MANAGEMENT | RESEARCH ARTICLE

The intervention of organizational sustainability in the effect of organizational culture on open innovation performance: A case of Thai and Chinese SMEs

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Abstract: Small- and medium-sized enterprises (SMEs) are largely encouraged to take an open innovation model as a systematic area for R&D to expand networks in science and technology operation (Sci-Tech), especially in Thailand and China. Our paper examines the relationship between organizational culture (OC) and open innovation performance (OIP) of SMEs and the mediating effect of organizational sustainability (OS). Our investigation of 300 SMEs from different business industries in Thailand and China reveals that organizational sustainability significantly intervenes in the interaction of organizational culture and open innovation performance. From the findings, it is established that organizations should set robust and appropriate strategies for organizational sustainability to have excellent innovation outputs in SMEs’ performance. This paper also shows the significant effect of organizational culture on organizational sustainability in that cultural characteristics maintain the core business competencies in terms of marketing, operations, customer orientation, capital management, and monitoring & evaluation for

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PUBLIC INTEREST STATEMENT

The study from a survey of 300 SMEs discovered that organizational culture and organizational sustainability influenced open innovation performance. This study shows the focus of makers and managers and realizes the crucial elements of organizational culture such as leadership, teamwork and organizational climate. From the findings, it is established that organizations should set strong and appropriate strategies for organizational sustainability to have great output performance of SMEs and other companies. This study shows the effect of organizational culture on open innovation performance and finds that there is no significant relationship between them. Organizational sustainability operates in its contribution to innovation performance. Interestingly, involved with organizational culture, the new hypothesized finding makes a mediator contribution of organizational sustainability to the outcomes of open innovation performance. This paper provides implications of findings for theory and management practice, as well as the directions of further research investigation.
sustainability. Such elements of organizational sustainability operate in a significant mediator contribution to SMEs’ performance to manage open innovation. As a practical contribution, this paper suggests managers realize the crucial elements of organizational culture, such as leadership, teamwork, and organizational climate, to improve performance by combining organizational sustainability in their strategic decisions made during the open innovation processes.

Subjects: Organizational Communication; Economics; Business, Management and Accounting; Management of Technology & Innovation; Innovation Management

Keywords: Organizational sustainability; organizational culture; open innovation performance

1. Introduction

Recently, the awareness of innovation and creativity are strategic tools to sustain business success and put into the core principle for a successful innovation strategy, shorter product lifecycle, and continuous product development to meet customer needs and market success. This sounds great but not accessible to perform for smaller firms. Hence, open innovation (OI) is a powerful mechanism for the sustainable development of the firms and driving the productivity of all sections in economic development across firm boundaries. Setting the open innovation scoring system in terms of resources, condition, process, and results help a firm’s capacity to plan, monitor, and perform open innovation in an appropriate arena (Sivam, Dieguez, Ferreira, & Silva, 2019). That is to say, integrating innovation and creativity occurs as a direct consequence of multiple partners, including public organization, entrepreneurs, university, and community, in an open innovation process by which knowledge sharing and transfer are made across their boundaries (Secundo, Del Vecchio, Simeone, & Schiuma, 2019). Imagine that SMEs seek to develop a new product for innovative solutions through implementing crowdsourcing innovation or from community ideas presented by consumers and suppliers. The entire processes include gathering the search depth and breadth, evaluating the research stage, and becoming aware of the potential market need to help the integrated inside and outside teams to reduce the innovation risk and cost before the development performed. Such activities pertain to the target objectives, expectations, and goals assigned during the open innovation process, that is, the result of them will be provided through the feedback about their performance. This is, therefore, how firms embrace open innovation performance management. However, the open innovation performance management and overall development of the firm’s sustainability are committed to the cultural settings.

