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The Impacts of Middle Managers' Ambidexterity, Continuous Improvement, and Organizational Agility on Business Performance: A Knowledge-Based View

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Abstract:

Purpose: Using the knowledge-based view as the theoretical lens, this study aims to assess the effect of middle managers' ambidexterity, continuous improvement and organizational agility on the business performance within the manufacturing and service industries.

Design/methodology/approach: Quantitative survey was carried out using questionnaire whose data were collected from 197 middle managers' responses collected in 2021. Structural Equation Modeling was used to analyze the direct and mediation relationships.

Findings: The results demonstrated that the relationship between middle managers' ambidexterity and business performance was insignificant but fully mediated by continuous improvement capacity and organizational agility. In both manufacturing and service sectors, our research also confirmed that middle managers have an important role in building continuous improvement capacity and organizational agility. The interchange between exploration and exploitation capabilities is an important competency that today's middle managers should have.

Originality/value: This study is amongst the first to investigate the phenomenon of middle managers' ambidexterity in both manufacturing and service sectors from the knowledge-based view theory. The new knowledge is generated from the in-depth investigation of how middle managers interchangeably use their exploiting and exploring capabilities to achieve their business and operations performances..

Keywords: ambidexterity, middle managers, continuous improvement, agile organization, operations management

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1. Introduction

Middle managers play a vital position in organizational hierarchies and are responsible for implementing senior management strategies by ensuring their subordinate employees carry out their daily responsibilities (Harding, Lee

& Ford, 2014). Middle managers are considered a focal point of implementing day-to-day operations, particularly in supporting the achievement of firm's continuous improvement (Alhaqbani, Reed, Savage & Ries, 2016; Lleo, Viles, Jurburg & Lomas, 2017; Lleo, Viles, Jurburg & Santos, 2020; Rafique, Hameed & Agha, 2018), organizational agility (Kahl, de Klerk & Ogulin, 2022), and contribute to short- and long-term organization performance (Torres, Drago & Aqueveque, 2015). The roles of middle managers are therefore critical, particularly in addressing the competing needs for exploration and exploitation in the project phase, typical ambidextrous organizations that must balance these tensions (Awojide, Hodgkinson & Ravishankar, 2018).

However, to date the majority of the literature on organization ambidexterity has concentrated on the roles of senior leaders and top management teams (O'Reilly, Harreld & Tushman, 2009; Jansen, Vera & Crossan, 2009; O'Reilly & Tushman, 2008, 2011; Carmeli & Halevi, 2009; Gerlach, Hundeling & Rosing, 2020; Lawrence, Tworoger, Ruppel & Yurova, 2022), paying little attention to the roles of the middle managers (Burgess, Strauss, Currie & Wood, 2015). Recent research by Torres et al. (2015) found out that by combining exploration and exploitation practices into their programs, middle managers can support the achievement of superior firm performances. Ambidextrous firms indeed require ambidextrous managers, however, there seems to be a lack of thorough understanding on when and how middle managers implement ambidextrous capabilities to improve firm's performance (Mom, van den Bosch & Volberda, 2007).

With the ambidexterity theory in mind, we studied the middle managers' ambidexterity roles in orchestrating continuous improvement and organizational agility. The middle managers are required to fulfil the expectations of top managements to solve day-to-day problems and the organizational realities that need creativity and innovation for solving those problems (Way, Simons, Leroy & Tuleja, 2018). In our study, we consider managerial positions such as operations managers, marketing managers, warehouse managers, factory managers, supply chain managers as middle managers.

Our data were collected in Indonesia, a developing country with 5% growth annually and the shortage of middle managers is already acute (BCG, 2013). As with other developing countries with limited resources, middle managers in Indonesia are continuously faced with a plethora of tasks, both directly and indirectly related to their roles (Rafique et al., 2018), requiring exploiting and exploring capabilities (Torres et al., 2015; Xiong, Yan, Su., Bonanni & Li, 2021). By 2020, there will be a 40-60 percent imbalance between the demand for middle managers and the supply. When up to fifty percent of middle management positions remain empty, businesses will struggle to meet their objectives, motivate the frontline, and retain their overworked middle managers. Unless they can attract, develop, and retain middle managers, companies in Indonesia may need to dial back their expansion aspirations (BCG, 2013).

Chen, Tang, Lee-Cooke and Jin (2016) stated that the intensity of knowledge-sharing between middle managers and top management teams in the Chinese manufacturing industry bolsters the influence of the executive strategic human resource management system on organizational ambidexterity. This means that the accumulated knowledge of middle managers plays a vital role in continuously developing and adapting organization capability exchange relationships between the leaders and followers. For this reason, we consider the knowledge-based view (KBV) theory as a theoretical lens to observe the impacts of middle managers' ambidexterity on building continuous improvement capacity, that leads to firm performance.

Our review of literature has confirmed a paucity of empirical studies on how ambidextrous middle managers support the continuous improvement capacity and organizational agility in achieving firm performance. In addition, there is little research examining the roles of continuous improvement capability and organizational agility in mediating the relationship between the ambidexterity of middle managers and company performance. This research therefore aims to address these gaps, by proposing the following objectives:

1. Investigate the effects of middle manager ambidexterity on firm performance, and
2. Examine the way continuous improvement capacity and organizational agility mediate the relationship between middle manager ambidexterity and firm performance.

Using KBV as the theoretical lens, we studied a sample of 197 middle managers who work in the manufacturing and service industries. The sample is aligned with our study objectives, since the majority are middle managers who worked on the production line that need to combine exploitation and exploration practices properly (Way et al., 2018). In contrary to the previous studies on leadership in general, our study revealed that middle managers' ambidexterity has no direct influence on firm performance. We will therefore attempt to explain how and why this phenomenon occurred by providing various statistical analyses of our data. We will also provide our recommendations on how middle managers' ambidexterity may offer positive responses to the relevant operations strategies to attain the firm performance. These findings thus contribute to the extant body of KBV literature, particularly the roles of middle managers, continuous improvement capacity, organizational agility in achieving firm performance.

The remainder of the paper discusses the details of our study. Section 2 presents the review of relevant literature underlying this research. Section 3 describes the hypothesis development followed by the research methodology in Section 4. Sections 5 and 6 present the results of the study and the implications of the results. The paper concludes in Section 7 with some elaboration on both theoretical and practical contributions, as well as suggestions for further research.

2. Theoretical Framework

2.1. Knowledge-Based View (KBV)

KBV is an extension of Resource-based View (RBV) (Craighead, Hult & Ketchen, 2009). Knowledge is the most significant strategic resource, according to proponents of the KBV, because it can streamline other tangible resources in an efficient and effective manner, hence enhancing a company's overall performance and its capacity for innovation (Grant, 1996; Kogut & Zander, 1992). In addition, the KBV contains the concept of knowledge acquisition (i.e., organizational learning), which explains how new information can be assimilated to enhance the overall performance of a corporation (Eisenhardt, Santos, Pettigrew, Thomas & Whittington, 2000). KBV supports ambidexterity as exploitation refers to the refinement of current knowledge, whereas exploration is the quest for new knowledge (March, 1991). "*Exploitation refers to learning acquired by local search, experiential refinement, and the selection and reuse of existing routines, whereas exploration refers to learning acquired via processes of concerted variation, purposeful experimentation, and play*" (Baum, Li & Usher, 2000: page 768).

