with our native services is way bigger than what we could offer only by ourselves [CP1, Firm B, Independent Software Vendor (ISV) Sales and Business Development Manager].* A customer (Firm A) describes tangible benefits that are gained from the IT value cocreation, namely speed to market, knowledge and expertise, and cost efficiencies: *I think time to market, number one, and number two would be leverage ... best of the breed, tools and technologies and know-how...number three, I would say ... I don't have actual data in front of me, but cost-wise it's cheap. [PO2, Firm A, Program Manager].* In some situations, customers want to focus on their core competencies and leverage digital platforms and partners to fill internal gaps: *We much prefer to buy things from the market so long as commercially we can get the quality and features that we're looking for at a cost that's competitive, We're not looking to be a work management company would much prefer to focus on our core mission and leave all that up to you (SaaS Platform) [PO2, Firm D, Director of Operations].*

Co-envision. The co-envisioning process in IT value cocreation is visualizing the *art of the possible*, the process of exploiting the available digital platforms and solutions to speed innovation. Co-envisioning is the translation of a concept or an idea – often driven by a value driver – into a conceptual design solution; more specifically, into blocks of high-level business and technical requirements. As noted by a Firm B's solutions architect in Case 1, *"That's usually how we start the collaboration. First is understanding the customer, understanding their business and what they're trying to achieve. And then based on that opening the architectures and providing them solutions and helping them build that out as well"* [CP2, Firm B, Solutions Architect]. In Case 2, the customer and SaaS platform, together, identified an opportunity to optimize a set of mundane and repetitive processes. The customer's agents and coordinators had to navigate through hundreds of sites multiple times a day just to achieve the same thing, over and over. A program engineer (PO, Firm D) explained, *"So, when we embarked on this journey with one of our partners, [SP1, Firm E, Solutions Consultant], he and I were looking at some of our current process and we saw that there's a ton amount of manual toil...we saw that as an opportunity for us to implement process automation.* This idea or value driver was translated into blocks of requirements and ultimately into a conceptual digital solution. In Case 2, as explained by a director, *"When you can sort of complement the richness of [Customer's Cloud Platform], coupled with some of the things, the richness coming from [SaaS Platform] and kind of a go to market perspective. You're sharing these capabilities and you can join and go to market together"* [PO4, Firm D, Director].

Co-enable. The co-enabling process involves taking an idea into a conceptual design through educational enablement programs prior to fully committing resources for a full co-development and co-production. The conceptual design is part of the customer's proof of concept (PoC) to prove the value, determine the required investments, and quantify overall deployment timelines. The co-design aspect in this context is that the customer acts as the process owner, the SaaS platform solutions consultant as the digital solution and industry expert, and the system integrator as the technical subject matter expert (ultimately who builds and deploys the solution to a production environment). *After our journey here, it took us a while just in terms of really identifying what all the opportunities were and then nailing them down and developing them. Each of the process developments themselves were fairly quick; it took us*

maybe a few weeks to deploy, to develop, to test, and deploy a service end-to-end [PO3, Firm A, Technical Program Engineering Manager]. Customers business and technology stakeholders join forces with partners and digital platforms and together they explore the possibilities available to come up with feasible digital solutions to achieve the desired business outcomes. The level of project communication and coordination often depends on the customer's technical fluency in the platform and the project's level of complexity. There are situations where the customer has the capacity and technical expertise to take the design and build process on their own but with the support from the digital platform teams. In Case 2, for instance, a Firm E's customer success manager interacts with the customer offering the customer teams resources available to equip them with the appropriate tooling and get them started with the co-build phase: *we have what we call a low-code workshop, and this can be two hours, four hours, full day. And what we could do is take an actual [Process Name] use case and we build it out real time on an [SaaS Platform's Development Environment]. So, the output of that workshop is a real built out application [SP2, Firm E, Customer Success Manager].*

4.3 Seize

Seizing is about "making good decisions under uncertainty, and executing well on those decisions (Teece, 2007, p. 10). Three processes related to seizing emerged from our data: co-share resources, co-integrate platform modularity, and vertical and horizontal orchestration.

