

## **Synergizing Multi-Sided Platform Firms and Crowds: A Typology of an Open Innovation Mechanism in a Digital Ecosystem**

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### **ABSTRACT**

This article empirically explores the strategic fit of digital multi-sided platform (MSP) firms that adopt open innovation by incorporating their user crowds. The study constructs the typology and classification of four different open innovation mechanisms that provide strategic fits between an open innovation strategy and user crowds in a digital ecosystem. The inductive multiple case study findings from various leading digital MSP firms that have different business models show how they implement different approaches to integrate the characteristics of their type of open innovation strategy and user crowd participation in the innovation process. The open innovation mechanism in a digital landscape is the explanatory aspect of the open innovation performance differences between one and other digital MSP firms.

*JEL Classifications: O3, Y8*

*Keywords: open innovation; user crowds; digital platform; multi-sided platform; innovation process*

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## I. INTRODUCTION

The state of the art open innovation in strategic management research consists of three approaches, including inbound open innovation, outbound open innovation, and coupled open innovation (Enkel, Gassman, and Chesbrough, 2009). The inbound open innovation process enhances the firm's knowledge base and innovativeness through integrating external knowledge sources from the supplier or customer. On the other hand, the outbound open innovation process includes earning profit through allocating the intellectual property (IP) to the market and letting the market use the IP for its own benefit. The combination of those two open innovation processes and the coupled process include the co-creation activities such as giving and taking IP with complementary partners through cooperation, alliances, joint ventures, and so on.

From the resource-based theory perspective, the emphasis of a platform ecosystem context in open innovation research has been rising along with the digital firm involvement in the crowds that leverage external resources. The digital firm itself may take the role as a multi-sided platform (MSP) that leverages its user crowds or performs as a complementor for conducting open innovation within the platform ecosystem. Famous examples of firms with these characteristics are Alibaba.com, Airbnb, Facebook, TripAdvisor.com, PayPal, and Go-Jek. In this case, MSP is defined as 'an organization that creates value primarily by enabling direct interactions between two (or more) distinct types of affiliated customers' (Hagi and Wright, 2014, p. 7). On the other hand, the user crowds can be the individuals or organization that has a role in either the supplier-side of users or the buyer-side of that product or use the innovation, knowledge, or resources for their activities in the platform ecosystem (Hsieh and Wu, 2018). As a digital MSP, the firms have abundant user crowds that can be a source of innovation (Bogers, Afuah, and Bastian, 2010). On the other hand, as a complementor, the firm can initiate community-coupled open innovation toward the digital MSP firm and other complementors (Stanko and Henard, 2017; Sims and Seidel, 2016). The digital MSP firms that grow significantly in the Internet era often operate in this setting. As digital MSP firms that create and own the platforms, their managers need to pay attention to their platform ecosystems that consist of the user crowds as their complementors as well as their customers who interact in many business activities. Meanwhile, the digital MSP firms also often use open innovation products for their main activities such as open source software or digital products operated within the MSP firms' platform ecosystems (Rindova and Yeow, 2016; Rindova et al., 2012). Based on those studies, it can be concluded that the concepts of inbound open innovation, outbound open innovation, as well as coupled open innovation are found in a platform ecosystem setting.

In a platform ecosystem setting, networks play important roles for the open innovation interaction mechanism (West and Bogers, 2014). For example, in some studies, there are discussions about creating effective networks or ecosystems (Rohrbeck, Holzle, and Gemunden, 2009; Brikshaw, Bessant, and Delbridge, 2007). Furthermore, some scholars argue that firm innovative performance is determined by collaborative networks between firms (Zeng et al., 2010; Nieto and Santamaria, 2007). In digital MSP firm research, the network effect between the user crowds and other platform complementors perform an important role to enhance the user base that leads to resource accumulation, create a barrier to entry for the platform competitors, and even penetrate

and acquire the users from platform competitors (Eisenmann et al., 2011; Eisenmann et al., 2006; Van Parker and Alstynne, 2005).

Even though there is a rise in discussions of open innovation in a platform ecosystem setting, studies that explain why firms gain different benefits from the open innovation implementation are still limited (Saebi and Foss, 2015). Specifically, there are also no studies yet that examine the open innovation mechanism for digital MSP firms with their user crowds to achieve the desired open innovation outcome. A study by Saebi and Foss (2015) found that the business model design that fits with the open innovation strategy greatly affects the innovation performance. Therefore, in a platform setting, the open innovation mechanism, which has not been explored yet, can be a determinant factor for a digital MSP firm to produce high open innovation performance with its user crowds. This gap is addressed by investigating the typology of the open innovation mechanism in various digital MSP firm business models. The main objective of this research is to examine the strategic fit of the open innovation mechanism with an open innovation strategy type that is able to produce high open innovation performance for digital MSP firms. In order to achieve the research objective, the following research question is raised: How do digital MSP firms develop a strategic fit between the open innovation approach and a platform ecosystem environment? Therefore, this study contributes to the open innovation literature by enriching the open innovation process in a platform-based organization context.