Middle managers acquire expertise from both the top and the bottom. Top-down knowledge inflows and the execution of strategic decisions to support exploitation. However, bottom-up knowledge transfers from lower levels of management or workers can also help with exploratory activities (Mom et al., 2007; O'Reilly & Tushman, 2013). In addition to their inherent ambidexterity, middle managers need input from both senior managers and staff. In this function, they serve as hubs and apply structural and contextual strategies to effectively manage the resulting ambidexterity (Xiong et al., 2021).

From the perspective of middle managers, several studies have looked at knowledge acquisition activities in the development of ambidexterity (Wooldridge, Schmid & Floyd, 2008). Moreover, their method and strategies either promote or inhibit organizational ambidexterity. First, there are sources for knowledge acquisition, which can be vertical (top-down and bottom-up within a business unit) or horizontal (across business units). Knowledge acquisition activities, which reflect management patterns reliant on structural or environmental causes, make up the second component (Xiong et al., 2021). However, the interchange between exploitation and exploration capabilities to respond to the challenges in agility and continuous improvement has not critically been investigated in previous research.

2.2. KBV and Ambidextrous Leadership

Ambidextrous leadership is the capacity to employ both exploration and exploitation capabilities and to switch between the two with ease (Rosing, Frese & Bausch, 2011). This style of ambidextrous leadership is comprised of three components: (a) opening leadership behaviors, such as provide future operational needs; (b) closing leadership behaviors, such as current operational improvement; (c) and the ability to move between the two, such as coming up with creative solutions to operational problems, depending on what the current situation calls for (Rosing et al.,

2011; Zacher & Rosing, 2015). This allows ambidextrous leaders to drive an organization sustainable and adaptive to change (Floyd & Lane, 2000). Leaders, in general, with high exploiting and exploring capabilities improve innovativeness, such as team innovation (Oluwafemi, Mitchelmore & Nikolopoulos, 2020; Zacher & Rosing, 2015), employee innovation (Oluwafemi et al., 2020), organization innovation (Gerlach et al., 2020), and radical innovation (Li, Jia, Seufert, Wang & Luo, 2020). Further, it has positive correlation to entrepreneurial orientation (Luu, Dinh & Qian, 2019) that translate into proactiveness, innovation, and risk taking (Covin & Slevin, 1989; Frishammar & Hörte, 2007; Saeed, Yousafzai & Engelen, 2014). However, closing leadership behaviors refer to actions that reduce the behavioral variability of employees and promote greater utilization of existing knowledge, such as defining guidelines, monitoring target achievement, and correcting errors (Holmqvist, 2004; Rosing et al., 2011).

Middle managers are essential for organizational agility (OA) due to: (1) their role as organizational connectors (Taylor & Helfat, 2009); (2) their ability to span boundaries through linking activities (Wooldridge et al., 2008); (3) their position at the middle levels of the organization, which allows them to mediate and adjust strategy (Floyd & Wooldridge, 2012; Nonaka, 1988); and (4) their relationships with frontline workers, which allow them to manage change (Balogun, 2003).

The participation of middle managers in decision-making has a major positive effect on the innovation of a firm. First, firms should encourage middle managers to actively participate in decision-making, particularly based on their ability to deploy internal-external resources. Such participation by middle managers is crucial for enhancing innovation performance (Cheng, Song & Li, 2017). Shaaban and Awni (2014) interviewed a group of middle managers and discovered that their capacity to conduct continuous improvement and lean is a crucial success element in TPM.

Traditional leadership styles such as transformation and transactional leadership styles are unable to capture business environmental dynamism that needs both exploiting and exploring behaviors (Gerlach et al., 2020). Therefore, current operational environment demands not only a manager good at cost reduction or continuously improving current operational performance but also must be able to quickly adapt to market and operational changes at the same time (Appelbaum, Calla, Desautels & Hasan, 2017). In order to attain firm performance, leaders must not only develop synergy between exploitation and exploration practices, but also integrate external and internal knowledge (March, 1991; Raisch, Birkinshaw, Probst & Tushman, 2009; Tuan, 2016).

Although the roles of middle managers in an organization is critically important (Delmestri & Walgenbach, 2005), to the best our knowledge, most of the current studies are on the senior leaders or top management and this is the first study on leadership ambidexterity in the context of middle managers. Middle managers with their day-to-day experience gain practical knowledge of organization and able to practice the three elements of ambidextrous leadership (Rosing et al., 2011).

2.3. KBV and Organizational Agility (OA)

KBV asserts that the purpose of an organization is to generate, transfer, and convert knowledge into competitive advantages (Kogut & Zander, 1992). Curado and Bontis (2006) conclude logically that the influence of the capability development mechanism will have an effect on the firm's KBV. Dynamic capabilities can reconfigure, redirect, transform, shape, and integrate central knowledge, external resources, and strategic and complementary assets, and have a direct correlation with organizational agility (Baškarada & Koronios, 2018; Blome, Schoenherr & Kaesser, 2013; Pereira, Mellahi, Temouri, Patnaik & Roohanifar, 2019; Teece, Peteraf & Leih, 2016).

In a KBV, middle managers are a source of tacit knowledge who identify knowledge as a key factor in the emergence of innovation (Jin & Junfang-Yu, 2015; Wang & Han, 2011). This knowledge might arise from internal sources, such as employees (middle managers), or external sources, such as government entities, consultants, universities, and research institutions (Jimenez-Jimenez, Martínez-Costa & Sanchez-Rodriguez, 2019; Zieba, Bolisani, Paiola & Scarso, 2017). Middle managers with ambidextrous skills can contribute to the success of an agile organization (Kahl et al., 2022).

OA is the ability of a company to respond quickly and creatively to changes that frequently occur unexpectedly in business contexts, utilizing disruptions as chances to advance and succeed (Goldman, Nagel, Preiss & Iacocca,

1995; Van Oosterhout, Waarts & Van Hillegersberg, 2006; Zhang & Sharifi, 2000). The more agile an organization, the better they proactively respond to unexpected market changes and adapting their operations. The challenge is how leaders and managers make quick decision (Appelbaum et al., 2017). Strong dynamic capabilities are required to foster the organizational agility required to deal with deep uncertainty, such as that generated by innovation and the associated dynamic competition, as well as uncertainty in day-to-day operations (Teece et al., 2016). OA is affected by human side that makes connections among on leadership, organization culture, and employee reward systems (Crocitto & Youssef, 2003).

Lu and Ramamurthy (2011) consider agility from two dimensions: operational adjustment agility and market capitalizing agility. The ability to cope up with and adapt quickly to market changing can lead to firm performance (Roberts & Grover, 2012). However, the inability of a firm to adjust their operations simultaneously with their market agility, will not deliver the firm operations in efficient way (Perols, Zimmermann & Kortmann, 2013).

Previous studies have asserted ways in which agility mediates the relationships between various business practices. For instance, Khalfallah and Lakhal, (2021) demonstrated that agile manufacturing fully mediates the relationship between TQM, JIT-purchasing and TPM, and the operational performance. Furthermore, Kale Aknar and Başar (2019) found that strategic agility mediates absorptive capacity and firm performance. However, the roles of agility in mediating the link between ambidexterity and business performance have not been widely explored.