With the backdrop of the Thai economy, Thai public institution (e.g., National Innovation Agency: NIA) attempts to provide an innovative business opportunity for SMEs to be able to respond consumer needs and to increase their competency in ASEAN level. Moving towards open innovation can be the solution that diverse players (e.g., government, industry, customers, and university) collaborate to enhance competitiveness. Investing in innovation by SMEs themselves may be painful, open to others outside to widen the scope of networking, and diversify the investment risk will be benefited to small scale businesses like SMEs (National Innovation Agency (NIA), 2019). Hence, Thai entrepreneurs aim at searching their collaboration using a creative business plan to be funded and the effectiveness of organizational architecture to be able to contribute employees dedicated to the attainment of open innovation as one of its goals (Phonthanukitithaworn, Ketkaew, & Naruetharadhol, 2019). Enterprise or entrepreneurial development creates shared values and regulates the role of individual task-based performance beyond the formal control system, procedures, and authority. In the encounter of declining revenues, shrinking market share, and increasing market competitiveness, a firm spur the performance of innovative task-based activities by clearly introducing new, tangible objectives, goals, and incentives for the team members, by loosing enough that team members have autonomy in how to reach those goals, and by assigning the right work to match the individual’s interests and demonstrate a positive
challenge (Amabile, Barsade, Mueller, & Staw, 2005; Amabile & Pratt, 2016; Johnson, 2011). With this, having such a positive culture can promote the firm’s ability to innovation performance to be measured. From the practitioner’s point of view, organizational culture may be an improbable but more forceful obstacle to innovation. Therefore, if innovation is to be successful, organizational culture must adapt to unknown risks and uncertainties. To illustrate, the firm’s system must advocate its goals. This means the firm aspires to a culture of innovation; the innovative and risky behavior must be rewarded and recognized even though the consequence may not be immediately positive.

As analyzing the managerial performance of innovation, empirical evidence shows that the effects of organizational culture on innovation performance have been neglected in the past; indeed, organizational culture does theoretically influence the management of innovation performance. However, both results should go together. To understand the role of organizational culture in open innovation, literature will have been reviewed through the previous work as follows. (Hogan & Coote, 2014) consider Schein’s model providing an empirical framework for how organizational culture layers, including values, norms, and artifacts, should be in a firm’s mind to promote innovative behaviors that sustain firm performance and how cultures of innovation should be fostered. They find that organizational culture’s layers (e.g., norms, artifacts, and innovative behaviors) partially mediate the impact on values supporting innovation on measures of firm performance. (Naqshbandi & Tabche, 2018) focus on building upon the resource-based view of the firm, their model being addressed how the interaction of leadership with absorptive capacity and organizational culture affect open innovation outcomes, but their finding does not confirm a significant effect which plays in the interaction of organizational culture and absorptive capacity on open innovation. The problem inherited a misalignment between the intentions of top management and the behavior of involved employees during the implementation of open innovation. Hence, it is important as (Lopes, Scavarda, Hofmeister, Thomé, & Vaccaro, 2017) consider that organizational sustainability increasingly focuses on how to manage whether new knowledge of ideas or not and practices that can expand business model. Based on their case study’s results, the firm’s experience with the adoption of strategic organizational sustainability can promote open innovation. To distinguish from their work, we hypothesize that organizational culture also influences the management of open innovation performance when organizational sustainability intervenes in their relationship. What’s more, we use indicators of performance as the management rather than the measurement, which reflects strategy definition and sub-processes of open innovation.

As the prior studies leave the room, we question (i) does the influence of organizational culture have on open innovation performance management? (ii) If so, can the effect of organizational culture have on the management of open innovation performance when it is intervened by organizational sustainability? and (iii) how does organizational sustainability mediate the effects of organizational culture on open innovation performance management. To fill the gap of knowledge, this paper has two main objectives (i) to investigate how does organizational sustainability mediate the effects of organizational culture on open innovation performance management, (ii) to examine whether the open innovation performance management can be motivated by organizational culture and sustainability, and (iii) to test organizational culture and organizational sustainability as the latent exogenous variables.

Considerably, the scope of the current paper is designed and contributed when a firm adopts or experiences in open innovation as its business model for organizational sustainability that takes into consideration to manage external funding capital sources and operations for this model, thus, the open innovation effectiveness will be performed depending upon the degree of organizational culture and sustainability playing supportive roles in it. Understanding organizational culture (OC) and individual behavior will help team members during the open innovation process convey expectations by how they act and perform the innovation tasks and new product development aiming at inducing a deeper understanding of the problem although there are no particular rules of
what would be the acceptable way to act at the open innovation performance, all team members need to know leadership, teamwork, and their engagement setting the culture. As a result of this, the existence of organizational culture has been sustained the growth and development of a firm. What’s more, those team members also need to work on the degree to which the firm focuses on the climate of open innovation. Knowing the effectiveness of how to perform open innovation can help small firms to make decisions about the continuation of this strategy and sustain this business model in the future. Therefore, it is necessary to know the impact of organizational culture on innovation performance. When the internal source of the core competitiveness of a firm plays its role, organizational culture then forms and accumulates in the long-term operation.