## **II. THEORETICAL DEVELOPMENT**

### **A. Open Innovation Strategy**

#### **1. Open innovation**

Discussions about the open innovation role as a determinant factor of a firm's competitive advantage have strengthened the resource-based theory that has been increasingly popular in strategic management research for the past two decades. Initially, Gassman and Enkel (2004) coined the 'coupled open innovation' term as a combination of inbound and outbound knowledge flow from one organization to another organization. After a few decades, the concept was developed to be interactive coupled open innovation where two or more actors cooperatively develop products or knowledge beyond each organization's boundaries (Piller and West, 2014). The inbound open innovation process includes sourcing (non-monetary) and acquiring (monetary), while the outbound open innovation process includes revealing (non-monetary) and selling (monetary) (Dahlander and Gann, 2010). On the other hand, the mechanism of coupled open innovation includes alliances, an innovation ecosystem, inter-organizational collaboration, and networks (Stanko, Fisher, and Bogers, 2017). Mazzola, Bruccoleri, and Perrone (2012) summarized the coupled open innovation practices in the manufacturing industry to include co-patents, R&D alliances, and manufacturing alliances. In the FOSS industry, Sims and Seidel (2016) included intellectual property (source code) and assistance that are taken and given between the community members as coupled IO practices. In online communities, Piller et al. (2011) revealed that coupled open innovation practices can be performed through collaboration with customers to design the new products for them with a content-based user generated approach.

## 2. Crowds or community-based open innovation

In open innovation literature, the external resources that can be utilized by MSP firms include crowds and communities (West and Sims, 2016). This conceptualization was coined by accumulating a high volume of user innovation into the firm innovation process and combining user innovation with the firm's open innovation strategy. Even though open innovation and user innovation have overlapping concepts, those theories have some contrasting perspectives (Piller and West, 2014). The open innovation that was coined by Chesbrough (2003) mostly uses firms (or R&D division) as the unit analysis. From this firm perspective, it has some key principles including the dispersion of knowledge beyond the firm, alignment of innovation with the firm's business model, and embracing the alternatives from both internal and external sources. Thus, mostly there are technological knowledge transfers between the firms and external resources with the form of IP or technological content that include patents as well as licensing contracts. On the other hand, 'user interface' (UI), coined by Von Hippel (1998), uses individual users as the unit of analysis of the research. These individual users have valuable sticky information, desire to solve their own problems that are related with the firm, and also use word-of-mouth to other users. Hence, there is valuable information about needs as well as idea transfers between the users and the firms or between users with the form such as free revealing information as well as creative common license.

For the other aspects, the motive for the open innovation actors is mostly related to monetary incentives, while the motive for the UI can be social incentives or self-use incentives. Thus, the key managerial decision in open innovation includes building an absorptive capacity and preparing the internal organization for open innovation adoption. In UI, the keys of managerial decision are identifying lead users and bridging them toward lead user innovation and also the coordination to keep them in the platform. The crowds and communities that are utilized in the coupled open innovation process, as a combination of open innovation and UI, are different in certain manners such as the collaboration reason for communities and problem-solving reason for crowds (West and Sims, 2016). While the phenomena studied for communities are mostly related with community practice, crowd phenomena are found within internal crowdsourcing and crowdfunding. However, the output for the MSP firms is similar. While communities can provide information, knowledge, or tangible goods, the crowds can create information or information goods for the MSP firms.

In coupled open innovation activities with the crowds or communities, especially using an online platform, Rayna and Striukova (2015) developed a matrix typology based on the input (differentiated or integrated) and output (mass or custom) of this co-creation process. The crowd involvement can create user manufacturing and crowd customization (differentiated input and custom output) as well as crowdfunding and crowdsourcing (differentiated input and mass output). On the other hand, communities can provide open source (integrated input and mass output). Another scholar (Schweisfurth et al., 2011) developed the coupled open innovation typology based on the free revealing model, including commons-based peer production (open content), user innovation networks (user generated content and user innovation communities), open source innovation (open source software, open design), and also crowdsourcing (idea competitions).

### 3. Open platform strategy

Contrary to the industrial organization economic perspective, the technology management perspective uses a platform as technological architecture with a focus on innovation from the supply side of the platform. Therefore, the value creation is developed from the economics of scope in innovation and supply. This condition is achieved when the cost to innovate products A and B is less than the cost to innovate both products separately (Bresnahan and Trajtenberg, 1995). It has coordination roles among innovators (complementors). In this perspective, the platform leaders open their interfaces to a certain degree with core and periphery modular component structures to facilitate the ecosystem innovation (Baldwin and Woodard, 2009; Baldwin and Clark, 2000). The complementors can use periphery components to conduct the innovation. One example is Google has 51 open APIs (in 2014) such as Google Maps that can be used for another device or platform complementor. This innovation strengthens the indirect effects between platform users and the complementors. Opening the system for complementors affects the innovation for the platform from distributed heterogeneous knowledge as well as broad accessible external capabilities (Chesbrough, 2003).

In a technology management perspective, Gawer (2014) also commented about the lack of an explanation about platform evolution since the innovation comes from a stable core architecture (Baldwin and Woodard, 2009). Furthermore, different from an industrial organization economics perspectives, platform competition is not well examined within this perspective. However, in a recent study, there is an exploration about how platform competition and platform innovation interact with each other. In a study about a mobile handheld platform, there is an inverted U-shape relationship between innovation performance and opening platform access related with the competition among complementors at a certain level (Boudreau, 2010; Boudreau, 2012). In a platform setting, the innovation performance is manifested as products/ services/ features/ content innovation (incremental innovation) or business model innovation (radical innovation) as well as the firm performance, such as sales or growth triggered by those types of innovation (Tien and Cheng, 2017; Crossan and Apaydin, 2010).