2.4. KBV and Continuous Improvement Capacity (CIC)

Continuous improvement (CI) is defined as a "*systematic effort to seek out and apply new ways of doing work i.e., actively and repeatedly making process improvements*" (Anand, Ward, Tatikonda & Schilling, 2009: page 444). It can also be considered as "*a systematic management approach that seeks to achieve ongoing incremental performance enhancements through a gradual never-ending change process*" (Audretsch, Martínez-Fuentes & Pardo-del-Val, 2011: page 1922). CI becomes one of the most essential ways in which an organization can contribute to its performance (Lam, O'Donnell & O'Donnell, 2015; Yeung, Cheng & Lai, 2005). These definitions reflect the jobs or tasks of middle managers.

CI is a fundamental tenet of Total Quality Management that has shown to be an essential survival tool (Kumar, Maiti & Gunasekaran, 2018). CI encourages employees to aim for continuous improvement in their day-to-day operations and company performance. CI is originated in manufacturing but is now widely utilized in services industries (Farrington, Antony & O'Gorman, 2018).

Drawing from KBV, we posit that a firm with intense internal knowledge transfer are more capable of achieving high continuous improvement capacity (Yuen et al., 2016). Firms that excel at continuous improvement are more able to experiment with new concepts or solutions to improve the effectiveness and efficiency of processes in order to achieve corporate performance. They are also better able to take advantage of corporate performance for their own gain (Yuen, Thai & Wong, 2016).

Middle managers must drive the implementation of CI using several CI tools as Six Sigma, Balanced Scorecard, Kanban, TQM, etc. Several CI strategies such as Lean, Six Sigma, Kaizen and Sustainability can used in the implementation of Industry (Vinodh, Antony, Agrawal & Douglas, 2020). During the time of COVID-19, things are new every hour and needs to be documented and for continuous improvement and leadership play an important role (Graham & Woodhead, 2021).

Middle managers with extensive knowledge gained from their day-to-day experience will help organizations achieve their continuous improvement capacity (CIC). However, how middle managers exploit and explore their day-to-day experience to achieve organization CIC have not been empirically studied by operations management researchers.

3. Hypothesis Development

In this section, we explain the logic behind the hypotheses development and how we apply a fundamental theory to our research, with a focus on the components of our model. We begin by describing the middle managers' ambidexterity to show how exploitation and exploration can contribute directly (or indirectly) to continuous improvement capacity, organizational agility, and business performance.

3.1. Positive Association between Middle Managers' Ambidexterity (MMA) and Firms' Business Performance (BP)

The significance of middle managers' involvement and knowledge in the operation of manufacturing and service organizational innovation is currently overlooked by operations management researchers. Organizational capabilities are found to mediate the relationship between middle managers' involvement, autonomy, and firm performance in a quantitative empirical research of 372 European companies (Ouakouak, Ouedraogo & Mbengue, 2014). Middle managers also help to save money by lowering employee turnover (Friebel, Heinz & Zubanov, 2022). To improve operational performance, top and middle management must deal with human resource capability and production planning systems to make better decisions (Numan & Hilman, 2017). In addition, their studies have revealed that the CEO's attention on strategic human resource management has the biggest effect on the firm's performance via commitment-based human resource systems. This research underscores the significance of middle managers in operationalizing the strategic focus of top management and providing empirical support for a fundamental assumption of resource orchestration theories (Chadwick, Super & Kwon, 2015). Chen et al. (2016) discovered that the relationship between the efficacy of the top management team and organizational ambidexterity may be altered by the degree to which middle managers communicate knowledge with top management team members.

We argue that business performance is also dependent on how middle managers manage the integration of information or knowledge flows both vertically (within business units) and horizontally (from outside business units). These also enable ambidexterity in middle managers, initially at the level of the business unit and eventually at the organizational level. Based on this substantiation, we can formulate our first hypothesis:

H1: Middle managers' ambidexterity positively affects firms' business performance.

3.2. Mediating roles of Continuous Improvement Capacity (CIC)

Middle managers should act in ways that employees can trust and that encourage them to take part in activities that lead to continuous improvement in an industrial context. It shows how important middle managers are when it comes to creating a work environment that encourages employee participation (Lleo et al., 2017).

Previous research has uncovered a variety of effective continuous improvement (CI) programs (e.g., Lam et al., 2015; Laureani & Antony, 2018; Netland, 2016; Timans, Ahaus, van Solingen, Kumar & Antony, 2016). However, recent research has revealed that a vast majority of CI programs fails (e.g., Beer, 2003; Jurburg, Viles, Tanco, Mateo & Lleó, 2019; Lodgaard, Ingvaldsen, Aschehoug & Gamme, 2016; McLean, Antony & Dahlgaard, 2017). Due to the complexity of implementing CI initiatives, Sánchez-Ruiz, Blanco and Gómez-López (2019) present enablers that can increase the success rate of continuous improvement initiatives, such as establishing clear objectives, providing relevant training, recognizing achievements during implementation, and conducting post-project implementation as a learning experience for future CI programs.

In addition, McLean et al. (2017) identified eight key factors that contribute to the failure of CI programs, one of which is management leadership, which includes a lack of senior management commitment, inadequate management support and involvement, and a weak connection between top management and middle managers. To ensure the successful implementation of a CI program, obtaining subordinate buy-in is crucial (Baird, Hu & Reeve, 2011; de Menezes, 2012; Lagrosen & Lagrosen, 2005; Lam et al., 2015). Previous research has demonstrated a positive correlation between empowered leadership and committed leadership for continuous improvement and committed leadership for continuous improvement serves as a link between empowered leadership and ambidexterity at both the organizational unit and individual levels (van Assen, 2020). But research in the field of operations management has not yet found out what role CIC plays as a mediator. Therefore, in this research we posit that:

H2: Continuous improvement capacity mediates between middle managers' ambidexterity and firms' business performance.

3.3. Mediating roles of Organizational Agility (OA)

In today's global economy, responsiveness is an increasingly important capability for businesses. Thus, organizations must be agile (Rialti, Marzi, Silic & Ciappei, 2018; Swafford, Ghosh & Murthy, 2008) particularly in adopting

technology, which has a significant impact on organizational agility (Zain, Rose, Abdullah & Masrom, 2005). Another study found that top management ambidextrous leadership influenced firm performance, especially in telecommunication industry that is susceptible to disruption (Bawono, Gautama, Bandur & Alamsjah, 2022; Mihardjo, Sasmoko, Alamsjah & Elidjen, 2019). It was discovered that the highest project performance can be obtained by combining leadership style, agility, and organizational variables while implementing projects that are inherently uncertain (de Oliveira, Valentina & Possamai, 2012). Despite the fact that a motivated and adaptable workforce, collaboration between management and employees, the availability of training, and the implementation of employee and patient suggestions play a significant role in OA in the healthcare industry, there is little research on the roles of middle managers (Patri & Suresh, 2017).

Along with the advancement of Industry 4.0, supply chains undergo various digital transformation capabilities (Alamsjah & Yunus, 2022) as they need to become more agile, adaptable and ambidextrous to boost digital innovation initiatives (Del Giudice, Scuotto, Papa, Tarba, Bresciani & Warkentin, 2021; Nobakht, Hejazi, Akbari & Sakhdari, 2021). With these capabilities, they can respond quickly and be adaptable to market changes (Cepeda & Arias-Pérez, 2019).

Therefore, we hypothesize that:

H3: Organizational agility mediates between middle managers' ambidexterity and firms' business performance.