The remaining structure of this paper will be explained the importance in each section as follows. Section 2 begins by surveying the review of literature on open innovation, organizational culture, and organizational sustainability, as well as developing the hypotheses through the proposed model. Section 3 addresses how the research methodology has been conducted. Section 4 reports the results using the survey data. Followed by section 5, we conclude by discussing the theoretical and practical implications and recommend the new considerations for future research.

2. Literature review
This paper studies the effect of organizational culture on the management of open innovation performance that can be signed when organizational sustainability obtains the recognition in SMEs. We methodologically and integratively review three areas of research that are involved in the present study include organizational culture, organizational sustainability, as well as open innovation correspondently.

2.1. Organizational culture: a multi-dimensional construct
In this paper, the term “Organizational culture has been defined and addressed by (Schein, 1992, 2010; Schein & Schein, 2016) as ‘a pattern of underlying assumptions or values that were shared among the group who learned and used it to solve its problems due to internal integration and external adaptation, that has sufficiently designed and competently worked to be considered valid and, thus, to be taught to new members in the correct ways they can perceive, think, feel about those problems. Organizational culture has a significant impact on determining organizational success and the tendency to innovate. (Schein, 1992, 2010; Schein & Schein, 2016) This definition emphasizes the layers or levels of culture include artifacts, behavioral patterns, norms, and values; this is called “Schein’s model of organizational culture.” The previous work by (Hogan & Coote, 2014) test the application of Schein’s multi-layered model of organizational culture for thinking about processes that foster innovation. Thus, organizational culture plays a critical role in determining the organization’s behavior (Herzog, 2011). To increase innovation performance, innovation, (Cooper & Kleinschmidt, 1995) suggest that innovation culture actively pay attention. This paper considers the firm’s activities to support the culture of open innovation at the organization level because we aim at understanding how the firm’s culture influences innovation performance. In contrast to existing literature, we consider the firm’s innovation culture in terms of its focus on four main sub-activities to create an open innovation culture: leadership culture, teamwork, climate, and employee engagement.

2.2. Transformational leadership
The role of leadership is critical not only in creating the employees’ motivation to obtain the assigned tasks but also in shaping organizational culture. The theoretical concept of leadership should be paid attention to the style to foster the culture for open innovation. The term “leadership” refers to an influential relationship among leaders and followers, making changes and expecting in outcomes that reflect their shared purposes (Rost, Joseph, & Burns, 1991). This paper focuses on transformational leadership other than transactional leadership. The first introduced concept of transformational leadership was given by (Burns, 1978) as a leadership approach
by which results in the individual and social system change. As (Bass, 1985) extended the work of (Burns, 1978) by explaining transformational leadership can affect followers’ motivation and performance through the extent of individualized consideration, intellectual stimulation, inspirational motivation, and idealized influence. (Aragón-Correa, García-Morales, & Cordón-Pozo, 2007) find that leadership has a robust and significant impact on firm innovativeness with a culture that focuses on adaptation, innovation, and learning. Besides, innovation positively impacts performance. Hence, in the relationship between leadership and organizational culture, the empirical study by (Kargas & Varoutas, 2015) indicates the empowerment of their relationship is when a prominent style of leadership interacts with the relative style of culture (for instance, leadership with market-oriented style will associate with market culture). (Tsui, Zhang, Wang, Xin, & Wu, 2006) point out that leadership plays a decisive role in organizational culture. Therefore, transformational leadership can help build a strong organizational culture that helps organize a positive atmosphere for innovation to influence the organization’s innovative behavior. Such individual behaviors are empowered to make justifiable decisions when they tend to share and acquire knowledge to team members, whether from inside or outside firms. In addition to transformational leadership, (Naqshbandi & Tabche, 2018) focus empowering leaders also play key role in outbound open innovation, implying that empowering leadership facilitate firms to manage their knowledge outflows more effectively because organizational characteristics and culture facilitate empowerment, along with empowering leadership, those empowered employees are more likely to demonstrate initiative and creativity to achieve goals so that the firm benefits from its empowered employees; such benefits usually arise through the inflows of knowledge exploitation (Naqshbandi & Tabche, 2018; Xue, Bradley, & Liang, 2011). Based on the above, this leads to the following hypothesis:

H1: Leadership positively influences organizational culture

2.3. Organizational climate

A firm’s climate for innovation is subject to the openness to change frequently and can be shaped by its upper management. In this paper, we separate organizational climate from organizational culture by reason that organizational climate, as an independent variable, is a firm’s mood and atmosphere are created by the culture of firm. The term organizational climate was first appeared and defined by (Lewin, Lippitt, & White, 1939) as the atmosphere of a mutually agreed and shared internal perceptions and attitudes about a firm’s practices and procedures. Thus, the emphasis on the culture that actually increases the climate with all the effort to measure and enhance employee engagement. A work of (Schneider, Ehrhart, & Macey, 2013) shows that a positive value can create a culture of happiness, which lays the foundation for achieving strategic goals for organizational success (e.g., firm and innovation performance). At the same time, a positive culture being built upon the climate for the awareness of innovation among employees helps to make the organization an attractive workplace. As a result, attracting and retaining talents also helps to improve innovation and organizational efficiency. To support this, (Kang, Matusik, Kim, & Phillips, 2016) indicate that a firm’s innovation is positively related to the culture that supports employees’ innovative behavior, subject to the firm climate for innovation. Likewise, (Shanker, Bhanugopan, van der Heijden, & Farrell, 2017) find that the climate for innovation is positively relevant to innovative work behavior and teamwork. To sum up, this can be said that the organizational climate for innovation affects the organizational culture of innovation. Therefore, we hypothesize as follows:

H2: Organizational climate positively influences organizational culture

2.4. Teamwork

Teamwork is an essential element of team performance and explains how a team behaves (Cannon-Bowers & Salas, 1998). During the open innovation process, it’s important to work alongside team members in interacting and evaluating information (e.g., external knowledge exploration and exploitation) at the right time to get the most proper decision for improving innovation
performance. By promoting organizational culture, teamwork can be achieved through training and strengthening of the team. Therefore, encouraging and implementing these principles and standards among the organization’s employees and management is the primary way to achieve effective performance. According to (Crossman & Lee-Kelley, 2004), their result shows that a firm that provides teamwork, employees tend to have more sense of commitment to their organization, which is a major element of organizational culture. (Shahzad, Xiu, & Shahbaz, 2017) consider teamwork as an aspect of culture promoting innovation performance for sustainable development, but they did not give a clearer and more in-depth interpretation of their findings on how teamwork influences organizational culture. As a result, we come up with the following hypothesis:

H3: Teamwork positively influences organizational culture

2.5. Employee empowerment

Employee empowerment refers to the use of better ways to manage potentially effective self-practices in an organization. As (Thomas & Velthouse, 1990) consider, the climbing rate of inherent task innovation due to competencies and self-determination of employees is reflected in an employee’s empowerment. The study by (Seibert, Silver, & Randolph, 2004) considers employee empowerment through work-unit-level construct and empowerment climate as the result was found that empowerment intervened in the nexus between empowerment climate and individual performance as well as job satisfaction. To link empowerment to culture, (Appelbaum, Karasek, Lapointe, & Quelch, 2015) consider the success or failure of empowerment initiatives. They find that a team-oriented structure and a culture orients to trust and open communication can increase the successful implementation of empowerment. While (Shahzad et al., 2017) consider employee empowerment as the cultural aspect that affects an organization’s innovation performance, indicating that when an increase in employees’ involvement and participation in decision making promotes them to feel more responsible for and importantly valuable to the firm. This allows to make full usage of employee’s knowledge and competencies towards innovation. Consequently, we propose the following hypothesis:

H4: Employee empowerment positively influences organizational culture.