The discussion about various open innovation practices as the antecedents of innovation performance led to the following proposition being developed:

*Proposition 1: The adoption of an open innovation strategy in a digital MSP ecosystem can lead to high firm innovation performance.*

#### B. Open Innovation Performance through Leveraging External Resources

The notion about open innovation in existing studies cannot be separated from leveraging external resources as the source of innovation. These external resources include individuals, universities, suppliers, customers, or other entities outside the firm. In the early studies, the trigger to do external sourcing was emphasized on the motivation to improve efficiency through the economies of scale and to improve the access toward innovations. In further developments, as mentioned in the previous sub-section, in the recent years there is growing literature that discusses user innovation (von Hippel, 2005). There are various forms of user innovation about this conception, depending on the firm's involvement. The firm may present itself explicitly as the organizer for an innovation project such as the case in crowdsourcing (Jeppersen, Afuah, and Tucci, 2012; Lakhani, 2010) or co-creation (Piller and West, 2014; Prahalad and Ramaswamy, 2004). However,

the firm may be absent explicitly as well like in the case of FOSS (Von Hippel, 2007). Both conditions can contribute for the firm's benefit in certain settings since the interactions between the firm and crowds or communities or between peers can happen. From this point, West and Bogers (2014) summarized a sequential three-model step from the external innovation creation to commercialization for the customers that includes obtaining, integrating, and commercializing. They also added an interaction mechanism that is commonly present in the couple open innovation process.

### **1. Obtaining and interactions**

In the first stage of the open innovation process, the community management practice is discussed as a co-creation activity to acquire external knowledge or innovation through the platform.

#### **a. Crowds or community management practices**

As mentioned earlier, the open innovation practice extends the firm's boundaries through access to external resources that are beyond the internal organization. In industrial organization studies, the scholars noted that the firms are aware of the potential benefits in utilizing external resources from the community as a valuable asset. However, some mechanisms need to be prepared to unlock its potential (Dahlander and Wallin, 2006). The common mechanism to leverage the community as an external innovation source is opening the firm boundaries (Langner and Seidel, 2015; Parmentier and Mangematin, 2014; Teigland et al., 2014).

Previous studies also recorded the various community management practices with different outcomes. Langner and Seidel (2015) mentioned that the effort to influence community members' cognitive ability to feel a "dual-social identity" will sustain the knowledge flow to the firm. Developing the community innovation capacity through community boundary management logic (power, identity, competence, and transactional efficiency) can develop the firm's absorptive capacity as well (Teigland et al., 2014). These findings will be a starting point for the study to examine the role of the community management practice to conduct open innovation in an entrepreneurial firm when the initial absorptive capacity is low or absent.

### **2. Integrating and interactions**

In the second stage of the open innovation process, the open innovation climate is discussed as the organizational culture for the integrating mechanism of external knowledge or innovation.

#### **a. Open innovation climate**

Another perspective of the resource-based theory that is applied in open innovation research is about some concepts related with the organizational culture. The organizational culture contributes to the firm's competitive advantage since it is very difficult to be imitated by another competitor (Barney, 1986). The organizational culture in the open innovation practice is related with having acceptance and an open mind-set for leveraging an innovation that is not wholly created by the organization. Chesbrough (2011) mentioned that the important aspect is accepting a "not-invented-here" culture for the inbound open innovation process and the "not-selling-here" culture for the outbound

open innovation process. In the open innovation process perspective, Remneland-Wikhamn and Wikhamn (2011) suggested to measure an open innovation climate as a deeper understanding of organizational culture that supports open innovation practices and implementations. An open innovation climate measures the innovativeness and flexibility, outward focus, and also reflexivity within the organization.

Since the past few decades, several strategic management and organizational behaviour scholars have defined the organizational climate in various terms including organizational environment reality with the scope of employee feelings and attitudes (Hansen et al., 2008), shared perceptions about organizational procedures and policies developed from the social interaction process (Charbonnier-Voirin et al., 2010), or the organizational context of the individual actions (Baer and Frese, 2003). There is also a term about organizational climate related to innovation that supports the innovative behaviour (Cresspell and Hansen, 2008), encourages the learning, promotes idea expression and flexibility (Charbonnier-Voirin et al., 2010), enables proactiveness, supports persistence, and encourages self-starting behaviour of some work (Baer and Frase, 2003), and allows for risks to try new things (Choi et al., 2013). These climates are related to and support the innovativeness of the firm, and the innovativeness is related with the firm performance (Sethibe and Steyn, 2016).