Co-share resources. The process of co-sharing resources assumes exchanging specialized knowledge and sharing information, sharing cross-functional technical resources that are difficult to replicate or find in the market, to exploit each firm's capabilities to build joint digital products and services. Teece et al. (1997) defines resources as "firm-specific assets that are difficult if not impossible to imitate" (e.g., trade secrets, specialized production facilities, experience) (p. 516). A Firm B's partner solutions architect explains the process in which multiple firms join forces to understand each other's unique value propositions and capabilities, *And to the extent that they can, they have discussions between each other to really understand what unique value propositions do each other's capabilities bring to the table and how do we make the most of those right? If [Cloud Provider Product] supports running [Cloud Provider Product] or it supports running inference in the edge, and that is something that may or may not be unique. And if it's unique enough, such that [Customer] finds that their customers would be interested in it, then they will make sure that an integration with that capability is part of the overall solution...How do you exploit each these capabilities? [CP3, Firm B, Partner Solutions Architect].* Firms A and B in Case 1 took a similar approach in their co-sharing process where they conducted design reviews and held whiteboarding sessions as part of their co-design activity, as explained by a Firm A's senior engineering manager and Firm C's system integrator's consultant, *We also shared our own designs, and they shared their ideas. So, it's kind of common design reviews, especially on the infrastructure – how it's going to look like, architecture and content structure. We have extensive meetings with the different folks [professional services] that are related to these areas... [PO1, Firm A, Senior Engineering Manager, Collaboration Platforms]. We used whiteboarding extensively to actually do these information sharing sessions, design reviews. We also had a physical presence – all our discussions, results, were documented as project meeting notes, and also as documents proper – results documents [SI1, Firm C, Global Enterprise Services Manager].* A sales operations manager in the customer's sales and marketing team explained the partnership with statisticians to build algorithms that are executed in the SaaS platform with the goal of reducing customer churn, *It's very much about utilizing our predictive models developed in partnership with our statisticians to share, and we're targeting those customers and accounts that are just really highly elevated, likely to welcome the retention, is likely to disconnect so that there is something we can do about the diversity attempt [PO5, Firm D, Sales Operations Manager].*

Co-integrate platform modularity. Given the complexity and modularity of digital platforms (cloud computing services, SaaS platforms), the co-integration process involves managing the interconnectivity and interoperability of a broad range of architectural components. Digitalization introduced layered modular structures that enable 'massive and parallel' experimentations of recombination of digital components (Lyytinen et al., 2016). In the example below, the customer is complementing and exploiting

internal systems and APIs where the goal is to leverage the SaaS platform as the case management application and facilitate user interactions through the customer's chat bot service. As explained by a technical program manager, followed by a lead business architect explaining the role of the SaaS platform at the customer: *I want to build an intake form that has the required elements to create a bug. I want to call our [Bug API System Action] to create that bug. And then I want to go into [Bug System], outside the system, make an update, and then come back into [SaaS Platform] and show how that update in the bug gets propagated into the case. What I like to do is explore how do we integrate Chat, with using the Chat Bot it, even if it's just a notification through the chat by saying, hey, this bug has been created in this component and then the user isn't able to actually interact with the bug [PO6, Firm D, Technical Program Manager)].* However, there are cases where there is no native integration component available and therefore the partners and customers need to join forces to develop that missing integration, *We want someone to be able to build that or create that in some component. So, you guys need to figure out which test component we can use. We could just use the one that we were using when we did the [Customer Application] API [SI1, Firm F, Business Architect].*

Vertical and horizontal orchestration. Teece (2007) suggests that the innovation process requires active orchestration of assets (tangible/intangible) by managers which aligns with our key findings. Co-orchestration assumes orchestrating people and resources (e.g., sales teams, partner teams, executives, etc.) across firms but also orchestrating emerging technologies and the convergence of technologies from all firms cocreating digital solutions (e.g., cloud infrastructure, open-source containers, APIs, RPA applications, etc.). These types of orchestrating layers provide a source of value that, when combined, exponentially open opportunities for more value-generating and digital innovation and transformation initiatives. A VP at the SaaS Platform elaborated how with the combination of emerging technologies are changing 'the game' in application development to the point of companies becoming 'digital native': *We've low-code with cloud, with Kubernetes, and all these other things, you literally can build new digital applications in days and weeks. You put together machine learning, AI, IoT, cloud, micro services, and then you orchestrate all of the work that gets done in your organization in a single entity [SP3, Firm E, VP, Robotics Process Automation].*

