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Effectuation in digital multi-sided platform startups: An entrepreneurial journey through open innovation process

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ABSTRACT

A paradox arises in platform-based open innovation, wherein digital Multi-Sided Platform (MSP) firms with little initial co-creation ability can successfully adopt an open innovation strategy that typically requires a high level of co-creation capacity. This study aims to fill this gap by theoretically exploring the connection between effectuation, which involves entrepreneurial action based on a given set of means and the selection of possible effects, and the open innovation process with co-creation capacity. The objective is to contribute to the significant growth of digital MSP startups. This study investigates the process of open innovation based on platforms in the context of resource constraints, limited knowledge, and uncertainty. The outcomes of a quantitative study including 70 digital MSP startups indicate that the most efficient route for these businesses to achieve Innovation Performance is by first developing Effectuation, followed by Integrative Capabilities and Co-Creation Capacity, and last, Innovation Performance. However, in this shortest path, the involvement of Crowds or Communities Management Practices plays a role in partially moderating the relationship between Effectuation and Integrative Capabilities. Platform-based innovation serves as the point of integration between effectuation theory in entrepreneurship research and open innovation strategy in strategic management research. The bridge connecting these two fields has significant implications for research on platform-based innovation in the field of strategic entrepreneurship.

1. Introduction

A *multi-sided platform (MSP)* is a type of digital platform that connects multiple distinct groups of users, facilitating interactions and transactions among them (Tan & Pan, 2015). Recently, there has been an increase in the number of *digital MSP firms* established by young entrepreneurs. Rudiantara, the Minister of Communication and Information of the Republic of Indonesia, stated that a minimum of 500 digital MSP startups were officially registered as legal entities in 2019 (Bisnis Indonesia, 2019). These entrepreneurs initiate the establishment of *digital MSP firms*. Indonesia startup landscape is quite unique. The *digital MSP startups* usually founded by inexperienced founders but they try new and emerging business model without similar example of successful business model within the country in the past. In Indonesia, often times digital startups register the legal entities only after there are situations that needs them to provide legal entities such as big projects or investment. Therefore, 500 *digital MSP startups* with legal entities shows that there are high number of startups that have potential to provide significant contribution for national economy through *digital MSP*

business model.

As an illustration, there is a crowdfunding platform named Kitabisa.com was established by a recent university graduate who had only accumulated 2 years of job experience in a training and consulting company. Crowdfunding itself is an emerging *open innovation* tools that able to improve the firm knowledge through feedback/inputs from external resources to get new ideas and study recent demands trends (Cappa, 2021; Troise, Matricano, Sorrentino, & Candelo, 2022; Troise, Tani, Dinsmore Jr, & Schiuma, 2021). The highest funded campaigns can show the current trends categories. The engine expansion of Kitabisa.com is fueled by external resources, such as contributors and campaign creators, who communicate with one other on the platform to support social projects. As of the end of 2018, Kitabisa.com has managed to gather USD 15 million from 531.353 contributors throughout 11.650 social initiatives ([Kitabisa](http://Kitabisa.com), 2019). Another example, Tokopedia.com, a leading e-commerce platform in Indonesia, was created by the entrepreneurs in their mid 20s with modest bootstrapping cash for the initial 2 years. On the other hand, Tokopedia's engine growth is fueled by the sellers' innovation and the presence of other platforms inside the

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Tokopedia ecosystem, such as Midtrans (a payment gateway) and Go-Send (third-party logistics services) that are utilized by customers (Santoso & Wahyuni, 2018). In 2019, Tokopedia asserted that they have made a 1% contribution to the broader Indonesian economy (Tokopedia, 2019). Both *digital MSP startups* implement *open innovation* strategy to achieve high growth by utilizing not only an emerging business model but also insufficient resources and experience.

These phenomena are quite different with the context in the *open innovation* theory where the firms can successfully adopt an *open innovation* strategy in their business model and corporate venturing efforts if they have a well-established company (such as IBM, General Electric, or LEGO) with ample resources and expertise, to drive their growth (Chesbrough & Tucci, 2020; Dahlander et al., 2023). Furthermore, since startup represent a temporary form of organization, their role in open innovation process for early stage needs to be observed (Spender, Corvello, Grimaldi, & Rippa, 2017), and the extent of openness that is still beneficial of startups needs to be determined (Marullo, Casprini, Di Minin, & Piccaluga, 2018). Thus, there is a need of some exploration about pre-venturing entrepreneurship for *digital MSP startups* that implement *open innovation* strategy.

The debate on the pre-venturing entrepreneurship stream highlights the connection between the emergence of *digital MSP startups* that utilize *open innovation* strategy and the young entrepreneurial team that founded them (Ghezzi & Cavallo, 2020). *Open innovation* can be defined as “a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization’s business model” (Chesbrough & Bogers, 2014). *Open innovation* research in the field of entrepreneurship, particularly in new venture contexts, has received increasing attention in recent years. For instance, the inductive study conducted by Greul, West, and Bock (2018) uncovers the specific circumstances that prompt a new business to embrace or reject inward or outward *open innovation*. Ajah (2023) and Eftekhari and Bogers (2015) illustrate the potential of open innovation to enhance the chances of survival for new ventures. Despite the growth of this research field, there is still a scarcity of studies that investigate the connection between entrepreneurship and platform-based *open innovation* strategy, while also developing the core competencies of the platform (Hsieh & Wu, 2019).

Open innovation practice needs a pre-condition where the firms require to have decent *absorptive capacity* (West & Bogers, 2014), that is also often mentioned as *co-creation capacity*, for the organization that has knowledge flows from the customers and other external stakeholders. *Co-creation capacity* itself is often mentioned as the organization capability in explore, transform, and exploit the external knowledge into consumer-centric products/services (Beier, Schmidt, & Froehlich, 2023; Emami, Klein, Ramadani, & Hisrich, 2021; Tussyadiah & Zach, 2013). There is still a lack of understanding on how young entrepreneurial teams, who have limited *co-creation capacity* due to resource and experience constraints, may effectively implement an open platform strategy using a *digital MSP* business model (Patton, 2014). Furthermore, digital MSP entrepreneurs frequently generate an emerging business model that has yet to be validated (Choudary, Parker, & Van Alstyne, 2015).

Entrepreneurs commonly employ the *effectuation* strategy to anticipate and attain favorable outcomes for new ventures (Chandler, DeTienne, McKelvie, & Mumford, 2011; Djuricic & Bootz, 2019; Fisher, 2012; Read, Song, & Smit, 2009; Sarasvathy, 2001). The scope of *effectuation* theory encompasses means-driven, non-predictive control, leveraging contingencies, and designing the environment (Dew, Read, Sarasvathy, & Wiltbank, 2008; Sarasvathy, 2001; Sarasvathy, 2009). As a result, the entrepreneurs often experiment the emerging business model (Burnell, Stevenson, & Fisher, 2023). This theory has the potential to explain the process of platform-based entrepreneurship in *digital MSP startups* that enable them to implement open innovation strategy with the limited co-creation capacity in the beginning. The platform-based entrepreneurship focuses on maximizing the roles of digital

platform ecosystem members, including agents, user communities, and supporting partner firms (Zeng, Yang, & Lee, 2023). In this article, digital platform ecosystem terminology has similar meaning with digital ecosystem as a socio-technical system connecting multiple, typically independent providers and consumers of assets for their mutual benefit (Koch, Krohmer, Naab, Rost, & Trapp, 2022). The environment within the digital platform ecosystem conduct a governance mechanism for dynamic business environments that has both contractual (access to platforms and their shared resources) governance and non-contractual (enhance collective value of the platforms and their resources) governance mechanism (Legenvre, Hameri, & Golini, 2022).

Based on the explanation in the previous paragraphs, the main objective of this research is to identify and analyze the roles of effectuation within open innovation process that enable *digital MSP startups* to achieve remarkable innovation performance. To achieve this objective, the author raises a research question “What are the roles of effectuation within open innovation process and whether effectuation contribute to the development of co-creation capacity as a pre-condition of open innovation strategy?” By answering this research question and achieve the research objective, this research contributes to the entrepreneurship field through explaining the processes involved in *digital MSP startups* to acquire the capability to collaborate with the stakeholders within open innovation process that generate innovative outcomes.

This research adopts a platform approach, focusing on *open innovation* within a platform innovation setting, that is also called *platform-based open innovation* (Enkel, Gassmann, & Chesbrough, 2009; Saebi & Foss, 2015). The innovation is generated through the interaction between the platform owner and the members of the digital platform ecosystem (Gawer, 2014). Within the context of this research, the effectuation plays a crucial role as the driving force behind the *platform-based open innovation* process in the digital domain. The *platform-based open innovation* process involves three key components: *integrative capabilities*, *crowds or communities management practices*, and *co-creation capacity*. *Integrative capabilities* refer to the ability of *digital MSP startups* to coordinate and communicate win-win business models with members of the digital platform ecosystem (Helfat & Raubitschek, 2018). *Crowds or communities management practices* are used to sustain the flow of external knowledge from these ecosystem members (Langner & Seidel, 2015). The insight from both customers and non-customers involved in the crowdsourcing process of *digital MSP startups* can be a valuable external knowledge flow for open innovation mechanism after being extracted through some data analytics techniques (Cappa, 2021). Lastly, *co-creation capacity* refers to the ability of *digital MSP startups* to explore, transform, and exploit external knowledge from the digital platform ecosystem environment (Beier et al., 2023; Tussyadiah & Zach, 2013).