### **3. Commercializing and interactions**

In the last stage of the open innovation process, innovation performance is often considered as the outcome from the open innovation process. However, the firm's absorptive capacity is also mentioned as the pre-condition of the open innovation practice (West and Bogers, 2014). In the platform setting, open innovation performance is strongly related with the crowds', communities', and complementors' involvement within the platform ecosystem. The platform dynamics from its ecosystem members may lead the platform to innovate the whole ecosystem. In this conception development, Gawer (2014) criticized the economic perspectives of the platform ecosystem for its static approach. The platforms are taken to be fixed and exogenous. There is no explanation about how and why the platform evolves. Furthermore, the supply side is not seen as complementors. Instead, it is considered as mere consumers from a demand-side perspective that do not perform an innovation. However, there are emerging studies that shift beyond static assumption by examining both demand-side users and supply side users (Eisenmann et al., 2009). In further research, the platform envelopment shows the scope change of the platform in a platform competition context through extending the functionality with shared user relationships (demand-side) and also shared components (supply-side) (Eisenmann et al., 2011).

#### **a. Absorptive Capacity**

Absorptive capacity consists of several components including recognition capacity, assimilation capacity, and exploitation capacity in the organizational process within open innovation practices (Zobel, 2017). Assimilation capacity includes coordination, integration, and knowledge management processes. This conception is derived from the original absorptive capacity that is defined as the firm's ability to recognize and assimilate the value of new information as well as apply it for commercial purposes (Cohen and Levinthal, 1990). In a further development, Zahra and George (2002)

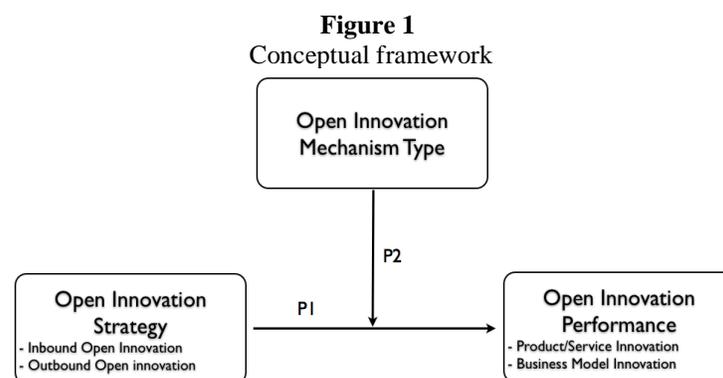
reformulated the concept of absorptive capacity to explore other areas besides the R&D investment to develop the firm's absorptive capacity by defining two different absorptive capacities that include potential absorptive capacity and realized absorptive capacity. Potential absorptive capacity deals with acquiring and assimilating external knowledge. On the other hand, realized absorptive capacity deals with transforming the knowledge to develop and refine the routines through combining existing and new knowledge and also deals with exploitation capability to get the benefits from new products or services.

Consistent with the conception from Zahra and George (2002), open innovation implementation also requires certain dynamic capabilities to sense, seize, and reconfigure opportunities through the integration and orchestration of new and existing resources (Teece, 2007). One of the capabilities is an absorptive capacity to understand the possibilities and constraints of external knowledge that are related with the firm's own resources (Spithoven et al., 2010; Chesbrough, 2006, 2003). In a further development, Lichtenthaler and Lichtenthaler (2009) coined the term 'knowledge management capacity', a dynamic capability to manage the knowledge base over time that complements absorptive capacity in an open innovation framework. Knowledge management capacity consists of inventive capacity (internal exploration; generate and integrate), absorptive capacity (external exploration; acquire and assimilate), transformative capacity (internal retention; maintain and reactive), connective capacity (external retention; maintain and reactive), innovative capacity (internal exploitation; transmute and commercialize), and desorptive capacity (external exploitation, identity and transfer).

Based on the theoretical background about achieving open innovation performance through leveraging external resources that includes the interactions with the crowds, communities, and complementors, the following proposition is developed:

*Proposition 2: The open innovation mechanism that fits with the open innovation strategy can enhance the digital MSP firm innovation performance.*

The research framework about both propositions is presented in Figure 1.



### III. METHODOLOGY

As mentioned earlier, there is still a limited understanding about the open innovation mechanism in a digital MSP firm context. Therefore, an exploratory and inductive

multiple case study approach was used to analyze this nascent concept (Yin, 2009; Eisenhardt, 1989). These qualitative methods are suitable to explore the local context and situational constraints that present comprehensive perspectives about the phenomenon as well as to develop a theory (Yin, 2009; Eisenhardt and Graebner, 2007; Eisenhardt, 1989). Hence, they are relevant with the nature of this study that has an objective to classify and create a typology for the open innovation mechanism from various types of digital MSP firms.

In order to explore the open innovation mechanism type in a digital platform setting, in-depth interviews were conducted with the founders of Indonesian digital MSP firms that had different open platform activities. In this study context, emerging markets like Indonesia are relevant to assess the role of user crowds since there is significant growth of nascent entrepreneurs who rely on digital MSP firms for their businesses (Wiradinata, 2017). The list of digital MSP firms and their characteristics is presented in Table 1. The main criteria for the respondents are the digital MSP firms that implement either inbound or outbound open innovation strategies, and also incorporate their user crowds within those strategies. Furthermore, all of the respondents have shown remarkable open innovation performance through certain open innovation mechanisms in recent years.