The customer and digital platforms (cloud provider, SaaS platform) leverage each other's unique digital capabilities and skills in order to implement scalable applications horizontally across the customer's business functions (*horizontal orchestration*). A unique nuance worth highlighting is that the complementary layer extends to internal and external partners – beyond the digital platform and customer. Interviews suggest that in the absence of complementary resources and for the customer and digital platform to generate value, they must facilitate application integrations, data interactions, and automation, as described by a Firm F's system architect, *How [SaaS Platform] is using the dynamic case management to really automate all of them and how it is integrating with the apps at [Customer]. So, if you really look at it, [SaaS Platform] is working as not just the orchestration engine, but also a very sophisticated integration engine to connect these apps very seamlessly for data flow [SI2, Firm F, Lead System Architect].* Business relationships among partners also represent a source of value and facilitates the co-orchestration process. There are significant benefits for the SaaS platform when they partner with the professional services firm, primarily because of the deep bench of SaaS platform's experts and professionals scattered all over the world. This is a limited capability and a shortcoming of the SaaS platform in that they do not have that deep consulting arm to scale and grow as fast as the professional services firm: *Our [SaaS Platform] practice is approximately 2000 people and size approximately 20 million plus in license. And influence revenue that we do year on year for [SaaS Platform] by partnering together [SI3, Firm F, VP, Professional Services].*

4.4   Transform

Transform refers to the ability to recombine and reconfigure assets and organizational structures as markets and technologies change (Teece, 2007). Three processes related to transforming emerged from our data: co-market, co-sell, and co-govern. Co-govern facilitates sensing, seizing, and transforming.

Co-market and Co-sell. The co-marketing process involves multiple firms engage in joint marketing activities. Co-marketing occurs between digital platforms, competitors, and customers but with the goal of commercializing and selling their joint solutions to the marketplace. For revenue generating and commercially driven digital solutions that are cocreated between customers and digital platforms, the next logical process of the IT-based value cocreation is to co-market and co-sell the digital solution to the marketplace. In Firm B (cloud provider), for example, there is a dedicated resource that is responsible for co-marketing and co-selling activity in the ISV sector, *So as a Partner Manager, my role is to find ways of creatively going to market with these ISVs [CP4, Firm B, Partner Manager].* The co-marketing and co-selling processes were far more evident in Case 1 than Case 2. In Case 1 for example, we found that the cloud providers co-design and co-build market accelerators as a pre-sales and go-to-market mechanisms. These Quick Starts promote cloud adoption which result in revenue growth for the cloud provider. It is also a co-selling mechanism for the partners (competitors) because they are effectively selling a full, turnkey solution that combines technical layered components from the cloud provider and the competitors (e.g., open-source database management software built on top of the cloud provider's platform)*: These accelerators reduce hundreds of manual procedures into just a few steps, so you can build your production environment quickly and start using it immediately [CP5, Firm B, Partner Cloud Architect].* Here is an example where the cloud provider partnered with two of their competitors and co-designed and co-built a Quick Start. The two competitors are a global visualization software vendor and a cloud-based data-warehousing vendor which both run flawlessly on the cloud provider's platform. However, the cloud provider's catalog of services also includes the same or similar services as these two competitors (a cloud-powered business intelligence and visualization service and a cloud-base data warehouse platform service), *These Quickstarts are used by the partners to us as pre-sales mechanism. So, maybe [Visualization Software Vendor] and [Cloud-based Data-warehousing Vendor] are out in the field trying to sell their products on [Cloud Provider] and they're using these to deploy the technologies as a proof of concept to their prospects [CP1, Firm B, Independent Software Vendor (ISV) Sales and Business Development Manager].*