This research has contribution to combine the open innovation approach (within a digital platform ecosystem) with the effectuation theory. The integration demonstrates that despite limited resources, young entrepreneurs may effectively implement an open innovation approach for their digital MSP platform by utilizing efficacious logic principles that harness external resources from members of the digital platform ecosystem. The study demonstrates the outcomes of the study that the growth of resources, the expertise in conducting experiments, and the ability to take advantage of unexpected opportunities using effectuation, with the help of members in the digital platform ecosystem, enhance the young entrepreneurs’ understanding of a wide range of topics and their in-depth knowledge. This, in turn, enables them to create new products, services, or business models through collaborative efforts.

2. Literature review

2.1. Platform-based open innovation

The current landscape of open innovation within strategic management research is characterized by three primary approaches: inbound,

outbound, and coupled open innovation (Enkel et al., 2009). Inbound open innovation involves integrating external knowledge from suppliers or customers to enrich the firm's knowledge base and enhance innovativeness. Conversely, outbound open innovation focuses on monetizing intellectual property (IP) by licensing it to the market for their use and benefit. Coupled open innovation combines these two processes, fostering co-creation activities such as exchanging IP with complementary partners through cooperation, alliances, and joint ventures. In recent developments, open innovation has expanded to encompass various themes including knowledge acquisition (Spithoven, Clarysse, & Knockaert, 2011), knowledge dissemination (Lichtenthaler & Ernst, 2009), levels of openness in open innovation (Herrmann, Gassmann, & Eisert, 2007), innovation methodologies (Saguy & Sirotinskaya, 2014; Galati, Bigliardi, & Petroni, 2016), licensing arrangements (Bogers, Bekkers, & Grandstrand, 2012), and the efficacy of open innovation practices and initiatives (Greco, Grimaldi, & Cricelli, 2015; Tomlinson & Fai, 2013).

Many studies on coupled open innovation also investigate the management of crowds or communities to acquire, integrate, and leverage external resources. Langner and Seidel (2015) propose that maintaining continuous external knowledge flows is essential for gaining a competitive edge from communities. Firms can adopt porous boundary practices and garner community support to foster a dual social identity among community members. These firm-sponsored communities can enhance the firm's capacity for co-creation, as they benefit from the innovation capabilities developed through the firm's community management practices (Teigland, Di Gangi, Flaten, Giovacchini, & Pastorino, 2014). Additionally, entrepreneurs or managers should consider specific types of dominant crowds or communities that align with particular technology life cycles (Seidel, Langner, & Sims, 2017). However, Briel and Recker (2017) caution that the implementation of online open innovation communities may fail due to a lack of critical mass of contributors, customer unwillingness to engage in the community, and the risk of falling into a vicious cycle trap associated with the open innovation climate.

On another front, the primary motivation for actors engaged in open innovation tends to be monetary incentives, whereas for user innovation, motivations can revolve around social incentives or personal use. Consequently, key managerial decisions in open innovation entail developing co-creation capabilities and preparing the internal organizational structure for open innovation adoption. In user innovation, managerial priorities include identifying lead users and facilitating their transition towards leading user-driven innovations, along with coordinating efforts to maintain their engagement on the platform. The crowds and communities utilized in the coupled open innovation process, which combines open innovation and user innovation, exhibit distinct characteristics, such as collaboration being the primary motive for communities and problem-solving being the primary motive for crowds (West & Sims, 2017). Communities are typically associated with community practices, whereas crowds are observed in contexts like internal crowdsourcing and crowdfunding. However, the outcomes for the MSP firms are largely similar, as communities can provide information, knowledge, or tangible goods, while crowds can generate information or informational goods for these firms.

From the perspective of resource-based theory, there has been a growing focus on the digital platform ecosystem context within open innovation research, particularly concerning firms' engagement with crowds for leveraging external resources. Firms themselves may assume the role of MSP and also act as complementors within the digital platform ecosystem to facilitate open innovation. As MSP, firms benefit from a plethora of users who can serve as sources of innovation (Bogers, Afuah, & Bastian, 2010). Conversely, as complementors, firms can initiate community-coupled open innovation initiatives involving the MSP and other complementors (Sims & Seidel, 2017; Stanko & Henard, 2017). This setting is often observed in digital MSP startups that experience significant growth in the Internet era. Managers of these startups,

who create and own the platform, must carefully manage their digital platform ecosystem, which includes complementors and customers engaged in various business activities. Additionally, digital MSP startups frequently utilize open innovation products for their core activities, such as open-source software or digital products operated within the digital platform ecosystem (Rindova, Yeow, Martins, & Faraj, 2012; Rindova, Martins, & Yeow, 2016). Drawing from these studies, it can be concluded that the concepts of inbound open innovation, outbound open innovation, and coupled open innovation are applicable within the digital platform ecosystem setting that is mentioned as platform-based open innovation (Ghezzi, 2019).

2.2. Effectuation in startup creation

In the realm of strategic entrepreneurship literature, entrepreneurs initiate some actions in response to entrepreneurial opportunities (Sarasvathy, 2001). These opportunities manifest within contexts of imperfect competition within factor or product markets (Alvarez & Barney, 2013; Venkataraman, 1997) and hold the potential to generate economic wealth (Barney, 1986). Such circumstances arise when new goods, raw materials, services, or organizational methods can be sold in the market at a price exceeding production costs, thereby establishing new relationships between means, ends, or both (Eckhardt & Shane, 2003; Shane & Venkataraman, 2000). In contrast to the market process view, which lacks specifications regarding mechanisms to identify and pursue opportunities, the concept of effectuation introduced by Sarasvathy (2009) encompasses beliefs and actions aimed at both pursuing and realizing entrepreneurial opportunities. In essence, effectuation is a strategic approach that emphasizes leveraging existing resources, engaging in affordable experimentation, and forming strategic partnerships to navigate uncertainty and create value in entrepreneurial endeavors. It represents a mindset and a set of principles that guide entrepreneurial decision-making and action in complex and unpredictable environments (Sarasvathy, 2001).

Effectuation is characterized as a "structured improvisation" and non-predictive control approach that accepts a predefined set of means and focuses on selecting from among possible outcomes achievable with those means (Sarasvathy, 2001; Sarasvathy, 2009). Entrepreneurial perception and action can transform certain situations into opportunities in a creative and adaptable manner. Entrepreneurs employing this approach are adept at accessing and identifying new resources while pursuing opportunities and maintaining open-ended goals (Garnsey, 1998).

Effectuation presents a contrasting decision-making approach to the causation logic typically adopted by MBA graduates. Consequently, it empowers entrepreneurs to cultivate fledgling, adaptable business models by harnessing resources, contingencies, and goal flexibility in uncertain and unpredictable environments (Fisher, 2012; Laskovaia, Shirokova, & Morris, 2017; Read et al., 2009; Roach, Ryman, & Makani, 2016; Sarasvathy, 2001). This necessitates a recalibration of graduate attributes and pedagogical techniques to align with this evolving paradigm. Table 1 below delineates the comparative and contrasting features of effectual and causation logic in decision-making approaches.

Traditional university-level business and management education predominantly fosters high levels of managerial competence, characterized by causation logic as outlined in Table 1. However, during the pre-venture phase, entrepreneurs often rely more on effectual logic than causation logic to experiment with diverse resource combinations aimed at achieving potential goals. This reliance is contingent upon the entrepreneurs' capacity for affordable loss, their ability to forge alliances with external stakeholders to navigate uncertainty, their utilization of contingencies that may arise over time, and their management of unpredictability based on the resources at their disposal (Haugh, 2007; Sarasvathy, 2004). Sarasvathy (2001) refers to these pre-venture processes as "effectuation." Moreover, the interaction between the effectuation and causation processes remains crucial in established firms

Table 1
Causation logic vs effectual logic comparison (adapt from Dew et al., 2008; Sarasvathy, 2009).

Principle	Causation Logic	Effectual Logic
Orientation approach	<i>Goal orientation</i> - > find resources that enable to achieve pre-defined goals	<i>Means orientation</i> - > set the potential goals based on who am I, whom I know, and what I know
Risk management	<i>Based on expected return</i>	<i>Based on affordable loss</i>
Attitude towards external parties	<i>Potential competitors</i>	<i>Potential partners</i>
Attitude towards contingency	<i>Contingencies avoidance</i>	<i>Leverage contingencies</i>
View about future environment	<i>Forecast</i> - > future environment is perceived as externally given situation. Forecast help to adapt with the future	<i>Create/Design</i> - > future environment is created/ designed from the entrepreneurs' action

facing diverse scenarios where organizational ambidexterity is required. Examples of such scenarios include high environmental uncertainty (Yu, Tao, Tao, Xia, & Li, 2018) and a strategy orientation towards co-competition (Galkina & Lundgren-Henriksson, 2017).