4. Methodology

4.1. Research Model

This study considers the role of middle managers capability to business performance of manufacturing and service companies and its research model is depicted in Figure 1. A knowledge-based view (KBV) theory was adopted to developing the theoretical framework. To deploy the theory to our study, we consider four constructs: middle managers' ambidexterity (MMA), continuous improvement capacity (CIC), organizational agility (OA) and business performance (BP) of the company. The middle managers' ambidexterity is decomposed into exploitation and exploration capacities adopted from (Kristal, Huang & Roth, 2010; March, 1991).

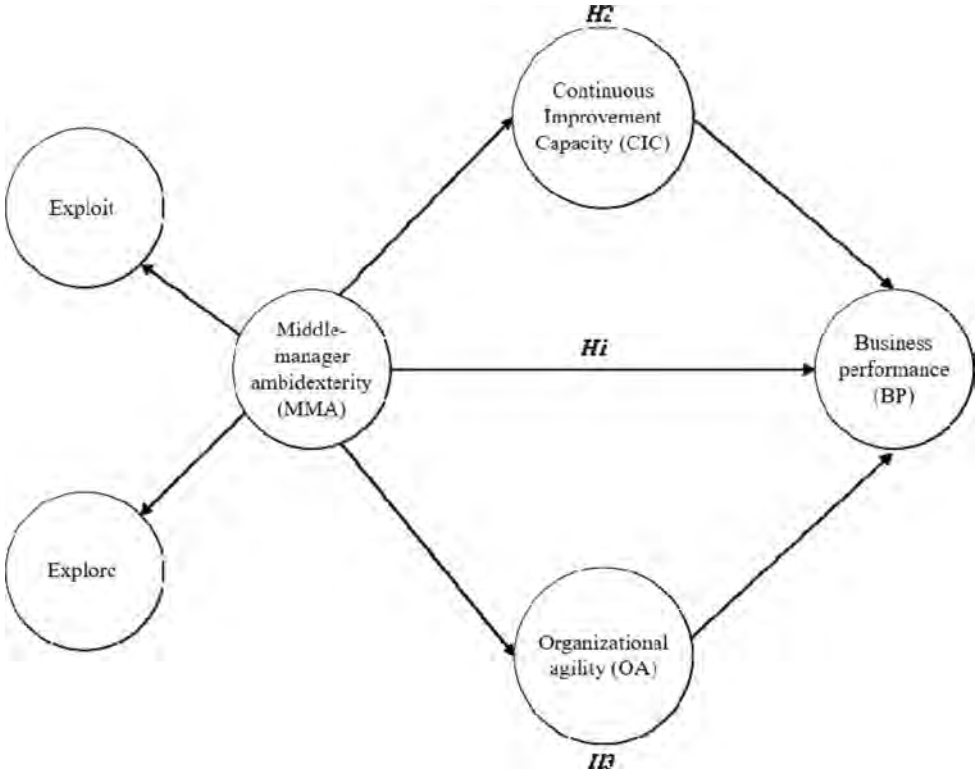

Figure 1. Research model

4.2. Data Collection

The background and qualifications of the respondents were taken into consideration while using a purposive sample technique. The questionnaire was administrated online by SurveyMonkey platform to middle managers of reputable, large companies in Indonesia, with more than 500 employees. We received 197 middle managers responses from various industrial sectors collected during 2021. Generally, as formulated in our problem definitions, the respondents are coming from mostly experienced middle managers with more than 10 years in the current company. The respondent's demographic profile is showed in Table 1.

No		N	%
1.	**Industrial Sector**		
	Manufacturing	111	56.34
	Service	86	43.65
2.	**Years of experience at current company**		
	< 5	14	6.80
	6-10	78	37.86
	11-15	70	33.98
	16-20	27	13.11
	> 20	8	3.88
3.	**Number of employees**		
	< 50	13	6.31
	50-100	23	11.17
	101-200	17	8.25
	201-500	26	12.62
	>500	118	57.28

Table 1. Demographic profile of the middle managers as respondents

4.3. Measurement and Data Analysis

This research proposed three hypotheses to provide evidence in the role of middle managers capacity to business performance. Overall, the data collection using questionnaire organized by two parts, demographic profile, and factors questions to test the hypotheses. The demographic profile is consisted of three main questions as described in Table 1. The questions related to theoretical framework were organized as follows:

- Middle managers' ambidexterity (MMA) consists of 15 questions decomposed into exploration (eight questions) and exploitation (seven questions), adopted from Kristal et al. (2010).
- Continuous improvement capacity (CIC) consists of five questions, adopted from Aloini, Martini and Pellegrini (2011).
- Organizational agility (OA) consists of six questions, adopted from Lu and Ramamurthy (2011).
- Business performance (BP) consists of five questions, adopted from Brik, Rettab and Mellahi (2011) and Maletič, Maletič, Dahlgaard, Dahlgaard-Park and Gomišček (2016).

The data analysis was conducted in two ways: descriptive and inferential statistics. The descriptive statistics provided the demographic profile of the respondents while the inferential statistics aimed to test the hypothesis and tested the validity of the data. The inferential statistics test employed partial least square (PLS) technique using SmartPLS software. The measurement items to test the hypothesis and data validation were adopted from Hair, Risher, Sarstedt and Ringle (2019).

PLS is part of the structural equation modeling to estimate theoretical structures to practical application combining principal component analysis and least square regression. The application of PLS for the data analysis offers some advantages, for instance, robustness for nonnormal data distribution (Sarstedt, Hair, Ringle, Thiele & Gudergan, 2016), no restricted number of samples (Dijkstra & Henseler, 2015; Jöreskog & Wold, 1982) and the identification of significant relationships in the population (Sarstedt et al., 2016).

5. Result

The analysis in the PLS-SEM consists of two parts, reflective and formative measurements. In the reflective measurement, the following metrics were examined: loading factors, convergent validity, and discriminant validity. In the context of loading factors of each construct, Hair et al. (2019) proposed a threshold value of 0.708. This threshold indicates that the construct can explain most of the indicator's variance and does demonstrate an acceptable reliability. The loading factor of the indicators are showed in Table 2.

Variable	Code	Indicator	Mean	St. dev	Loading Factor
Middle Managers' Ambidexterity (MMA)	ER1	Allowing different ways of accomplishing a task	3.99	0.884	0.636*
	ER2	Encouraging experimentation with different ideas	4.02	0.793	0.731
	ER3	Motivating to take risks	4.086	0.785	0.729
	ER4	Giving possibilities for independent thinking and acting	3.97	0.726	0.695*
	ER5	Giving room for own ideas	3.838	0.701	0.629*
	ER6	Allowing errors	4.208	0.639	0.741
	ER7	Encouraging error learning	3.437	0.874	0.379*
	ER8	Exploitation	4.162	0.671	0.517*
	ET1	Monitoring and controlling goal attainment	4.345	0.607	0.791
	ET2	Establishing routines	4.294	0.672	0.783
	ET3	Taking corrective action	4.178	0.616	0.752
	ET4	Controlling adherence to rules	4.315	0.615	0.751
	ET5	Paying attention to uniform task accomplishment	4.228	0.648	0.761
	ET6	Sanctioning errors	3.594	0.835	0.363*
	ET7	Sticking to plans	4.234	0.584	0.656*
Continuous Improvement Capacity (CIC)	CIC1	My company employs continuous improvement or a comparable formal improvement strategy to involve every employee in continual improvement.	4.345	0.678	0.633*
	CIC2	My company is focused on the enhancement activities of its clients.	4.345	0.670	0.763
	CIC3	My company's continuous improvement method is driven by measurements.	4.234	0.618	0.744
	CIC4	Individuals and groups ensure consistency between proposed improvements and strategic objectives prior to initiating an initial investigation and implementing modifications.	4.096	0.650	0.743
	CIC5	My company articulates and consolidates individual and group learning.	4.091	0.647	0.752