Co-govern. Announcing a big marketing 'launch' between participating firms is a complex endeavor. Co-governance processes become critical to avoid or help mitigate any opportunism in the alliance. Not surprisingly, effective governance (safeguards) and information-sharing are key components that need to be managed properly by the partner manager(s) and key stakeholders involved. Once the actors understand that the contractual safeguards are in place, they tend to move fast and there is a great deal of transparency in the relationship between *some* of the partners in the alliance. However, they are careful in terms of how much information is shared to the public and among the partners involved. *And once you're a partner, you're a partner, there's a great deal of transparency, at least in the, like, if you think about [SaaS Competitor], they need to protect their IP. So there are a lot of things that none of the other three partners are going to know until it's announced, like new features, new products, etc. [SI2, Firm C, Partner Development Manager].* Participating firms opted for rather informal safeguards to lower transaction costs and to accelerate the value cocreation efforts. After the partnership is formed and the contractual safeguards are in place, the partners collaborate and work to achieve the business objectives. The stakeholders responsible for such IT value cocreation activities need to agree on the desired business outcomes but also the division of labor (roles and responsibilities) – including sales channels and co-selling arrangements, as described by the partner solution architect, *Once the partnership is going, the formalities when it comes to legal compliance or other stakeholders that might slow things down, I would say they go away, and it just becomes a matter of the two-business development or alliances organizations agreeing on what they want to do together [CP3, Firm B, Partner Solutions Architect].*

4.5   Business Outcomes

Business outcomes refer to monetization from the set of processes that enabled value cocreation and capture (Amit & Zott, 2001) between customers and digital platforms. We uncovered three main business outcomes associated to major *value drivers* (Amit & Zott, 2011): accelerating innovation, speed to market and cost savings, and revenue generation (refer to Table 2). ***Accelerating innovation*** refers to *novelty* which takes a Schumpeterian view suggesting the value creation potential of innovation,

specifically, the introduction of new products and services or "tapping of new markets have been the traditional sources of value creation through innovations" (p. 508). ***Speed to market and cost savings*** refers to *efficiency*, which suggests that "transaction efficiency increases when the costs per transaction decrease…" and that the greater the transaction efficiency the lower the costs and the more valuable it will be (p. 503). ***Revenue generation*** refers to *complementarities* "whenever having a bundle of goods together provides more value than the total value of having each of the goods separately" and "complementarities can be expected to increase value by enabling revenue increases" (p. 504-505). These value drivers are interrelated and does not mean that there is solely a one-to-one mapping but rather a value driver can be linked to one or more IT value cocreation business outcomes. For instance, novelty is linked to efficiency, complementarities, and lock-in (Amit & Zott, 2011) as innovators have an advantage of attracting and retaining customers, or creating and introducing novel assets in the market.

Major Value Drivers Constructs (Amit & Zott, 2011):	Value Drivers to IT Value Cocreation Mapping
Novelty; *Efficiency*	**Accelerating innovation** An important finding from this study is the emphasis on how the cloud drives innovation. Innovation in this case can be ambidextrous: it comes in a variety of flavors. In some cases, it is purely exploitative where the customer achieves great cost savings by redesigning their cloud services to fully optimize their architecture and service consumption. For instance, the cloud provider explains how by redesigning the application architecture for one of their customers (and direct competitors), they ended up realizing significant cost savings. This particular customer is a competitor of the cloud provider but yet runs their software entirely on the cloud provider's platform: *"A customer like [Customer] is very advanced consumer of [Cloud Provider]…The value that came from enterprise for my work with them is a redesign of their use of [NoSQL Database] using a caching service…then their consumption of [NoSQL Database] went down from about $250,000 a month, down to about 60,000 a month"* [SI3, Firm C, Enterprise Support Leader].
Efficiency; Lock-in	**Speed to market and cost savings** The cloud not only drives innovation, but it accelerates speed to market and the delivery of services to the customers' end users/customers. A major benefit for customers is that by using a 'pay as you go' model, there is no need to make large capital expenditures on infrastructure (e.g., hardware, data centers, etc.). Customers have the ability to scale up and down (e.g., compute and storage services) based on their needs and changing business requirements, *"The traditional infrastructure you have to go through a procurement process, make sure you have the right hardware or the right configuration, the right resources, and time of what it's going to take to set up, to build out the solution; whereas with cloud you can quickly ramp up and with a few clicks, you've got hundreds of servers, so allows them to quickly innovate and very quickly build solutions and quickly go to market…our goal is to help our customers innovate so we're able to bring them to a platform that allows them to quickly innovate"* [SI4, Firm C, Technical Program Manager].
Complementarities	**Revenue generation** A key business outcome uncovered in our analysis is around profit and revenue generation as a result of the partnership and collaboration between digital platforms, partners, competitors, and customers, as noted by a Firm B's senior technical manager, *"when we have that partnership and that collaboration it helps us grow our business, it helps increase revenue it helps us innovate it pushes our boundaries to innovate in a sense that we need to continuously come up with new solutions capabilities to stay ahead to ensure that our customers have a clear path and runway for them to accomplish their business objectives"* [CP6, Firm B, Senior Technical Program Manager].