The effectuation theory addresses the management of less complex organizations with constrained resources, which leverage external stakeholders to adapt to their environment (Sarasvathy, 2009). Effectuation facilitates the management of these limited resources by leveraging means from stakeholders (Roach et al., 2016). Within the digital platform ecosystem context, these stakeholders can comprise members of the digital platform ecosystem, including buyer-side users, supplier-side users, and supporting partner firms. Digital MSP startups utilize means (resources) from these digital platform ecosystem members through effectuation principles and various open innovation mechanisms, enabling them to accumulate resources without direct ownership (Santoso, Prijadi, & Balqiah, 2019). The principles of leveraging contingencies allow digital MSP startups to remain flexible in pursuing new goals, even in the face of limited internal resources. This flexibility stems from the exploitation of opportunities generated by interactions with stakeholders (Roach et al., 2016). Primarily, implementation involves the utilization or adaptation of existing resources in novel ways to exploit opportunities arising from stakeholders' resources (Fisher, 2012).

3. Research model and hypotheses

3.1. Effectuation in digital MSP startups

The primary objective of this study is to investigate the mechanisms by which fledgling digital MSP startups led by inexperienced founders, who have limited resources and untested business models, are able to develop co-creation capacity and attain high levels of open innovative performance. Within the field of entrepreneurship literature, the choices made by these founders are referred to as effectuation (Chandler et al., 2011; Fisher, 2012; Sarasvathy, 2001; Sarasvathy, 2009). Effectuation is designed to confront future uncertainty that is not only unknown but also unknowable in principle (Sarasvathy, 2009). While causation has orientation approach to find resources that enable to achieve pre-defined goals, effectuation set the potential goals based on available resources. In effectuation, future environment is created/ designed from the entrepreneurs' action. It is opposite with causation that perceive future environment as externally given situation that need forecasting help to adapt with the future (Dew et al., 2008).

Effectuation and open innovation share a commonality in their utilization of external resources to produce innovative outcomes. There is also a close connection between uncertainty and openness (Sarasvathy,

2024), that become the context of digital MSP startups in this research. This research defines the potential routes by which the logical decision-making process can impact open innovation success, as depicted in Fig. 1. The author also illustrate the differences between higher-order construct and lower-order construct. The lower-order constructs are not the part of hypothesis but they are the reflective or formative constructs of the higher order constructs. (See Fig. 2.)

The firm's network also influences certain characteristics, such as pertinent capabilities (Read, Sarasvathy, Dew, & Wiltbank, 2016). Within the scope of this research, the potential networks refer to crowds or communities within the digital platform ecosystem that play significant roles in the business models of digital MSP startups. In these circumstances, it is necessary for digital MSP companies to possess integrative capabilities that allow them to orchestrate ecosystems through effective communication and collaboration. These capabilities are crucial for fostering innovation, as highlighted by Helfat and Raubitschek (2018) and Teece (2018). The use of effectuation is crucial in establishing the ability to integrate when a company needs to seize new chances in response to a fast-evolving market (Baker & Nelson, 2005). It influences the ability of companies to effectively combine their resources to identify and capitalize on opportunities by acquiring knowledge from their strategic partners and implementing it within their company (Guo, 2018; Powell & Sandholtz, 2012).

The validation study by Chandler et al. (2011) underscores the synergy between causation and effectuation in entrepreneurial decision-making, suggesting that effectuation processes can facilitate resource leveraging and opportunity creation. This notion is further supported by Cai, Guo, Fei, and Liu (2017), who demonstrate that effectuation, coupled with exploratory learning, positively influences new venture performance, indicating its potential to enhance integrative capabilities. Additionally, Helfat and Raubitschek (2018) emphasize the significance of dynamic and integrative capabilities for profiting from innovation in digital platform ecosystems, highlighting the role of effectuation in fostering firms' adaptability and innovation within such environments. By synthesizing these studies, it can be hypothesized that the application of effectuation principles enables entrepreneurs to cultivate integrative capabilities crucial for navigating the complexities of digital platform ecosystems. The enhancement for integrative capabilities means that integrative capabilities is already established in order to run digital MSP business model. Effectuation makes these capabilities developed even further significantly to support open innovation process. Thus, in the context of open innovation within crowds or communities, this research establishes these settings as hypothesis 1, outlined as follows:

H1. Effectuation enhances integrative capabilities.

The effectuation approach considers the engagement of people or communities as a catalyst for the creation of resources (Fisher, 2012). Moreover, entrepreneurial firms that employ effectuation often engage in pre-commitment with selected partners through strategic partnerships in order to ascertain the market they should enter such as conducting profit sharing agreement instead of contractual purchase to the supplier (Chandler et al., 2011). In this context, there exists a dynamic interplay between the actions, thoughts, and surroundings of entrepreneurs, which can lead to a mutually influential scenario of co-evolution for both the entrepreneur and the community. In order to make use of the community, the entrepreneurs begin by employing two action mechanisms, reformulating opportunities to develop new strategies and making aggressive efforts to implement them, as the practice of open innovation (Björklund & Krueger, 2016). The primary purpose of the first action mechanism is to ensure the possibility of mutual benefit between the startups and their user communities, and obtain the initial input contribution from possible stakeholders. Meanwhile, the second mechanism is to establish and maintain a prolonged engagement with audiences or communities through attempts to concretize and generate feedback. These two mechanisms co-evolve to increase entrepreneurial action for both the entrepreneur and the ecosystem.

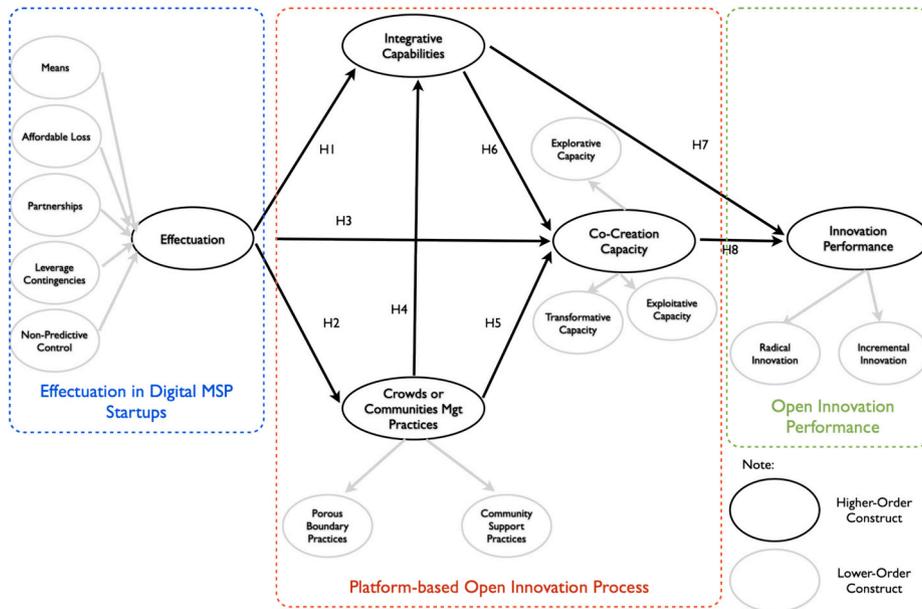


Fig. 1. Research model.

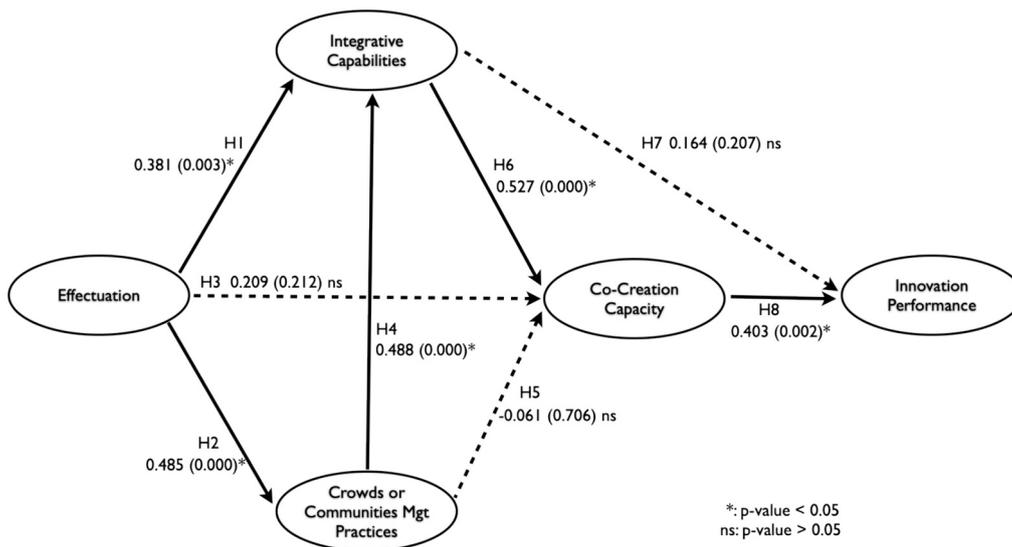


Fig. 2. Structural model testing with path coefficient and p-values (in bracket).