In this qualitative research process, semi-structured interviews were carried out for around 1 hour and 30 minutes and then followed up with 3 informal meetings for about 30 minutes for each respondent. The interviews were recorded and transcribed with the respondents' approval. For the data triangulation and reliability purposes, the information that was retrieved from the interviews was checked with the firm's website, social media channels, online news, as well as the founder's quotes in some speeches. The results of these case studies are presented in the next section about the open innovation mechanism. In the case study analysis, other digital MSP firm examples were also added that had similar open innovation mechanisms with these 5 respondents to strengthen the typology and classification.

#### **IV. CLASSIFYING PLATFORMS FOR THE OPEN INNOVATION MECHANISM**

##### **A. External-to-Internal Knowledge or Resource Flow with "Passive" User Crowds' Participation in the Innovation Process**

The open platform activities in Platform A are mostly driven by the digital MSP start-up initiatives. Practically, the P2P renting business model uses the user crowds' resources to monetize the platform activities. The users rent unused items from other users mediated and facilitated by the platform. These resources become a significant growth engine for the platform and gives a substantial advantage over the other rental business models, especially those that rely on their own resources. Similar with marketplace-based e-commerce, the product varieties and the number of products are critical to attract more users to join the platform. The P2P rental business model helps the digital MSP firm to achieve these two conditions through the user crowds' participation. The rental business models that rely on their own items to serve their market will hardly match the resource growth of P2P rental business models since they need minimal capital to add to their inventory.

**Table 1**  
Overview of digital MSP firms interviewed

<b>Digital MSP Firm Code</b>	<b>Funding Stages</b>	<b>Number of Employees</b>	<b>Business Model Domain</b>	<b>User Crowds</b>	<b>Open Platform Activities</b>
Platform A	Non-funding	20	Peer-to-Peer (P2P) Renting	Rental item owners, user communities	The digital MSP firm uses and monetizes the resources from the user crowds and monetizes it for another user
Platform B	Seed	50	Crowdfunding	Campaigner, beneficiary, donor	The user crowds create the crowdfunding content in the digital MSP firm infrastructure and attract the cross-side of the users to participate
Platform C	Acquired	23	Social media platform	User communities, food blogger	The user crowds create the social media content in the digital MSP firm infrastructure and interact with the same-side of users
Platform D	Seed	50	Infrastructure provider	Kiosk owner	The digital MSP firm provides all of the infrastructure needed and the crowd agents monetize the infrastructure for their market
Platform E	Non-funding	20	Software-as-Services (SaaS)	Rental entrepreneurs' communities	The digital MSP firm provides a certain technology and the user crowds combine the platform technology with their services or platform to serve their market

In the open innovation process perspective, implementing P2P rental business models alone is not enough without an appropriate open platform strategy in the platform ecosystem context. In the Platform A case, the P2P rental business model is not their first business model. Platform A was founded as a conventional online rental business model that uses their own resources to serve their market. This organization has a decent crowd management practice through their service that makes them have high intensity of interactions and communication with the user crowds. From those interactions, Platform A noticed that there are many users who want to make use of their unused items, especially the short-term used goods such as baby products. Then, the firm came up with developing a P2P rental business model as a win-win solution between the digital MSP firm and the user crowds. The digital MSP firm has a scalable model and potential source to grow its resources as well as transactions while the user crowds utilize the economic incentives for renting their unused goods.

Another business model innovation from Platform A, a second-hand online selling platform for baby items, was also developed by using a similar innovation process. There were user segments who wanted to quickly sell their unused products as soon as possible in order to have more space in their homes. Based on this problem, Platform A developed a new business model on top of the existing infrastructure. The latest business model results show more than 30% of the overall Platform A revenue just after three months of operation.

A typical platform like Platform A tends to have high intensity of external knowledge and resource flow into the platform. Most of the initiatives come from a digital MSP firm. Therefore, the platform needs to have certain mechanisms that are able to scan the opportunities within the platform ecosystem and transform it into a relevant innovation, since the knowledge and resources are not ready to use. Instead, the flow comes in the form of the crowds' problem. For example, even though the P2P scheme provides many available resources to be acquired, the digital MSP firms need to find the user crowds' insight about suitable resources that can provide decent services for them. On the other hand, the user crowds are more "passive" in the platform ecosystem and use the digital MSP firm feature as it is. However, as the users, they have insights and knowledge that can be converted into opportunities and innovation later on by the digital MSP firm.

Another example of digital MSP firms that fit with this mechanism typology are P2P services (e.g., Go-Jek, Hip Car, Babyloania.com, ruangguru.com, Travelio) or financial technology platforms (e.g., iGrow, Taralite). In these digital MSP firms, the user crowds can use their resources such as vehicles, properties, or skills to serve the platform end customer without a significant uniqueness. As a result, their service is similar with other crowds and mostly the user crowds perform like outsource laborers or suppliers for the digital MSP firm.