Table 2.   Value Drivers to IT Value Cocreation Mapping.

5   Discussion

By relying on the theory of dynamics capabilities proposed by Teece (2007), this paper sheds light on the question regarding what are the processes that enable IT value cocreation. Figure 2 illustrates key interrelated organizational processes that emerged from the case study. Results demonstrate that the sensing dimension of DC are triggered by external forces and value drivers. Specifically, the process model and data structure in Figure 1 describe the processes through which dynamic capabilities can be transformed throughout the IT value cocreation lifecycle. As a result, what emerged from this research are a set of dynamic and interrelated processes. Under ***Sense***, firms jumpstart the *co-envision* (the art of the possible) and *platform and partner selection* processes, followed by *co-enabling* where participating firms share platform and technical know-how to jump into the subsequent, iterative processes under ***Seize***: *vertical and horizontal orchestration*, *co-integrate platform modularity*, and *co-share resources*. Lastly, *co-market*, *co-sell*, and *co-govern* are carried out under ***Transform***. *Co-governance* is embedded throughout the lifecycle of the cocreation journey to ensure proper management and oversight of joint investments, IP, safeguards, and agreements. We found that these processes are bidirectional and iterative, for instance, firms may jump from the *co-envision* process to *co-share resources* to the *co-sell* process as the joint digital solutions and multi-firm relationships mature. We identified a set of business outcomes (benefits) from the IT-based value cocreation initiatives.
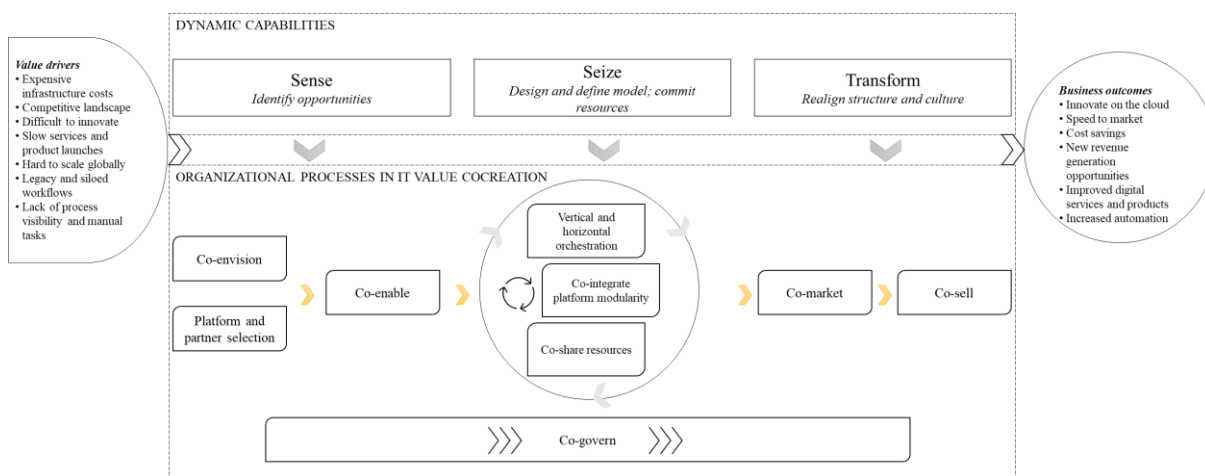

Figure 2.   Emerging Processes of IT value cocreation.

Our study aligns with Grover and Kohli's (2012) IT value cocreating framework, specifically the *knowledge-sharing* and effective *governance* determinants of value dimensions, but we extend their framework by identifying processes that contribute to the IT-based value cocreation lifecycle. Contrast with other intentions of defining processes (Kim et al., 2019; Takahashi & Takahashi, 2021) and the limited research on the role of dynamics capabilities in the creation of value cocreation (Sun & Zhang, 2021), we provide theoretical insights into extant literature about the processes of cocreating IT value and what motivates firms to build digital solutions in competitive digital platform ecosystems. Supporting previous claims (e.g., Teece, 2018), innovation process requires active orchestration of assets (tangible/intangible) by managers. Teece (2007) further suggests that [firms with strong dynamic capabilities results in "value-enhancing orchestration" of assets among firms involved within the business ecosystem (p. 26). Lastly, our findings align with researchers suggesting that firms must provide free access to complementary resources to facilitate exchanges and interactions between firms (Siaw and Sarpong, 2021) so that orchestrators of platform-based ecosystems may profit from innovations (Helfat & Raubitschek, 2018), and facilitate ambidexterity (Haim Faridian & Neubaum, 2021).