Chandler et al. (2011) highlighting the validity of effectuation in entrepreneurial endeavors. Guo, Cai, and Zhang (2016) further elaborate on how effectuation influences digital MSP startups growth through resource bundling strategies. In addition, Langner and Seidel (2015) emphasize the importance of sustaining the flow of external ideas through dual social identity across communities and firm, the situation where community members feel part of both the firm and communities, which aligns with the notion that effectuation can lead to engagement in crowds or communities. By leveraging effectuation principles, digital MSP startups may enhance their ability to engage with and manage crowds or communities effectively for enhancing the controllable resources within digital platform ecosystem. The reinforcement for crowds or communities management practices means that these practices are developed because of the effectuation as entrepreneurial action. Therefore, these circumstances are expressed as hypothesis 2 in the following manner:

H2. Effectuation reinforces engagement crowds or communities

management practices.

From a dynamic capabilities perspective, entrepreneurial attitude is a determining factor for both the potential and actual ability for co-creation (Khodaei, Scholten, Wubben, & Omta, 2016). In the study conducted by Khodaei et al. (2016) on high-tech academic spin-offs, it was found that the impact of entrepreneurial orientation on performance was greater than the impact of domain specific experience. This is in contrast to previous research in the field of organizational learning, such as the work of Cohen and Levinthal (1990), which suggests that prior experience is a key factor in the development of co-creation capacity. Within the context of emerging economies, the capacity for co-creation is also linked to entrepreneurial orientation, since it acts as a mediator between entrepreneurial orientation and company performance (Cui, Wu, & Tong, 2018; Hughes, Hodgkinson, Hughes, & Arshad, 2018). Both of these situations have significant risks that require an entrepreneurial mindset to cultivate the ability to co-create.

Roach et al. (2016) found that effectuation positively influences

innovation and performance in SMEs, indicating its potential to drive value creation. [Tussyadiah and Zach \(2013\)](#) further support this notion by highlighting the role of social media strategy in fostering consumer co-creation, suggesting that effectuation can be instrumental in enhancing co-creation capacity by enabling effective engagement with consumers through innovative approaches. By combining the principles of effectuation with co-creation activities, organizations may be better positioned to leverage their resources, networks, and creativity to collaboratively develop value propositions that resonate with their stakeholders, ultimately enhancing their capacity for co-creation. Co-creation capacity is already established from the beginning in order to run digital MSP business model. Effectuation makes this capacity developed even further significantly to support open innovation process. Given the similarity between effectuation and entrepreneurial attitude stated earlier, hypothesis 3 is constructed to examine the relationship between these two factors:

H3. *Effectuation enhances co-creation capacity.*

3.2. Platform-based open innovation process

The prior literature on innovation management has highlighted that a firm's integrative capabilities are determined by its openness, tight contact with networks, and utilization of network resources ([Ceptureanu & Ceptureanu, 2019](#); [Lin, Su, & Higgins, 2016](#)). In their study, [Ferraro and Iovanella \(2017\)](#) elucidate the influence of connection patterns on the organization of networks by illustrating the positioning of members inside the structure. According to [McGrath and O'Toole \(2008\)](#), the management practices of crowds or communities allow firms to actively engage with various interconnected players in order to intentionally exchange knowledge, create opportunities, and collaboratively enhance processes, including integration and innovations. From the perspective of dynamic capabilities, the requirements mentioned above on the management practices of crowds or communities overlap with relational capability, which is a separate sort of dynamic capability ([Helfat et al., 2007](#)). The management practices of crowds or communities can be viewed as the ability to establish and maintain relationships with a significant number of people in a digital platform ecosystem who play a vital part in platform business models ([Langner & Seidel, 2015](#)). This relationship has the ability to enhance integrative skills by fostering intense engagement that facilitates the exchange of knowledge about the state of the digital platform ecosystem.

[Langner and Seidel \(2015\)](#) emphasize the significance sustaining the flow of external ideas across communities and organizations, highlighting the importance of integrating diverse perspectives from external organization for innovation. On the other, [Helfat and Raubitschek \(2018\)](#) discuss how dynamic and integrative capabilities are essential for developing successful open innovation practice in digital platform ecosystems, underscoring the need for organizations to adapt and evolve in response to changing environments by the help of the crowds or communities. By leveraging management practices that foster knowledge management, learning, and technology acceptance, organizations can enhance their integrative capabilities, enabling them to effectively utilize external ideas and drive innovation within and across communities and organizations. Integrative capabilities are already established from the beginning in order to run digital MSP business model. Crowds or communities management practices makes these capabilities developed even further significantly to support open innovation process. Therefore, these circumstances are expressed as hypothesis 4 in the following manner:

H4. *Crowds or Communities Management Practices enhances integrative capabilities.*

The potential and realized co-creation capacity can either complement or substitute each other at a specific juncture ([Volberda, Foss, & Lyles, 2010](#)). Firms that prioritize their potential for co-creation, namely

their ability to acquire and assimilate knowledge, are able to consistently replenish their knowledge resources. However, they may face challenges in terms of the costs associated with acquiring external knowledge for the purpose of commercialization. However, companies that excessively prioritize their realized co-creation capacity, which encompasses both transformation and exploitation capabilities, may be able to attain short-term advantages but also run the risk of falling into a competence trap. Therefore, in the practice of open innovation, firms must find a balance between open and closed innovation by creating the necessary co-creation capacity ([Kim, Kim, & Foss, 2016](#)).

[Langner and Seidel \(2015\)](#) emphasize the role of social connections in organizational capacity for innovation. [Roberts and Dinger \(2016\)](#) focus on virtual customer communities and their impact on organizational innovation through an co-creation capacity perspective, indicating that interactive engagement with external stakeholders can drive innovation. Therefore, by integrating the insights from these two studies, it can be hypothesized that effective management practices that foster dual social identity and interactive engagement within crowds or communities will lead to increased co-creation capacity, facilitating innovation and idea exchange between organizations and external stakeholders. Co-creation capacity is already established from the beginning in order to run digital MSP business model. Crowds or communities management practices makes these capacity developed even further significantly to support open innovation process. Therefore, these circumstances are expressed as hypothesis 5 in the following manner:

H5. *Crowds or Communities Management Practices enhances co-creation capacity.*

Integrative capabilities have an impact on both explorative and exploitative capacity in emerging markets, despite the presence of some factors that affect a firm's strategic posture (proactiveness) and the external market environment condition (technology turbulence) ([Jiang, Yang, Pei, & Wang, 2016](#)). Within a digital business context, the establishment of a firm's ability to collaboratively create digital data-driven solutions requires the use of the firm's integrative capabilities, which encompass the utilization of both big-data and small-data ([Lam, Sleep, Hennig-Thurau, Sridhar, & Saboo, 2017](#)). Big data is the term used to describe the data collected by a company from various sources, such as transactions, ratings, reviews, etc., that meet the criteria of being of large volume, high velocity, and diverse in nature. On the other hand, small data refers to the data collected from interactions with external parties ([McAfee, Brynjolfsson, Davenport, Patil, & Barton, 2012](#)). Platform leaders must establish strong communication channels with their ecosystem partners, bolstered by integrated capabilities. [Lam et al. \(2017\)](#) propose that integrative capabilities are responsible for driving a firm's ability for digital data-driven co-creation.

[Helfat and Raubitschek \(2018\)](#) emphasize the significance of dynamic and integrative capabilities within digital platform ecosystems, highlighting the role of orchestration and value capture. [Roberts and Dinger \(2016\)](#) further contribute to this understanding by discussing how interactivity within virtual customer communities influences organizational innovation through an co-creation capacity lens. By synthesizing these perspectives, it can be hypothesized that integrative capabilities play a pivotal role in fostering co-creation capacity within digital platform ecosystems by enabling the efficient utilization of resources and knowledge exchange, ultimately driving innovation and value creation. Co-creation capacity is already established from the beginning in order to run digital MSP business model. Integrative capabilities make this capacity developed even further significantly to support open innovation process. Thus, hypothesis 6 is constructed based on these circumstances as follows:

H6. *Integrative capabilities enhances co-creation capacity.*

3.3. Open innovation performance

In the context of emerging economies, the capabilities of integration have an impact on firm performance, which is then mediated by business model innovation (Pang, Wang, Li, & Duan, 2019). Conversely, in the context of internet-based firms, integrative capabilities play a mediating role in the relationship between resource stock and innovation performance (Liao, Kickul, & Ma, 2009). From the standpoint of innovation output, the concepts of business model innovation and product innovation, as previously mentioned, are seen as measures of innovation performance in relation to radical innovation and incremental innovation, respectively (Crossan & Apaydin, 2010).