Variable	Code	Indicator	Mean	St. dev	Loading Factor
Organizational Agility (OA)	OA1	We make and implement appropriate decisions rapidly in response to market/customer changes.	3.995	0.809	0.753
	OA2	We constantly look for ways to reinvent/reengineer our organization to better serve our marketplace.	4.188	0.661	0.703
	OA3	We view market-related fluctuations and apparent disorder as rapid-growth opportunity.	4.137	0.703	0.791
	OA4	We meet our customers' needs for quick responses and special requests whenever they come up and they trust us to be able to do this.	4.127	0.683	0.804
	OA5	We can quickly scale up or scale down our production/service levels to support fluctuations in demand from the market.	3.975	0.757	0.765
	OA6	Whenever there is a disruption in supply from our suppliers, we can quickly make necessary alternative arrangements and internal adjustments.	4.051	0.703	0.652*
Business Performance (BP)	BP1	Return on investment: market share	4.076	0.773	0.639*
	BP2	Sales growth	4.127	0.753	0.735
	BP3	Profit growth	4.096	0.731	0.767
	BP4	Customer satisfaction	4.183	0.610	0.745
	BP5	Levels of innovation	4.168	0.718	0.750
	BP6	Employee Satisfaction	4.208	0.607	0.749

* Loading factors under threshold of 0.708

Table 2. Loading factors of the indicators

The loading factors of the construct show that some indicators do not meet the threshold. Those do not meet the threshold were then removed. The final loading factors of the indicators are depicted in Figure 2.

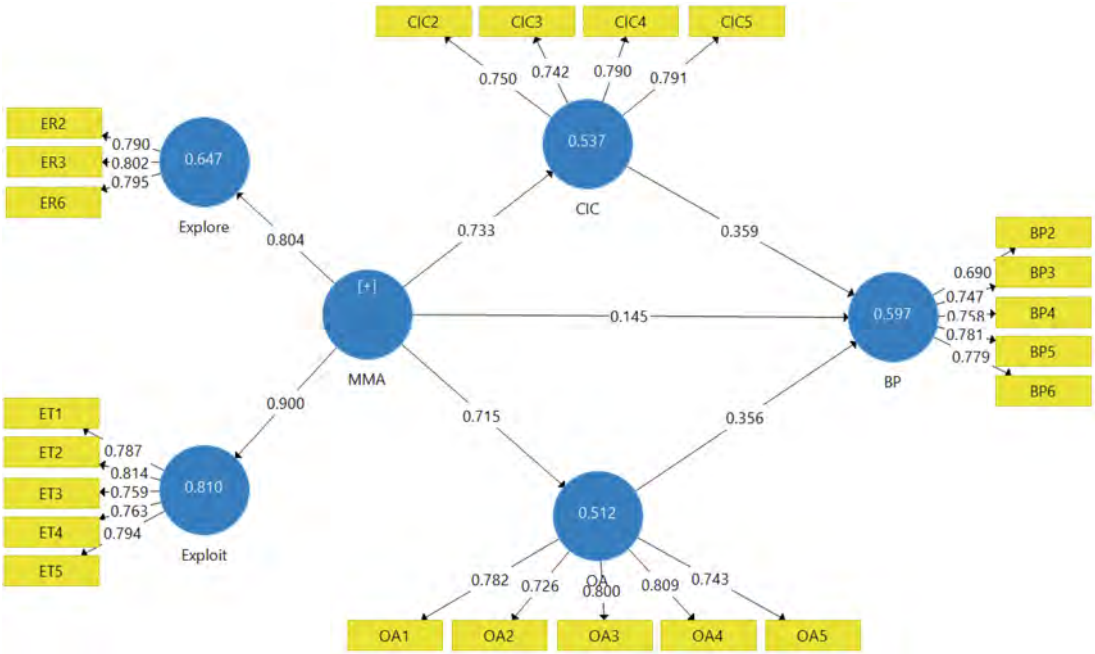

Figure 2. Loading factor of the research model

Figure 2 confirms that all loading factors have met the threshold, meaning that they are all acceptable as reliable. Further, the model should also evaluate the internal consistency reliability using composite reliability. Table 3 shows that all construct has composite reliability score more than 0.8 which means satisfactory to good (Hair et al., 2019). Table 3 also provides average variance extracted (AVE) to explain convergent reliability of each construct. Hair et al. (2019) recommends AVE score more than 0.5 which means the construct explains 50% of the item's variance. Our result shows that all constructs have AVE score more than 0.5, ranging from 0.56 to 0.567.

The last metric to assess the model is the discriminant validity to check that the proposed constructs in the theoretical model are distinct. Previous research assesses the discriminant validity using AVE compared to the squared inter-construct correlation. Moreover, Henseler Ringle and Sarstedt (2015) show this technique does not perform well. As suggested by Hair et al. (2019) this paper evaluates discriminant validity using *heterotrait-monotraint* (HTMT) score as shown in Table 4. HTMT is defined as the item correlation across construct relatively to mean of the average correlations of the construct. The result shows that HTMT value ranging from 0.74 to 0.85 which means that all constructs have presented discriminant validity. We do not provide the discriminant validity of exploration and exploitation, since they have been decomposed by MMA.

Variable	Composite reliability	AVE	R-Square
Middle Managers' Ambidexterity (MMA)	0.871	0.694	
Continuous Improvement Capacity (CIC)	0.851	0.589	0.417
Organizational Agility (OA)	0.866	0.597	0.582
Business Performance (BP)	0.866	0.565	0.602

Table 3. Construct reliability

Constructs	CIC	MMA	BP
Middle Managers' Ambidexterity (MMA)	0.810		
Business Performance (BP)	0.861	0.731	
Organizational Agility (OA)	0.827	0.764	0.819

Table 4. Discriminant validity using HTMT (heterotrait-monotrait) score

The formative measurement was carried out to assess the variance inflation factor (VIF). VIF represents the collinearity of the model. The score should be under 3, indicating there are no critical collinearity issues among the indicators. Our results show that the VIF scores of the items range from 1.296 to 2.037, which subsequently confirms there are no collinearity issues.

Finally, we applied the bootstrapping technique with bias-corrected and accelerated (BCA) confidence interval method, as suggested by Hair, Matthews, Matthews and Sarstedt (2017), to test our hypotheses. Table 5 shows that a direct hypothesis is rejected since the t-statistic value is below 1.9. In addition, indirect or mediating hypothesis test shows a significant result for CIC and OA as mediators.