## **B. External-to-Internal Knowledge or Resource Flow with "Active" User Crowds' Participation in the Innovation Process**

In this study, Platform B and Platform C are found to have similar types in terms of the user crowds' role. The growth of the platforms depends on the contributions of user crowds to create content that is able to attract either cross-side users or same-side users or both. Hence, it becomes a common challenge for this typical digital MSP firm to find

a suitable content provider category for its platform settings. In the beginning, Platform B tried to adopt a famous crowdfunding platform in the world, kickstarter.com and gofundme, for a social movement. Platform B utilized a business model to facilitate the user crowds as campaigners who raised funds for their relatives or somebody who needed help. However, they struggled to generate growth of the platform in a different context. After experimenting with various social movement campaigns through different user crowd categories for about 2 years, Platform B found a user crowd social campaign category that provided significant growth for the platform and attracted promising donors to join the platform, a medical-related social campaign. Once the digital MSP firm found a categorization that brought it to a tipping point, it adjusted the platform features to maximize the medical-related social campaign contribution as a growth engine. For example, Platform B initiated a campaign led by doctors who treated patients with a financial burden. Furthermore, Platform B also created a spin-off company, an NGO, which helped the user crowds to raise enough funds from the donors for their campaign. Once the crowdfunding digital MSP firm achieved organic growth for certain user content categories, it could also drive the other categories to grow and attract the donors even for those with low growth rate previously.

A similar scenario also happened with Platform C. Platform C was founded as an e-commerce platform for user crowds to sell home-made food for the platform customers. However, they struggled to find enough buyer-side user crowds who wanted to purchase the food from supplier-side user crowds. As a result, the digital MSP firm had no substantial growth in the beginning. In order to enhance the interaction of both sides of the user crowds, Platform C initiated the new feature, a social media platform embedded within a home-made food e-commerce platform, which allowed the users to create and share food recipes. They had decent growth in the social media platform with high interactions where more users joined the platform to comment on the user-generated content about the food recipes and even modified the food recipes as well as posted the dishes afterwards. Nevertheless, the high-penetration social media platform still could not help the main business model, the homemade food e-commerce platform, to reach a decent growth rate. In the end, Platform C chose to abandon the homemade food e-commerce platform, even though it had invested many resources in this platform. Instead, it focused on developing the social media platform for food recipes as its main business. After several years, the platform got substantial growth and started to create a spin-off culinary-related company that strengthened the offline communities.

The Platform B and Platform C case studies show that the digital MSP firms need to develop a co-creation initiative that fits with user crowd activities within the platform's ecosystem, since they bring direct innovation, knowledge, and resources into the platform (inbound open innovation). Thus, the level of platform service quality also depends greatly on their user crowds. In this matter, simultaneous experiments are quite critical to do since user crowds bring various types of innovation that do not always fit with either the same-side of users or cross-side of users. This platform type commonly has a scalable growth after they are able to co-create an innovation that fits with certain categories of user crowds such as Platform B with a medical-related crowdfunding campaign and Platform C with a social media platform for food recipes. Further exploitation initiatives in certain innovation outcome categories through co-creation also need to be conducted to strengthen the platform growth.

Other examples of this platform type are marketplace-based e-commerce (e.g., Bukalapak, Tokopedia, Berrykitchen), digital media (e.g., IDN times, Cookpad), crowdsourcing (e.g., tees.co.id, sribu.com, Kitabisa.com), or inbound Software-as-Services/SaaS (e.g., jurnal.id). The products, content, or services in these digital MSP firms are the result of co-creation between the platform and user crowds with certain task allocations between them (Rayna and Striukova, 2015). For example, in marketplace-based e-commerce, the user crowds prepare or produce the high quality products and the platform handles the fulfilment. Similar with it, in the crowdsourcing business model, the user crowds offer their services or resources and then the platform handles all of the supporting system to deliver them to the end customers.

### **C. Internal-to-External Knowledge or Resource Flow with “Passive” User Crowds’ Participation in the Innovation Process**

Different from the case studies mentioned above, in Platform D, the user crowds do not provide inbound knowledge, resources, or innovation flow to the platform. Instead, the user crowds have a role as the arms or agents of the digital MSP firms to reach their customers. The platform prepares end-to-end infrastructure, processes, as well as the product or service knowledge to be used by the user crowds. By using this approach, Platform D creates an innovative business model that is able to convert the traditional kiosks owned by the user crowds into smart-kiosks that have integrated supply chain management, digital retail technology, as well as coffee shop-like facilities such as a charging station, Wi-Fi, an LED TV, and also surveillance cameras for the customers to spend their time in these kiosks. This end-to-end infrastructure enables the user crowds to gain much more revenue compared to the micro-entrepreneurs who operate their traditional kiosks. Integrated supply chain management enables them to supply cheaper products with more variation for the smart-kiosks. Digital retail technology makes their operations more efficient. The coffee-shop like infrastructure attracts more customers to spend more time and money there. Since there are more customers to spend time there, the smart-kiosk user crowds also get more revenue from advertising through LED TVs. Up until this article was written, Platform D had successfully converted 1000 traditional kiosks into smart-kiosks with a decent revenue growth rate for each kiosk in less than one year.