According to (Helfat & Raubitschek, 2018), dynamic and integrative capabilities are crucial for profiting from innovation in digital platform ecosystems. These capabilities allow firms to effectively connect diverse resources and knowledge, leading to improved innovation outcomes. Moreover, Tien & Cheng (2017) emphasize the significance of managing online creativity to enhance innovation performance, either incremental innovation performance or radical innovation performance. By creating a conducive creative environment and utilizing online platforms effectively, organizations can boost their innovation performance. Therefore, it is reasonable to posit that integrative capabilities positively impact innovation performance by facilitating the efficient utilization of resources, knowledge, and creativity within organizations. Higher integrative capabilities can result better innovation performance. Thus, these circumstances are expressed as hypothesis 7 in the following manner:

H7. Integrative capabilities positively influences innovation performance.

From the standpoint of the open innovation process, both inbound and outward open innovation necessitate the presence of co-creation capacity. The process of incorporating new ideas and information through inbound open innovation necessitates the presence of a well-developed co-creation capacity in order to improve the operational procedures of firms (Parida, Westerberg, & Frishammar, 2012). Moreover, the ability to transform allows the company to enhance its capacity to adopt innovation methods (Knudsen & Roman, 2004). Conversely, the process of outbound open innovation involves commercializing the outcomes of innovation in the external environment. This requires the ability to form partnerships and transfer information with external entities (Burcharth, Knudsen, & Søndergaard, 2014; Chen, 2004). The exploitation capacity, as a component of realized capacity, enables the firm to effectively engage with external organizations and individuals (Dyer & Singh, 1998). Hence, the effectiveness of both inbound open innovation and outward open innovation is contingent upon the ability for co-creation, as demonstrated by studies conducted by Naqshbandi and Kamel (2017) and Ahn et al. (2016). Coupled open innovation refers to the integration of both inbound open innovation and outbound open innovation, which involve engaging with crowds or communities. This categorization is based on the work of Enkel et al. (2009) and West and Bogers (2014).

Debrulle, Maes, and Sels (2014) emphasize the importance of co-creation capacity in startups, highlighting the significance of human and social capital in enhancing innovation outcomes. Tien & Cheng (2017) further support this notion through online creativity management including explore, transform, and exploit the external knowledge that can lead to improved innovation performance. By synthesizing these references, it can be inferred that a company's ability to co-create, drawing on internal and external knowledge sources, can indeed drive innovation success. This suggests that fostering a culture of collaboration and openness to external ideas and inputs can significantly enhance a firm's innovation performance. Higher co-creation capacity can result better innovation performance. Thus, these situations are articulated as hypothesis 8 in the following manner:

H8. Co-creation capacity positively influences innovation performance.

4. Research methodology

To analyze the implementation process in the new venture that utilizes an open innovation method, this study selects the members of the founding team from Internet-based MSP companies. The initial team members are young individuals with limited co-creation capacity and minimal expertise in developing businesses or managing firms. Guo et al. (2016) and Milanov & Fernhaber (2009) have found that new Internet companies often have an age of 10 years or less. The selection of the research context is based on its alignment with effectuation, which encompasses untested and innovative business models (Fisher, 2012; Sarasvathy, 2001), as well as rising economies (Cai et al., 2017). These situations exhibit significant market growth and considerable unpredictability resulting from environmental dynamism. Hence, the challenge necessitates the use of exploratory learning. Table 2, Table 3, and Table 4 present the respondents background including funding stage, operation duration, number of employee, and industry type.

In this study, the researcher used a self-administered questionnaire-based quantitative approach to examine the hypotheses presented in the preceding section by using Partial Least Squares Structural Equation Modeling (PLS-SEM) as a statistical method. The researcher started the study by defining the research objectives and conceptual model, including identifying the latent constructs and their relationships. Subsequently, the author collected the data through surveys and other appropriate methods to measure the constructs identified in the model. After data collection phase has been conducted, the author proceed the data analysis phase using PLS-SEM. This phase involved conducting the measurement model assessment to evaluate the reliability and validity of the measurement model. Then, the author assessed the internal consistency of the constructs, convergent validity, discriminant validity, and composite reliability. Following the measurement model assessment, the author conducted the structural model assessment. In this phase, the relationships between the latent constructs were analyzed to test the hypotheses formulated in the conceptual model. Lastly, the researcher assessed the path coefficients, significance levels, and the overall model fit to determine the strength and significance of the relationships.

The research circumstances necessitate the application of the Partial Least Square – Structural Equation Modeling (PLS-SEM) approach to analyze the relationship between constructs since this study research goal is to explore new theoretical constructs and predict outcomes. Furthermore, PLS-SEM is suitable for small sample situation (Hair Jr, Hult, Ringle, & Sarstedt, 2016). This study will utilize the effectuation construct developed by Chandler et al. (2011), which has been applied in quantitative research within the context of new ventures in both transition economies (e.g. Cai et al., 2017; Shirokova, Osiyevskyy, Morris, & Bogatyreva, 2017; Guo et al., 2016) and developing economies (Hes, Sulaiman, Chávez, Mintah, & Salman, 2017; Laskovaia et al., 2017; Eyana, Masurel, & Paas, 2018). Additionally, it will explore its application in novel business models or new ventures (Laskovaia et al., 2017; Roach et al., 2016). The research incorporates the community management practice dimension outlined in the study by Langner and Seidel (2015), specifically focusing on porous boundary practices and community support practices. This choice is justified by the fact that the research examines open innovation-based MSP Firms, namely

Table 2
Funding stage.

Funding Stage	Frequencies	Descriptive (amount average)
Bootstrap/Non-Funding	13 (18.57%)	< \$50.000 equity funding
Seed	19 (27.14%)	\$50.000 - \$500.000 equity funding
Pre-Series A	17 (24.29%)	\$500.000 - \$1.000.000 equity funding
Series A	16 (22.86%)	\$1.000.000 - \$15.000.000 equity funding
Multi-Series Funding	5 (7.14%)	> \$15.000.000 equity funding

Table 3
Operation duration-year & number of employee.

Operation Duration	Frequencies	Number of Employees	Frequencies
3rd Year	33 (47.14%)	< 15	16 (23.86%)
4th Year	17 (24.29%)	15–49	29 (41.43%)
Above 4th Year	20 (28.57%)	50–100	18 (25.71%)
		> 100	7 (10%)

Table 4
Respondents industry type based on crowds or communities interaction.

Crowds or Communities Interaction	Frequencies	Descriptive
Consumer-consumer platforms	19 (27.14%)	Platforms allow consumers to communicate with each other (e.g. <i>user discussion forum in e-commerce platform, social media group for user-to-user interaction, etc.</i>)
Firm-consumer platforms	34 (48.57%)	Platforms create a trustworthy environment where consumers are more willing to share and discuss their ideas and knowledge, and contribute their reviews and recommendations (e.g. <i>rating, review and recommendation mechanism, etc.</i>)
Consumer-firm platforms	11 (15.71%)	Platforms allow consumers to dominate the discussion and offer some action to the firm (e.g. <i>consumers' projects, user-led projects supported by digital platform, etc.</i>)
Firm-firm platforms	12 (17.14%)	Users' discussions in the context of firms' interactions with supporting partner firms (e.g. <i>business discussion forum for developer, third-party/supplier forum, seller forum, etc</i>)

Threadless and Local Motors, which heavily rely on crowds or communities for their innovation processes.

The three roles of integrative capabilities that will be assessed are networks of associations, external knowledge links, and acquisition of know-how. The measurements provided are derived from multiple sources, including Helfat and Raubitschek (2018), Dangelico, Pontandolfo, and Pujari (2013), Wu and Ragatz (2010), and Bruni & Verona (2009). The design of co-creation capacity should be able to encompass the three potential types of open innovation processes, which are inbound open innovation, outbound open innovation, and co-creation as coupled open innovation. In order to do this, the construct of co-creation capacity is applied, drawing upon the organizational learning viewpoint as described in the study by Tussyadiah and Zach (2013). This research measures the results of the open innovation process discussed in the preceding parts by utilizing the innovation performance construct. The research assess the level of innovation achievement, encompassing both incremental innovation, which involves the development of new products/services or processes, and radical innovation, which involves the creation of business models (Crossan & Apaydin, 2010). The researcher use both incremental innovation and radical innovation as second-order dimensions using several assessment indicators adapted from Tien & Cheng (2017) work since it shares a similar context with the author study that focuses on open innovation practices involving audiences or communities in emerging economies. The complete operationalization of the constructs is presented in Appendix.