Effect	Construct	Original estimate (β)	t-statistic	p-values	Result
Direct	MMA	0.136	1.838	0.070	Rejected
Indirect/mediating	CIC	0.241	4.433	<0.001	Accepted
Indirect/mediating	OA	0.227	4.531	<0.001	Accepted

Table 5. Hypothesis test results

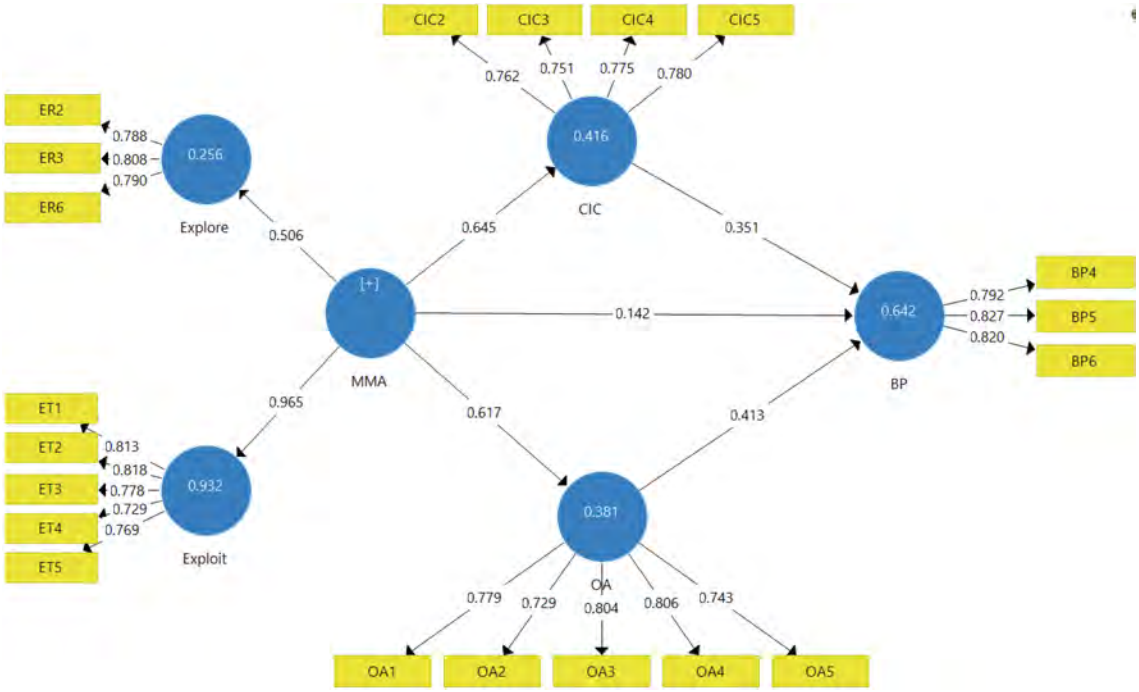

Figure 3. Loading factors of operational performance model

We also tested the direct effect of middle managers ambidexterity to operational performance, indicated by the last three of business performance (BP) indicators involving customer satisfaction (BP4), levels of innovation (BP5) and employee satisfaction (BP6) as shown in Figure 3. The hypothesis test confirms that there is a significant direct effect of middle managers ambidexterity (MMA) to operational performance, as shown in Table 6.

Effect	Construct	Original estimate (β)	t-statistic	p-values	Result
Direct	MMA	0.142	2.367	<0.001	Accepted
Indirect/mediating	CIC	0.226	4.917	<0.001	Accepted
Indirect/mediating	OA	0.255	5.923	<0.001	Accepted

Table 6. Hypothesis test results of the operational performance model

Currently, a company's manufacturing division creates its final products, while its service sections provide the resources necessary for sales and after-sales services. Consequently, it is challenging to distinguish between a manufacturer and a service provider (Cudney & Elrod, 2011). Nevertheless, Lovelock and Gummesson, (2004) identified four common differences between manufacturers and service providers including the inseparability of production and consumption, heterogeneity, inventory-ability, and perishability. We argue that these distinctions may necessitate a different emphasis on exploration and exploitation capabilities for middle managers. To test the argument, we then constructed two models as shown in Figure 4.

Tables 7 and 8 show that exploring and exploiting capabilities have a significant impact to CIC both in manufacturing and service industries. However, the impact of exploitation of middle manager in manufacturing is higher than that of exploration, as can be seen from Table 7. The direct correlation between exploitation to CIC has t-value 10.131 with a significant value 0.000 (sig <1%) while correlation between exploration and CIC has t-value 2.490 which is significant at 5%. This result is also in line with the original estimate value (β), where exploitation has a value (0.625) which is greater than that of the exploration (0.176). This could suggest that in attaining CIC, the exploitation capability understandably has a greater impact than the exploration capability in the manufacturing industry.

The direct correlation between exploration and exploitation in CIC for the service industry is shown in Table 8. The t-value and p-value in both exploration and exploitation constructs show a significant correlation to CIC. Furthermore, the t-value and the original estimate (β) of exploitation construct has a greater influence on CIC than that of exploration, which was in line with the manufacturing industry.