There is a growing adoption of the platform with this type of business model such as lead-agent digital retail (e.g., Warung Pintar, Kioson, Dusdusan, Kido, Kidokado) and online-to-offline (O2O) e-commerce (e.g., Agen Tokopedia, Mitra Bukalapak). Since almost no inbound knowledge, innovation, or resources flow from the user crowds, the critical success of this platform is the acquired number of user crowds because this condition creates more probabilities to increase transactions. Thus, the common approach is the digital MSP firm puts its general end-to-end infrastructure system on top of the user crowds’ resources to create value for both user crowds and their customers. This platform business model is also used by the leading e-commerce that has enormous capabilities in e-retailing as a scalable expansion strategy. This strategy has led the e-commerce to create an O2O e-commerce business model that has strong online and offline capabilities. For example, the O2O e-commerce put its end-to-end infrastructure system in tens of thousands of traditional kiosks that enable the kiosks’ customers to purchase everything that is available on the existing e-commerce (Bukalapak, 2018).

Platform D in this case also has advantages in developing end-to-end infrastructure for the crowd users since the founders are venture capitalists who have close networks with cutting edge digital retail technology start-ups.

#### **D. Internal-to-External Knowledge or Resource Flow with “Active” User Crowds’ Participation in the Innovation Process**

Platform E was founded as a spin-off company of Platform A. Rental e-commerce, especially P2P renting, is considered as a new business model in the e-commerce sector. Therefore, the supporting system for both rental e-commerce and the P2P renting business model is not yet well developed. As the first mover in the online rental e-commerce landscape, Platform A experimented with a solution for its own problem in the new e-commerce sector without many benchmarks. Once the solution was fully developed into a ready-to-use innovation product, Platform A created Platform E to disseminate the innovation by utilizing a software-as-services (SaaS) approach to the other rental e-commerce players as the platform user crowds. An example of their SaaS is an e-commerce platform that is specialized for rental business operations. Then, the user crowds modified this infrastructure based on their rental business. In this case, the innovation drove the growth of both the user crowds and Platform E as well as the e-commerce rental industry as a whole, including Platform A.

This type of open innovation mechanism commonly solves certain core industry problems. The implementation can be seen as an expansion strategy of innovation products that previously were only used for one’s own platform or as a third-party service for specific features that many players in the industry rarely develop on their own. Besides Platform E, another example of this type of platform includes a payment gateway (e.g., Midtrans API), third-party services (e.g., Tiket.com API, Mailtarget, JNE Online Booking, Kaskus API), or e-commerce infrastructure (e.g., Storelogy, Supersewa). The open application programming interface (API) in payment gateway helps the e-commerce player to accept various payment methods from their customers. The payment gateway digital MSP firm utilizes much effort to make these things happen such as coordinating and developing the application with a financial institution such as a bank or credit card issuer. In this situation, the e-commerce teams do not need to take care of all of the payment handling matters, so that they can focus on their core digital business.

For another example, third-party logistics services enable the e-commerce to offer instant delivery services that close the satisfaction gap between online and offline shopping (Santoso and Wahyuni, 2018). On the other hand, the third-party logistics services also get the substantial order growth from the e-commerce transactions. Therefore, the outbound knowledge, innovation, or resource flow from the digital MSP firm enables both user crowds and the platform itself to develop substantial innovation outcomes that they cannot do on their own. In this matter, the user crowds can be other leading digital MSP firms. Several leading e-commerce platforms also allow the user crowds to use their infrastructure through an Open API as well as combine it with the user crowds’ services as an expansion strategy. For example, there are user crowds that created a tourism information website with the flight booking facilities from a leading travel booking platform Open API.

## V. FINDINGS AND DISCUSSION

The case study above with 5 interviewed digital MSP firms and other platforms with the same type of each category shows that digital MSP firms need to determine the fit open innovation mechanism based on the characteristics of the open innovation strategy and user crowds in their business model. In an open innovation strategy from the platform point of view, there are two possibilities of the knowledge, resource, or innovation flow. First, this flow can originate from the user crowds (external platform) into the core platform (inbound). Second, the digital MSP firms can also provide the innovation, knowledge, or resources to be utilized or modified by the user crowds (outbound). A different business model may also lead to different characteristics of the user crowds. For some business models, the user crowds can actively contribute to the innovation, knowledge, or resources directly, while in other business models, the user crowds cannot contribute to the content of the platform directly. By adopting Hsieh and Wu's (2018) concept regarding crowds' new product development (NPD) / new service development (NSD) capabilities, a relevance was found between the intensity of user crowds and the NPD/NSD capabilities. The user crowds that are active in either providing inbound knowledge, resource, or innovation flow or maximize the outbound innovation provided by the digital MSP firm need to have high NPD/NSD capabilities. On the other hand, the user crowds with low NPD/NSD capabilities can be utilized for the open platform business model that allow the user crowds to use the platform features as they are.

From both case study findings and crowds' NPD/NSD capabilities (Hsieh and Wu, 2018), four types of open innovation mechanisms for digital MSP firms were categorized. The first type of this mechanism was conducted by a digital MSP firm that implemented an inbound open innovation strategy with low NPD/NSD capability user crowds. This type of platform needs to have intense interactions with the user crowds to scan the platform ecosystem environment and acquire the knowledge or resources needed from them to produce relevant innovation. This mechanism is often called market-based open innovation (Saebi and Foss, 2015). Hence, this open innovation mechanism is categorized into the listener platform mechanism. The second type of the open innovation mechanism is performed by the digital MSP firm that utilizes similar inbound open innovation strategy with the listener platform mechanism but also involves user crowds with high NPD/NSD capabilities. In this case, the digital MSP firm depends greatly on the user crowds since most of the innovation flow comes from them. The platform needs to co-create the innovation outcome with the user crowds that fit with either the same-side of user crowds or the cross-side of user crowds to ensure the platform growth. The supporting systems for co-creation also need to be explored and exploited to enable the user crowds to provide continuous substantial innovation flow for the platform to serve the customers. Therefore, this platform is categorized from an open innovation mechanism into a co-creation platform mechanism.