5. Result and data analysis

The primary investigation was carried out by selecting the founders or executives who serve as representatives of digital MSP startups as entrepreneurial organizations in several Indonesian big cities including Jakarta, Bandung, Yogyakarta, Surabaya, and Denpasar (Bali). These cities were selected based on the startup funding activity intensity as well as the ranking of university in those locations. These two aspects

often discussed as the most contributing factors for determining the maturity of entrepreneurial ecosystem in developing countries (Cie-sinski and RK, 2016). Out of the 151 questionnaires distributed online, 47 were filled out. An additional 31 questionnaires were gathered through face-to-face interviews. As a result, the response rate from the data collection activities is 51.66%. In the process, the respondents filled out the questionnaires in the front of the author. After the questionnaires have been filled, the author conduct interview with the respondents to clarify the response and conduct some fact findings that related with the research context. Out of the 78 data gathered, 8 respondent data were excluded due to their failure to meet the screening requirements. Therefore, there are a total of 70 usable data samples. There is an absence of missing data as this research actively contacts and monitors the respondents.

Concerning data distribution, the Kolmogorov-Smirnov test indicates that the *p*-values of the Asympt. Sig. (2-tailed) for all the measurement indicators are <0.05. It indicates that the data distribution of all measurement markers is non-normal. Hence, the PLS-SEM approach is appropriate for this scenario as it can accommodate non-normal distribution data (Hair Jr et al., 2016). Given that PLS-SEM requires a minimum of 60 respondents with 3 pointing arrows at a construct and a minimum R^2 value of 0.235 (Hair Jr et al., 2016), the collected sample data of 70 respondents is considered adequate. Hair, Sarstedt, Hopkins, & Kuppelwieser (2014) also propose that the minimum sample size should be ten times greater than the number of formative indicators. Therefore, this criterion requires a total of 50 samples, which have been successfully met in this research.

The measurement model has been modified iteratively to ensure that all Average Variance Extraction (AVE) values above the threshold of 0.5 and all loading factors surpass 0.6. Regarding the assessment of Composite Reliability (CR), it is important to ensure that CR values approach the threshold value of 0.7. This ensures that the value of AVE always exceeds the threshold, as recommended by Hair Jr et al. (2016). In the final measurement model, the Composite Reliability results for each construct have met the criterion, with values exceeding 0.7.

The initial segment of the comprehensive model test pertains to the significance of effectuation in the open innovation process of digital MSP startups. The results of the study provided support for Hypothesis 1, which posits Effectuation enhances integrative capabilities. The path had a significant effect with a coefficient of 0.318 (*p*-value < .05), indicating a high impact. With an R-square value of 0.52, the predictive capacity of this association is somewhat strong. The mediation analysis examining the relationship between effectuation and integrative capabilities reveals that the practice of managing crowds or communities partially mediates these two variables. This is supported by a VAF (Variance Accounted For) value of 0.45, falling within the range of 0.2 to 0.8, indicating a substantial mediation effect. Additionally, there is a significant direct and indirect effect observed between these variables, as reported by Hair Jr et al. (2016). The data provided evidence in favor of Hypothesis 2, which suggests that Effectuation reinforces engagement crowds or communities management practices. The path displayed a coefficient of 0.485, with a *p*-value of <0.01, indicating a significant and robust effect. The path coefficient exhibits greater strength than the influence of effectuation on integrative capabilities in hypothesis 1, as this research does not incorporate any mediation.

Impact on that relationship. With an R-square value of 0.261, the predictive strength of this association can be considered somewhat significant. Hypothesis 3, which suggests that Effectuation enhances co-creation capacity, was not confirmed. The *p*-value, which measures the statistical significance, was >0.05, and the path coefficient was 0.209. The hypothesis 3 result, which lacks support, indicates that there is a somewhat moderating influence of integrative capabilities on the association between effectuation and co-creation capacity with a VAF of 0.565. However, there are no mediating effects induced by crowd or community management strategies on that relationship, as the indirect effect is not significant.

The second part of the full model test examines the impact of Crowds or Communities Management Practices on the Open Innovation Process of Digital MSP Startups. Hypothesis 4, which suggests that Crowds or Communities Management Practices enhances integrative capabilities, was supported. The structural path analysis revealed a strong effect with a coefficient of 0.488 (p -value $< .01$). The predictive power of this relationship, measured by R-square, is moderate at 0.52. However, Hypothesis 5, which proposes that Crowds or Communities Management Practices enhances co-creation capacity, was not supported. The structural path analysis showed a non-significant result with a p -value $> .05$ and a Path Coefficient of -0.085 . Additionally, the mediation test indicates that integrative capabilities fully mediate the relationship between crowds or communities management practices and co-creation capacity, with a VAF of 1.07 (above 0.8) (Hair Jr et al., 2016).

The third component of the comprehensive model test pertains to the significance of integrative capabilities in the open innovation process of digital MSP startups. The results of the study provided support for Hypothesis 6, which states that Integrative capabilities enhances co-creation capacity. The structural path demonstrated a significant influence with a coefficient of 0.527 (p -value $< .01$), indicating a considerable impact. The predictive capacity of this association, as indicated by an R-square value of 0.435%, is moderate. The data did not provide evidence for Hypothesis 7, which suggests that Integrative capabilities positively influences innovation performance. The structural path was not statistically significant (p -value $> .05$; Path Coefficient 0.164). The study conducted a mediation test to examine the relationship between integrative capabilities and innovation performance. The results indicate that there is a partial mediating effect of co-creation capacity on this relationship. The mediation test yielded a VAF (variance accounted for) value of 0.609, which falls within the recommended range of 0.2 to 0.8 (Hair Jr et al., 2016). The data provided evidence to support Hypothesis 8, which states that Co-creation capacity positively influences innovation performance. The structural path had a significant influence with a coefficient of 0.443 (p -value $< .01$), indicating a considerable impact. The predictive capacity of this association, as indicated by an R-square value of 0.299, is rather substantial.

6. Discussion

The relationship between effectuation and the open innovation process is particularly evident when co-creation capacity is included as a need for generating high-performance open innovation. The connection between effectuation and co-creation capacity in an open platform business model is influenced by additional aspects that are also influenced by effectuation in the open innovation process. These aspects include integrative capabilities and the management practices of crowds or communities. The purpose of crowds or communities management strategies in this open innovation process is to cultivate integrative capabilities. Integrative capabilities refer to the ability to establish co-creation skills for digital MSP startups, which in turn indirectly leads to the generation of innovation performance as an effect of open innovation. Furthermore, the co-creation capacity, which is a necessary requirement for adopting open innovation, is closely linked to the performance of open innovation. In the platform-based open innovation setting, the digital MSP startups focus on creating opportunities and solving problems by using the resources that are available to digital MSP startups within their digital platform ecosystem, rather than making prediction and planning the future.

In order to provide in-depth insight of the finding about the roles of effectuation within open innovation process that enable digital MSP startups to achieve remarkable innovation performance, the author present the illustration of effectuation in platform-based open innovation for digital MSP startups based on the quantitative finding interpretation and some clarification from respondents interview. The common consumer-to-consumer (C2C) marketplace platform typically lacks internal content tailored to specific markets. Consequently, such

digital MSP startups often initiate an outbound open innovation process to leverage underutilized assets or ideas beyond their organization, as outlined by Chesbrough and Bogers (2014). Within this framework of open innovation, digital MSP startups develop core infrastructures or features that enable crowds or communities to utilize them for their own purposes. For instance, in the realm of marketplace-based e-commerce, platforms like Bukalapak and Tokopedia establish end-to-end online platform infrastructures, allowing small and medium-sized enterprises (SMEs) to create their online stores utilizing their own resources, while also incorporating various externally produced content.

PT. Bukalapak.com Tbk. (Bukalapak; <https://www.bukalapak.com>) is an Indonesian e-commerce startup with the highest IPO amount in Indonesia (IDR 21.9 trillion or USD 1.5 billion) for both technology sector (IDXTECHNO) and overall sector. On the other hand, PT. Tokopedia (Tokopedia; <https://www.tokopedia.com>) is the market leader Indonesian e-commerce startup that after conducting M&A with PT. GOJEK Indonesia (Gojek; <https://www.gojek.com>), a ride-hailing startup, to form PT. GoTo Gojek Tokopedia Tbk. (GOTO; <https://goto.com>), conduct the 2nd highest IPO amount in Indonesia for technology sector (IDXTECHNO) and 3rd highest IPO amount for overall sector (IDR 13.7 trillion or USD 954 million) under GOTO entity (SW Indonesia, 2024). These digital MSP startups become the main points where the online buyers and sellers from various background meet each other. The online users that can take the role as either buyers or sellers have various background from individual buyers, corporate buyers, branded official product sellers, retail sellers, online insurance agent, education service provider, until the faith-based charity organization who provide the donation services through Bukalapak or Tokopedia. These online store infrastructures are particularly valuable to SMEs, as they eliminate the need for costly independent development and maintenance of online store platforms. Simultaneously, the content generated by SMEs benefits the digital MSP startups by expanding its market reach through the SME network. By adopting this approach, digital MSP startups can effectively address niche markets that may not warrant internal research and development resources, instead leveraging crowds or communities. Consequently, the introduction of new content and markets can lead to increased revenue, platform traffic, and brand recognition within the industry. For example, when emerging SME sellers introduce new products such as used cars on the platform, they tap into previously underserved markets within the e-commerce marketplace. Similarly, as an example, two distinct Islamic charitable organizations (Amil Zakat), Rumah Zakat (<https://www.rumahzakat.org>) and Dompot Dhuafa (<https://www.dompetdhuafa.org>), utilize marketplace e-commerce infrastructure including Bukalapak and Tokopedia to cater to their target market of Zakat payers, who may not have been served by traditional e-commerce platforms previously. Zakat itself is a form of obligatory almsgiving in Islam. It involves the giving of a portion of one's wealth or assets to those in need, particularly to individuals who are less fortunate or struggling financially. The illustration of this context is presented on Fig. 3 based on the author interpretation from PT. Bukalapak Tbk. and PT. GoTo Gojek Tokopedia Tbk. IPO prospectus (Bukalapak, 2021; GoTo, 2022).