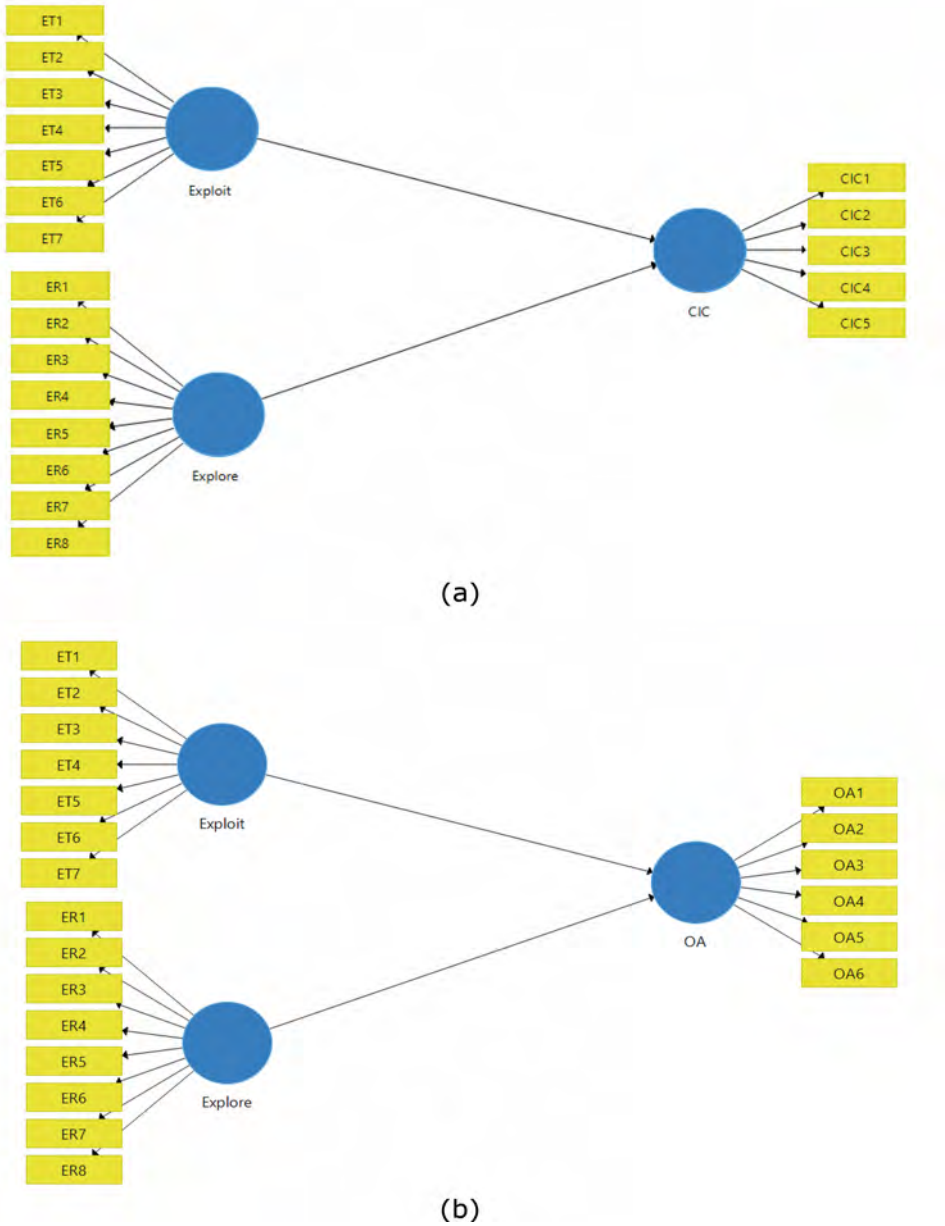

Figure 4. The links from exploring and exploiting capabilities to (a) continuous improvement capability (CIC) and (b) organizational agility (OA)

No	Effect	Construct	Original estimate (β)	t-statistic	p-values	Result
1	Direct	Exploitation	0.625	10.131	0.000	Accepted
2	Direct	Exploration	0.176	2.490	0.013	Accepted*

*Significant value: 5%

Table 7. Hypothesis test result for exploration and exploitation to CIC in manufacturing industry

No	Effect	Construct	Original estimate (β)	t-statistic	p-values	Result
1	Direct	Exploitation	0.546	6.146	0.000	Accepted
2	Direct	Exploration	0.319	3.834	0.000	Accepted

Table 8. Hypothesis test result for exploration and exploitation to CIC in service industry

Tables 9 and 10 present the correlation between exploration and exploitation, and OA, in the manufacturing and service industries respectively. In the manufacturing industry, it was found that exploitation has a significant effect (β=0.613, p-values<0.01) while exploration did not show a significant effect (β=0.135, p-values > 0.05). This might suggest that in order for the middle managers to practice organizational agility in the manufacturing industry, they have focused more on exploitation rather than exploration. However, in the service industry, both exploration and exploitation have a significant influence on OA. Moreover, both have almost the same influence, judged by the original estimate (β), t-statistics and p-values.

No	Effect	Construct	Original estimate (β)	t-statistic	p-values	Result
1	Direct	Exploitation	0.613	5.920	0.000	Accepted
2	Direct	Exploration	0.135	1.193	0.233	Rejected

Table 9. Hypothesis test result for exploration and exploitation to OA in manufacturing industry

No	Effect	Construct	Original estimate (β)	t-statistic	p-values	Result
1	Direct	Exploitation	0.370	3.352	0.001	Accepted
2	Direct	Exploration	0.369	3.796	0.000	Accepted

Table 10. Hypothesis test result for exploration and exploitation to OA in service industry

6. Discussion

Due to its social complexity and imitability, knowledge has the potential to generate sustained competitive advantage and superior corporate performance, making it the most valuable strategic asset of a company. (Cegarra-Navarro, Soto-Acosta & Wensley, 2016; Nickerson & Zenger, 2004; Soto-Acosta, Popa & Martinez-Conesa, 2018). As an extension to RBV stating that a firm's resources, including operations capability (e.g., production process, logistics and supply chain) can be a source of competitive advantage if they are valuable, rare, difficult to imitate, and not replaceable by other resources (Barney, 1991), we consider the ambidexterity of middle managers as the accumulation of exploitation and exploration knowledge processes (thus known as KBV).

This section will explore the importance of ambidexterity as a knowledge asset for organizations in achieving business performance while also fostering incremental innovation and the discovery of new information to promote radical innovation in problem-solving (Andriopoulos & Lewis, 2009).

6.1. The Relevance of Ambidextrous Middle Managers (MMA) in Improving Firm Performance

Our finding showed the insignificant correlation between middle manager's ambidexterity and firm performance. In our research, middle manager includes operations managers, supply chain manager, and factory managers. This leads us to suggest that the improvement of various firm performance indicated by typical measures, for instance, return on investment, sales growth, and profit growth, is beyond the middle managers' combined exploitation and exploration capabilities. This is in contrary to what (Cao, Gedajlovic & Zhang, 2009) found.

A possible explanation to this phenomenon is that ambidextrous middle managers in our contexts excelled at utilizing their existing knowledge in their day-to-day operations, such as problem solving (Delmestri, Montanari & Usai, 2005), ensuring radical changes to achieve successful implementation, and as a mediator who must understand business processes. Ambidextrous middle managers are also required to understand the 'language of top

management' and are subsequently able to translate and communicate the required changes in a language that can be understood by the lower-level management (Rouleau & Balogun, 2007).

However, when we exclude the return on investment, sales growth, and profit growth from the BP indicators (see Table 2) and only include operational-related indicators such as customer satisfaction, levels of innovation, and employee satisfaction, we found that MMA has a direct correlation with business performance (BP) indicators.

We therefore argue that for firms attempting to develop ambidextrous middle managers in the future, they must be able to increase middle managers' commitment to continuous improvement and encourage them to adapt to changes, both by capitalizing market opportunity and enhancing operations capability.

6.2. The Mediating Roles of Continuous Improvement Capacity (CIC) and Organizational Agility (OA)

Our finding indicates that continuous improvement capacity and organizational agility fully mediate the link between middle managers' ambidexterity and firm business performance. We therefore argue that middle managers with ambidextrous capability can improve both continuous improvement capacity and organizational agility. Tools such as Kaizen, Total Quality Management (TQM), and six sigma, are amongst the most frequently used to manage varying customer demands in their current business environment.

This implies that middle managers who are good at both exploitation and exploration tend to be able to encourage continuous improvement and operational agility, which is good for the business performance of their firms. In line with Fisher (1997) and Lee (2002), we suggest that companies that make functional products should use their ability to make continuous improvements, while companies that make innovative products (which have many different variants) should use flexibility/agility strategies. We did find, though, that the combination of lean and agile does help a company's business performance (Ahmed & Huma, 2021; Iqbal & Waseem, 2012).

In addition, CIC is applicable to improve OA to counter disruptive innovation (Vasanthan & Suresh, 2021). Previous studies also found that both continuous improvement capacity have correlation to business performance (Antony, Lizarelli, Fernandes, Dempsey, Brennan & McFarlane, 2019; Makwana & Patange, 2022; Mohaghegh, Blasi & Größler, 2021) and organization agility to business performance (Clauss, Abebe, Tangpong & Hock, 2021; Swafford et al., 2008; Yauch, 2011).

6.3. The Competencies of (and Support to) Middle Managers

Ambidextrous middle managers are able to link exploitation and exploration practices (Xiong et al., 2021) and bridge the operations strategy and firm performance. These competencies are valuable in responding to the operations strategy or competitive priority in terms of quality, cost, delivery, and flexibility. For this reason, ambidextrous middle managers are believed to be able to handle day-to-day lean and agile operations. Quality, cost, and delivery measures can be achieved via lean operations, while flexibility leads to agile operations (García-Morales, Jiménez-Barrionuevo & Gutiérrez-Gutiérrez, 2012). In this respect, ambidextrous middle managers must handle uncertainties in day-to-day operations that demand rapid decision making in the most efficient manner.