The third type of the open innovation mechanism is implemented by the digital MSP firm that uses an outbound open innovation strategy by incorporating user crowds with low NPD/NSD capabilities. In this case, the digital MSP firm needs to prepare an end-to-end infrastructure system that is ready to be used by the user crowds. The impact will be higher when the platform can put the infrastructure on top of the user crowds' resources and create a different value from them. The critical success factors of this mechanism are to produce an easy to use infrastructure system for user crowds and

acquire them in a scalable number to drive the transactions. Thus, this platform is categorized from an open innovation mechanism into a franchisor platform mechanism. Lastly, the fourth type of the open innovation mechanism is initiated by the digital MSP firm that uses an outbound open innovation strategy with the high NPD/NSD capability user crowds. This setting is suitable for the leading digital MSP firms that create an expansion strategy by enabling their infrastructure to be used and modified by the user crowds to serve their market. The combination between their infrastructure and the digital MSP firm outbound innovation flow can produce the emerging business model or innovation outcome for both parties that they cannot do on their own (Aitamurto and Lewis, 2013). Furthermore, this mechanism is effective when the outbound innovation flow can solve the core of the industry problem (Gawer and Cusumano, 2008). For this reason, this platform is categorized from an open innovation mechanism into a coring platform. This platform is presented as an open innovation mechanism typology into a matrix, as shown in Figure 2.

**Figure 2**

Typology of open innovation mechanisms and their examples of a firm-based digital multi-sided platform

<b>Open Innovation Strategy</b>		<b>Open Innovation Mechanism Type III: Franchisor Platform</b>		<b>Open Innovation Mechanism Type IV: Coring</b>	
		Outbound	Mitra Bukalapak Agen Tokopedia Dusdusan.com Kidokado Kudo	Kioson Warung Pintar	Midtrans API Tiket.com API Kaskus API JNE Online Booking (JOB)
Inbound	<b>Open Innovation Mechanism Type I: Listener Platform</b>	<b>Open Innovation Mechanism Type II: Co-Creator Platform</b>			
	Babyloania.com Go-Jek Ruangguru.com Taralite iGrow	Travelio Hip Car	Bukalapak Tokopedia Tees.co.id Kitabisa.com IDN Media	Jurnal.id sribu.com Berrykitchen CookPad	
		Low	<b>User Crowds NPD/NSD Capability</b>		High

## VI. CONCLUSION

The typology and classification of the open innovation mechanism in the digital MSP firm context provides the contribution of a strategic fit in an open innovation practice between the platforms' open innovation strategy and their user crowds. Furthermore, this study also emphasizes the manifestation of the open innovation practice that is still rarely discussed in a digital MSP firm setting, since the majority of open innovation research presents the mechanism in R&D based manufacturing (Bogers et al., 2017). The findings in this study show that various MSP business models lead a platform to develop different

open innovation mechanisms ranging from listener, co-creator, franchisor, as well as coring. These different mechanisms explain the different firms' open innovation performance, as mentioned by Saebi and Foss (2015). The digital MSP firms with a strategic fit in this mechanism are more likely to achieve decent innovation performance compared to those which have not adjusted their approach in a platform ecosystem setting. For this reason, the typology and classification of the open innovation mechanism in this study suggests some theoretical implications for future research.

First, a digital MSP firm can have the role as both an MSP firm itself and user crowds. For example, P2P online transportation companies can be an MSP firm when they provide their main service, but they take a role as user crowds when they support the same day delivery for an e-commerce platform (Santoso and Wahyuni, 2018). Since both roles need different open innovation mechanisms in the platform ecosystem, how the digital MSP firms develop the capabilities to perform both mechanisms need to be explored. Second, since there are digital MSP firm business models that perform both outbound and inbound innovation in a platform ecosystem (Sims and Seidel, 2016), there is a need to study about whether there is an intersection of knowledge, resource, and innovation flow itself that enable the platform to do both an open innovation strategy with a strategic fit mechanism.

Lastly, this study also promotes the managerial implications for the digital MSP firm managers. While one of the critical success factors for the platform growth are the creation network effect between the digital MSP firm and user crowds or between fellow user crowds within the platform ecosystem (Van Alstyne et al., 2016), the case study in this research shows that the open innovation mechanisms for each type of platform business model trigger the network effect itself. Therefore, besides choosing one or more open innovation mechanism from the typology and classification above that fit with the platform business model, the managers also need to prepare some initiatives, such as create official communities with frequent activities, visit the users when they conduct relevant activities, co-create initiatives, conduct the intense communication and analyze it afterwards, invite them to the digital MSP firm office, befriend digital ecosystem members, and hire the staff from the communities. These initiatives not only help the platform to find a suitable open innovation mechanism, but they also drive the sustainable knowledge flow from the user crowds to the platform (Langner and Seidel, 2015).

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