The emergence of new markets resulting from the outbound open innovation process becomes part of the digital MSP startups' market within the digital platform ecosystem. Subsequently, the inbound open innovation process occurs, whereby innovations and knowledge originating from crowds or communities contributing to the new market flow back to the digital MSP Startups. This inbound open innovation process involves external contributions and inputs, thereby broadening the firm's innovation process (Chesbrough & Bogers, 2014). The diverse markets introduced by SMEs can be served by other SMEs on the platform, offering various products or services. Consequently, both economies of scale and economies of scope can be realized within the platform (Chesbrough, 2011).

In the context of MSP platforms, inbound knowledge flow is not solely derived from SMEs as suppliers but also from customers. This

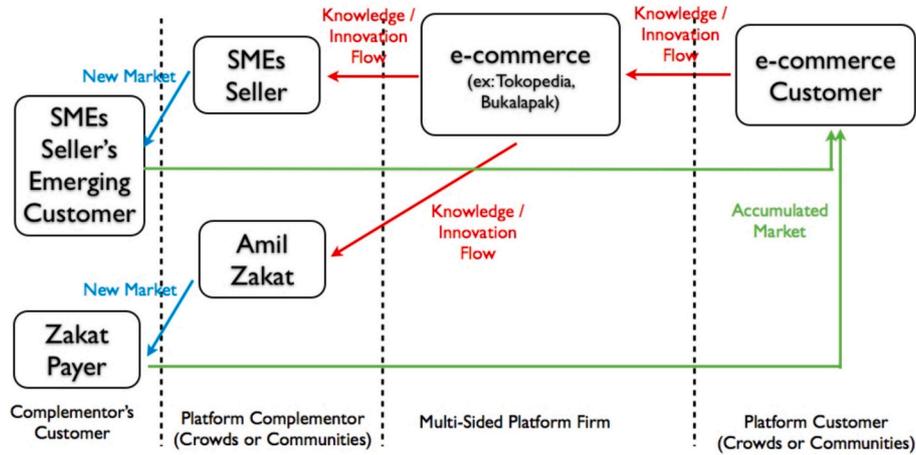


Fig. 3. Outbound open innovation process in digital MSP startups.

influx of knowledge leads not only to incremental innovation through data-driven insights but also to business model innovation (e.g., Tokopedia) and open service innovation (e.g., Gojek, Amazon, Apple App Store, Google Play) (Santoso & Wahyuni, 2018; Chesbrough, 2017). Open service innovation often entails transitioning product functionality into service-based offerings, such as Product-Service Systems, where ownership of the offering shifts to a pay-per-use method (Santoso & Erdaka, 2015). The extensive experimentation and exploration facilitated by the inbound open innovation process is beyond what the internal R&D division of digital MSP startups can achieve alone.

For digital MSP startups operating with a business-to-business (B2B) or business-to-consumer (B2C) model, their open innovation initiatives typically commence with the inbound process. Branded sellers and SMEs provide inbound new products/services to the platform, while third-party logistics offer solutions to innovate the fulfillment process. Additionally, customers provide feedback on platform services, which can be utilized to enhance or innovate the services offered. The illustration of the inbound open innovation process is presented on Fig. 4, also based on the author interpretation from Tokopedia and Bukalapak IPO Prospectus.

Effectuation plays a crucial role in driving the open innovation process. Within the context of platform development, the implementation of strategies motivates digital MSP startups to engage the various participants in the digital platform ecosystem, including users on the supplier side (e.g. branded seller, SMEs seller), users on the buyer side (e.g. e-commerc customers), and partner firms that provide assistance (e.

g. third-party logistic). These participants are seen as sources of open innovation that involve in the crowdsourcing process in each transaction and platform’s activities. Through effectuation principles some data analytics techniques, the insights and knowledge flows from these sources can be transformed into innovation outcome (Cappa, 2021; Ghezzi, 2019). Therefore, effectuation leads and enhances to at least three open innovation processes within the digital platform ecosystem.

The open innovation process include integrative capabilities enhancement, where digital MSP startups can coordinate and communicate win-win business models with members of the digital platform ecosystem. It is relevant with effectuation principles, form partnerships and affordable loss (Sarasvathy, 2024), where digital MSP startups and their stakeholder jointly create mutual benefit products/services as presented in Fig. 3 and Fig. 4 at the extent that each parties can still afford. Furthermore, there are other open innovation process, crowds or communities management practices, the engagement which help sustain the flow of external knowledge from members of the digital platform ecosystem. In effectuation principles, this process is relevant with means orientation and non-predictive control (Sarasvathy, 2024), where the crowds or communities involved in the platform transaction and activities is seen as the “controllable resources” used by digital MSP startups by any means. The more engage digital MSP startups with their crowds or communities results better resources and higher integrative capabilities can be developed. Lastly, there is an open innovation process, co-creation capacity enhancement, which refers to the ability of digital MSP startups to explore, transform, and take advantage of external

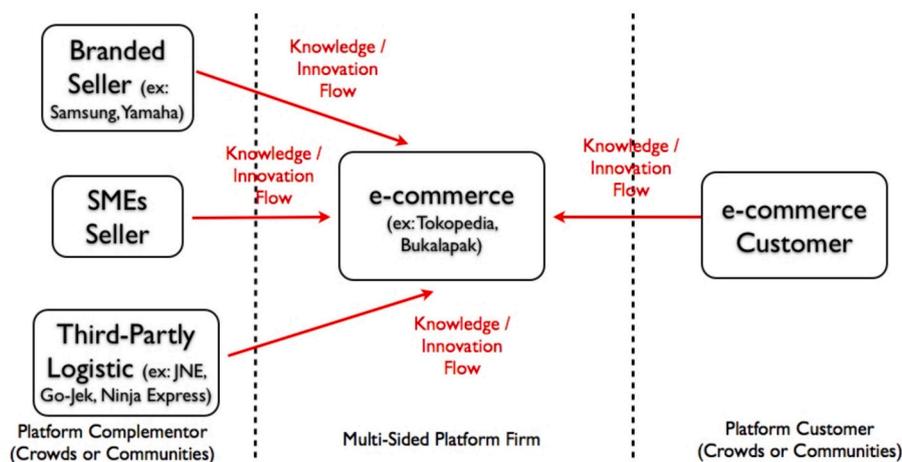


Fig. 4. Inbound open innovation process in digital MSP startups.

knowledge from the digital platform ecosystem environment. In effectuation perspective, digital MSP startups perform leverage contingencies that makes the products, services, or even business model changing overtime because of the influence of external stakeholder (Saravathy, 2024). As the pre-condition of open innovation strategy, co-creation capacity influence open innovation output that generate both radical (new business model) and incremental (new products/services) innovation for digital MSP startups.

7. Conclusion

7.1. Research implication

This research aims to address the research gap in platform-based open innovation by integrating the open innovation strategy and effectuation theory within the context of digital platform ecosystems by answering the research question “*What are the roles of effectuation within open innovation process and whether effectuation contribute to the development of co-creation capacity as a pre-condition of open innovation strategy?*”. Specifically, it focuses on the concept of platform-based innovation. The research explores the paradox of how digital MSP startups with limited initial co-creation capacity can successfully implement an open innovation strategy, which typically requires a high level of co-creation capacity. The results of this study provide explanation to the research question in section 1 concerning the relationship between effectuation and the open innovation process, which includes co-creation capacity as a prerequisite. Additionally, it examines the impact of effectuation on open innovation performance in the context of digital MSP startups. The first theoretical conclusion is to combine the open innovation approach (within a digital platform ecosystem) with the effectuation theory. The integration demonstrates that despite limited resources, young entrepreneurs may effectively implement an open innovation approach for their digital MSP platform by utilizing efficacious logic principles that harness external resources from members of the digital platform ecosystem. The study demonstrates that the growth of resources, the expertise in conducting experiments, and the ability to take advantage of unexpected opportunities using effectuation, with the help of members in the digital platform ecosystem, enhance the young entrepreneurs’ understanding of a wide range of topics and their in-depth knowledge. This, in turn, enables them to create new products, services, or business models through collaborative efforts. These young entrepreneurs may have fewer capabilities than MBA-type managers to execute established business models due to their little industrial experience. Nevertheless, their emerging business concepts are still in uncharted territory with a scarcity of expertise. Therefore, the creators of digital MSP firms possess expertise in this domain. Furthermore, this study contributes to the existing body of knowledge on entrepreneurship by examining the impact of digital platform ecosystem participants on the remarkable growth of digital MSP businesses (Nambisan, Siegel, & Kenney, 2018).