Going forward, ambidextrous middle managers should continue developing both exploitation and exploration capabilities in their day-to-day jobs to increase continuous improvement capacity and organizational agility. Furthermore, as continuous improvement capacity or organizational agility mediate the relationship between middle managers' ambidexterity and business performance, firms adopting operations excellence strategies must also exercise continuous improvement initiatives. Arguably, firms with product differentiation strategies will be more agile and thus require more exploring capabilities. To support both strategies, middle managers must have full commitments from their sub-ordinates at the lower-level management (Lam et al., 2015).

6.4. Exploitation and Exploration Capabilities of Middle Managers in Manufacturing and Service Industries

In general, exploitation and exploration capabilities of middle managers have a significant correlation to continuous improvement capacity and operational agility in both manufacturing and service industries, although their exploitation capability is more significant than that of the exploration capability. The exploitation capability of

middle managers in the manufacturing industries are seemingly more influential in achieving operational agility. This finding is consistent to some empirical and simulation studies demonstrating that the manufacturing industries have traditionally placed their emphasis on increasing efficiency. The adoption of operations management tools, such as Lean Six Sigma (Sharma, Kamble, Mani, Sehrawat, Belhadi & Sharma, 2021), scheduling optimization (Sun, Lin, Li & Gen, 2019) and supply chain integration (Kim & Schoenherr, 2018), can thus help middle managers improve their manufacturing efficiency. The manufacturing industries also demonstrated that they were more efficient during the pandemic than that of the pre-pandemic, despite their fewer resources (Fisher-Ke et al., 2022), which is in line with the requirements of Industry 4.0 (Martínez-Olvera, 2022; Rai, Tiwari, Ivanov & Dolgui, 2021). Therefore, middle managers in the manufacturing industries do grasp various exploitation practices in their day-to-day operations.

Service industries transform various inputs into outputs in the form of customers' experience. To achieve this, the service industries are continuously pressurized with ever-increasing customer expectations, hence the demand for continuous innovation. Although research in service industry innovation is in fact a key source of competitive differentiation across firms and markets (Helkkula, Kowalkowski & Tronvoll, 2018), there seems to be a clear paucity of research on innovation in the service industries (Hügel, 2019). During this digital age, services have been digitally enabled (Buhalis, Harwood, Bogicevic, Viglia, Beldona & Hofacker, 2019; Zheng, Wang, Sang, Zhong, Liu, Liu et al., 2018) in terms of service ecosystem, value co-creation (Lusch & Nambisan, 2015) and social innovation (Gallouj, Rubalcaba, Toivonen & Windrum, 2018). The success of service innovation has contributed to firm performance in terms of profit and revenue growth (Ordanini & Parasuraman, 2011). For this reason, it is clear that middle managers within the service industries should explore their innovation capabilities.

7. Conclusions and Future Work

We investigated the pressures faced by middle managers (including operations managers, supply chain managers, factory managers) in exploiting current resources to achieve firm performances while, at the same time, exploring new opportunities to improve innovation and adaptiveness to change. We found that middle managers' ambidexterity has no direct effect on business performance. However, it has a significant effect on operational performance. However, the effect has been mediated by both continuous improvement capacity and organizational agility. Our research thus confirms that middle managers have an important role in building continuous improvement capacity and organizational agility, in both manufacturing and service industries. The ability to interchange between exploration and exploitation capabilities are important competencies that today's middle managers must have.

7.1. Theoretical Implications

Our research contributes to the literature on ambidexterity theory by demonstrating that the accumulation of knowledge by middle managers on a daily basis is a crucial factor in achieving business performance. Prior research, such as e.g., Hernández-Espallardo, Sánchez-Pérez and Segovia-López (2011) and Wei, Yi and Guo (2014); however, a lack of discussion of how middle managers switch between exploitation (continuous improvement) and exploration (agility), which may have an impact on organizations' ambidextrous activities. Thus, we addressed this research gap and demonstrated the positive influence of continuous improvement capacity (CIC) and organizational agility (OA) on business performance (BP). This study extends the research on the theory of ambidexterity within the lean-agile framework (Ghobakhloo & Azar, 2018; Lotfi & Saghiri, 2018; Saini, Arif & Kulonda, 2018).

Another contribution this research brings to the ambidexterity theory is by unpacking it into exploration and exploitation capabilities in manufacturing and service industries (Bustinza, Vendrell-Herrero & Gomes, 2020; Cao et al., 2009). When we found that, in the manufacturing industry, exploitation capabilities have a significant effect while exploration does not, this might suggest that middle managers focused more on exploitation rather than exploration in order for them to practice organizational agility. However, it is interesting to observe that in the service industry, both exploration and exploitation have a significant influence on organizational agility. Middle managers face limited resources; therefore, their accumulated knowledge makes it easy to interchange between exploration and exploitation.

The results justify the use of KBV theory in leadership, particularly for transforming tacit and explicit information into a valuable form for middle managers. Middle managers may create, store, communicate, and use tacit to explicit knowledge as evidenced by their ability to switch between the exploration and exploitation competencies, thereby enhancing continuous improvement (lean thinking) and agility simultaneously, where operationally lean and agile are the two distinct dimensions. This study fills the gap in the extant body of literature by elaborating the relationship between ambidexterity and the knowledge management process.

7.2. Practical Implications

Our findings have significant implications for the knowledge management, continuous improvement capacity, and organizational agility of middle managers, as the acquisition of knowledge and the ambidexterity of middle managers become increasingly crucial for corporations in the current competitive context.

First, our results show that developing combined ambidexterity (Cao et al., 2009) is the foundation of knowledge acquisition and extension. This shows that knowledge is a key lever for switching between exploration and exploitation capabilities (Bustinza et al., 2020). From a managerial standpoint, middle managers establish exploration and exploitation practices as a means of knowledge acquisition, which subsequently serves as the basis for interchange between them.

Second, companies should pay more attention to the ambidexterity of middle managers so they can develop continuous improvement capability and organizational agility at the same time. In addition, with reference to the knowledge-based view theory (Abdi, Mardani, Senin, Tupenaite, Naimaviciene, Kanapeckiene et al., 2018; Dubey, Gunasekaran & Papadopoulos, 2017; Schütz, Kässer, Blome & Foerstl, 2020), the adoption of exploratory and exploitative by middle managers must be dynamically changed based on their unique positions in order to achieve greater performance.

Third, firms with ambidextrous middle managers will be able to (1) solve day-to-day operational problems and make their current business process more efficient and, at the same time, (2) suggest future technologies that can significantly improve their current operations.

7.3. Limitations and Future Research

The limitations of this study could be addressed in future research. This research was limited to a sample of Indonesian manufacturing and service firms in the Greater Jakarta area. Expanding the range of the sample could enhance the generalizability of the findings through additional research. Second, this study focused on the general roles of middle managers; it may ignore particular problems associated with specific functions, such as production, business development, and operations. Future studies are able to investigate the unique duties of middle managers, e.g. by divisions. Third, this study primarily looked at the mediating effects of agile and continuous improvement capability. It would be beneficial to consider other mediators or moderators that might affect the relationship in our model, for instance firms' digital capability and supply chain capabilities.

Declaration of Conflicting Interests

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