6 Conclusion, Opportunities for Future Work and Limitations

Our aim in this study is to further understand the core processes to carry out successful IT value cocreation in digital platforms. To answer our research question, we adopted the dynamics capabilities as our theoretical lens, and exploit a multi case study where multiple firms come together to cocreate IT-based solutions. These firms were involved in co-development, co-sharing of resources, co-marketing, and co-selling activities. This unique combination of firms cocreating value allows us to tease out key processes involved in IT value cocreation anchored through the lens of dynamics capabilities.

This study makes several contributions to research, and we believe our results can inform extant research in multiple ways and our study carries several implications for platform owners, customers, and partners forming partnerships to cocreate IT value. First, we proposed a process model by drawing on the dynamics capabilities (Teece et al., 1997) and its application to IT-based value cocreation (Grover & Kohli, 2012), as well as digital platform ecosystems (Hein et al., 2019), to tease out the underlying processes involved in IT value cocreation in digital platform ecosystems. Second, we address the need for research on the "processes" of IT value cocreation in IT platform-based, competitive environments (Grover & Kohli, 2012). Our study highlights a unique set of processes – including challenges and roadblocks along the cocreation journey. Third, we advance extant literature by introducing multiple value drivers and inputs (assets, resources, knowledge-sharing) that trigger the value cocreation processes, as well as the outcomes and value derived (revenue, speed to market) from the IT-based value cocreation lifecycle. We illustrate the specific sources of IT value cocreation by establishing a link to Amit and Zott's (2011) four major value drivers, which are anchored in the strategic management theory. Fourth, we extend the scope of the dynamic capabilities literature (Teece et al., 1997, 2018) by integrating a digital platform ecosystems perspective to exploit IT value cocreation in multi-firm environments (Haim Faridian & Neubaum, 2021; Helfat & Raubitschek, 2018; Mandrella et al., 2020; Sunder M & Ganesh, 2020). Firms are faced with disruptive changes and need to think outside the box by engaging with firms that form part of greater digital platform ecosystems (Dattée et al., 2017). We complement scholarly work on dynamic capabilities (Matarazzo et al., 2021) by exploring how firms cocreate IT value by reconfiguring their resources and capabilities across a partner network in fast changing ecosystems. Lastly, we link dynamics capabilities literature with IT value cocreation literature by offering insights on how digital platforms can facilitate the simultaneous development of digital solutions in multi-firm environments. We believe that our study extends extant literature in IT value cocreation and dynamics capabilities.

Finally, our research might also offer practical and managerial insights into the challenges and opportunities of IT value cocreation. Our proposed process model provides practitioners with a blueprint and an approach for managing the IT value cocreation journey. We offer a unique and a fresh look at IT-based value cocreation by exploring how firms cocreate joint digital solutions in highly collaborative and competitive conditions and digital platform ecosystems environments. Our results align with Teece's (2018) statement around orchestration, specifically, the firm's resources need to be "orchestrated astutely and coordinated with the activities of partner firms to deliver value to customers" (p. 43). These learnings provide distinctive value cocreation practices for managers, partners, and platform owners.

The research approaches and setting will naturally result in limitations and foster new avenues for future research. A limitation of our study is that findings are drawn from a multiple case study, and they cannot be generalized to all research settings. We also believe that the processes for cocreating IT value that emerged from this study is not an exhaustive list but rather a sound foundation for more empirical research. We offer potential avenues for future research to expand on these processes and the interdependencies. Other researchers have proposed focusing on specific aspects of dynamic capabilities to illuminate other aspects of digital innovation (Teece, 2018) or the orchestration of multi-layered platform ecosystems (Autio, 2022). In sum, our study demonstrates the relevancy and importance of capturing IT value cocreation processes in digital platform ecosystems.

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