7.2. Limitation of the study

This research possesses certain shortcomings that can be enhanced in further investigations. The primary constraint of this study is the insufficient sample size to provide a comparative analysis of the outcomes for each distinct attribute. The number of digital MSP startups in Indonesia that meet the criteria during the research period is still limited and the sample data do not involve the similar context digital MSP

startups from the other countries. As a result, statistical analysis cannot be used to analyze the differences in the effectuation dimension measurement and its impact on co-creation capacity for different types of digital MSP startups based on funding stage or open innovation orientation. This is because the sample size is below the minimum requirement. Subsequent investigations could duplicate this study in a comparable setting, with a bigger sample size, to gain a more comprehensive understanding of the results. A second constraint of this research is to the open innovation process and its antecedents in relation to the outcome of open innovation. The R-square value, used as a predictive measure for open innovation outcomes such as co-creation capacity and innovation success, barely meets the moderate criterion.

7.3. Future work

This research further establishes that effectuation theory plays a crucial role in determining the outcomes of open innovation. Additionally, there are certain areas where both theories exhibit similarities. As businesses begin or have already formed platform-based firms (Van Alstyne, Parker, & Choudary, 2016), further study can investigate platform-based innovation within the context of corporate entrepreneurship. Future research can focus on exploring the underdeveloped aspects of knowledge management and open innovation strategy for nascent business models. This is particularly relevant when startups have achieved significant growth, as the innovation process may become less dependent on their founders (Dalmarco, Maehler, Trevisan, & Schiavini, 2017).

The concept of managing crowds or communities elucidates the significance of ecosystems in the invention process and the actions taken by entrepreneurs to engage them in this process. Hence, next studies might investigate the integration of online and offline innovation processes within a digital platform ecosystem environment to maximize value acquisition. The findings also implies that there is a need to investigate additional factors, such as the open innovation process, integrative capabilities, and management strategies related to crowds or communities. These factors have the potential to significantly influence the outcome of open innovation in digital MSP businesses. To enhance the understanding of platform-based entrepreneurship (Hsieh & Wu, 2019), it is also possible to explore the connection between newly presented variables in the open innovation process and other entrepreneurial actions, in addition to effectuation.

CRedit authorship contribution statement

Adhi Setyo Santoso: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix A. Appendix

Operationalization of Effectuation Construct

Dimensions	Code	Indicators and Coding	Sources
Leverage Contingencies	LVC1	We experiment with different products, services, or business models, rather than locking in too early in the process	Chandler et al. (2011), Cai et al. (2017), Guo et al. (2016), Roach et al. (2016), Wiltbank, Dew, Read, and Sarasvathy (2006)
	LVC2	We experiment with different innovation concepts, rather than locking in too early in the process	
	LVC3	We try a number of different ways until we find a business model that works	
	LVC4	We were flexible and took advantage of opportunities as they arose	
	LVC5	We adapted what this research were doing to the resources this research had	
	LVC6	We avoided courses of action that restricted our flexibility and adaptability	
	LVC7	We allowed the business to evolve as opportunities emerged	
Affordable Loss	AFL1	We were careful not to commit more resources than this research could afford to lose	
	AFL2	We are willing to lose, even if our concept is very appealing	
	AFL3	We are careful not to exceed the company's financial capacity if our innovation project prove to be unsuccessful	
Means	MNS1	Our networks contribute significantly to our ability to adjust our innovation concepts	
	MNS2	Our networks help us to enhance and strengthen our innovation concepts	
	MNS3	Our technical networks (e.g. investor, advisor, or commercial partners) assist us in improving our innovation concepts	
	PCS1	We rely on our business networks to assist us in improving our innovation outcomes	
	PCS2	We use a number of agreements with customer, suppliers, organizations or individuals to reduce uncertainty	
Partnerships	PCS3	To manage innovation risk, We use precommitments from customers or suppliers as often as possible (e.g. pre-order from customer, term payment from suppliers, etc.)	
	PCS4	We focus on risk reduction by approaching potential partners or customers	
	NPC1	We talk with people we know to enlist their support in making the opportunity a reality	
	NPC2	When we think about the uncertainty of the market, we move forward anyway because our actions can create a future we value	
Non- Predictive Control	NPC3	As we develop a marketing approach, we will focus on customer segments this research can reach through our existing relationships	
	NPC4	As we manage product development, we will measure success towards the expectation that we and our partner businesses create for the product	
	NPC5	We base strategy on what we are capable of, given the means/resources available to us	

Operationalization of Crowds or Communities Management Practices Construct

Dimensions	Code	Indicators and Coding	Sources
Porous Boundary Practice	PBP1	Our user crowds, user communities, or supporting partner firms are often meet our team	Roberts and Dinger (2016), Developed based on Langner and Seidel (2015)
	PBP2	This research hire employee from our user crowds, user communities, or supporting partner firms	
	PBP3	Our employee involve with our user crowds, user communities, or supporting partner firms activities	
	PBP4	Our employee socialize with our user crowds, user communities, or supporting partner firms	
	CSP1	This research acknowledge our user crowds, user communities, or supporting partner firms contribution in our media channels	
	CSP2	This research provide the resource for our user crowds, user communities, or supporting partner firms project	
	CSP3	This research fulfill our user crowds, user communities, or supporting partner firms wish	
	CSP4	This research see our user crowds, user communities, or supporting partner firms as management priority	

Operationalization of Integrative Capabilities Construct

Dimensions	Code	Indicators and Coding	Sources
Integrative Capabilities	ICS1	Please rate the intensity of collaborations undertaken for the development of new products/services, process, or business models with one or more following actors: supplier side user, buyer-side user, supporting partner firm	Helfat & Raubitschek, 2018; Dangelico et al., 2013; Wu & Ragatz, 2010
	ICS2	Please rate the intensity of information used for the development of new products/services, process, or business models from one or more following sources: supplier side user, buyer-side user, supporting partner firm	
	ICS3	Please rate the extent to which you did one or more following activities for the new products/services, process, or business models: hired new competent staff, took specific training/courses, installed new tools	

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Dimensions	Code	Indicators and Coding	Sources
	ICS4	Please rate the intensity of communication with digital multi-sided platform ecosystems involving supplier side of user, buyer side of user, or supporting partner firms	
	ICS5	Our firm is able to do high quality communication with digital multi-sided platform ecosystems involving supplier side of user, buyer side of user, or supporting partner firms	

Operationalization of Co-Creation Capacity Construct

Dimensions	Code	Indicators and Coding	Sources
Explorative Capacity	EXPLR1	We effectively use analytics (digital or offline) to scan the environment of our digital platform for new products/services, process or business models.	Roberts and Dinger (2016), Debrulle et al. (2014), Adjusted from Tussyadiah and Zach (2013)
	EXPLR2	We thoroughly observe new opportunities and trends in the marketplace by using the analytics (digital or offline)	
	EXPLR3	We collect the knowledge/ideas/resources from users or supporting partner firms	
Transformative Capacity	TRC1	We frequently acquire knowledge/ideas/resources from external sources with the help of the analytics (digital or offline)	
	TRC2	We regularly transform knowledge/ideas/resources from users or supporting partner firms into new products/services/business models	
	TRC3	We recognize the usefulness of new knowledge/resources from users or supporting partner firms for existing knowledge/resources	
Exploitative Capacity	EXPLT1	We constantly apply knowledge/ideas/resources from users or supporting partner firms in new products/services, process or business models.	
	EXPLT2	We consider how to better exploit knowledge/ideas/resources from users or supporting partner firms	
	EXPLT3	We effectively implement knowledge/ideas/resources users or supporting partner firms in new products/services/business models development	

Operationalization of Innovation Performance Construct

Dimensions	Code	Indicators and Coding	Sources
Radical Innovation	RAD1	Ratio of sales or number of active user (from new business model) to total sales or total number of active user in the last three years	Adjusted from Tien & Cheng, 2017, Huang (2016)
	RAD2	Compared to the major competitor, your firm introduced more new business model in the last three years	
	RAD3	Your firm frequently introduced new business model into markets that totally new to the firm in the last three years	
Incremental Innovation	INC1	Ratio of sales or number of active user (from new features, content varieties, or process) to total sales or total number of active user	
	INC2	Your firm frequently introduced incremental new features, content varieties, or process into new markets in the last three years	
	INC3	Compared to the major competitor, your firm introduced more new features, content varieties, or process in the last three years	

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