2.6. Organizational sustainability: a multi-dimensional construct

When the setup of organizational culture is defined clearly in the above literature of organizational culture. However, (Shahzad et al., 2017) highlight and leave the critical message that is organizational culture continues to urge for sustainable development to be shown in innovation performance. Next, we will review the literature on organizational sustainability and its dimensions. “Sustainability” has been recently gained attention from various sectors whether the government, the economist, environmentalist, enterprise, academic, or even supply chain. Sustainability is, thus, one of the critical drivers for decisions in the management and future development of business. (Colbert & Kurucz, 2007) define sustainable development as “sustained business development.” In business terms, organizational sustainability is associated with the continuity of economic, social (including cultural), and environmental issues (Buys, Mengersen, Johnson, van Buuren, & Chauvin, 2014; Ribeiro et al., 2016). It is the manners of how firms have the leadership, talent, insights and change strategies essential to advance the sustainable challenges (e.g., economic, environmental, and societal pillars) facing firms today (Lopes et al., 2017). Organizational sustainability can be a major factor in a company’s ability to maintain a competitive advantage (Gimenez, Sierra, & Rodon, 2012). Previously, (Esteves, Santos, & Anunciação, 2012) consider the Direction, Posture, Organization, Behavior, and Evaluation (DPODE) model which measures as essential pillars of an organization to ensure its sustainability. That is, the DPOBE model for organizational sustainability indicates the joint of several agents such as the management of human and organizational resources and market efficiency, in order to ensure firms consolidated continuity in the community.
Contrary to existing literature, this paper reviews organizational sustainability in cases where firms recognize the potential of sustainability as their core business through operation, marketing, capital, customer service, as well as monitoring and evaluation. Thus, we define organizational sustainability as the degree to which firms survive and thrive in the future, together with the mitigating plan of any possible harm to their business and people around them. For example, firms may need to manage how to cultivate and sustain a diversity of income sources; this activity relates to capital management.

2.7. Organizational operations

Organizational operations for sustainability are considered as a firm’s operating system and as an important predictor for whether business or innovation performance. (Bettley & Burnley, 2008) point out that sustainability is strongly affected by operations management decisions; that is, the operations function must embrace the requirements of sustainability management. To manage sustainability, (Gunasekaran & Irani, 2014) analyze that the supply chain network should be considered and it needs to follow the firm’s selection and innovation strategies. That is, the supply chain networks must look for feasible innovation strategies to match the niche market ecosystem and carefully for the mechanism of cooperation innovation. Thus, (Opresnik & Taisch, 2015) the management and operational level initially position firm sustainability. When changes may happen in lights of capabilities, work procedures, relationships and technology, (Lopes de Sousa Jabbour et al., 2019) suggest that firms think on the basis of circular economy and integrate it into operations management. Taking the above into account, we hypothesize:

H5: Organizational operations management positively influences organizational sustainability

2.8. Marketing

Apart from responsible procurement and supply chain which are included in operations for sustainability, (Nawaz & Koç, 2019) indicate the importance of marketing and branding has been focused on organizational sustainability. They find that social activities significantly enhance the firms’ marketing and public relations, along with the lift of brand image. These activities allow firms to empower individuals’ decisions and protect the environment primarily. At the same time, the positive image of firms elevates their chances to attract new talent, while retaining the existing staff. Likewise, marketing for organizational sustainability should be also considered a reassessment of the existing market systems and a focus of responsibility for sustainable development in the firm environment (van Dam, 2017); transparency and ethical issues (Baldassarre & Campo, 2016); and selective target marketing as a feasible ingredient in current sustainable management (Dolnicar & Leisch, 2008). With the above review, we develop the following hypothesis:

H6: Marketing positively influences organizational sustainability

2.9. Capital management

Our paper uses “capital” as a term for the resources available to a firm based on nature, finance, society, manufacturing, and human. The maintenance of all five kinds of sustainable capital is crucial to sustaining economic development. (Viederman, 1994) consider five capital model links to the ways to define and reflect the firm’s sustainability-policies to the public. Since open innovation ventures develops venture funds that help to grow industry ecosystems, (Ernst, Witt, & Brachtendorf, 2005) find that firms not only focus on short-term but also long-term financial objectives to achieve the benefits from external innovation because external stakeholders or partners seek to get the return and retain their investment for the extending innovation project. However, (Fili, Berggren, & Silver, 2013) pinpoint that an integration of the social, human, and financial capital among the founding partners of the network. As a consequence, we propose the following hypothesis:
H7: Capital management positively influences organizational sustainability

2.10. Customer-oriented management
The firm needs to become aware of the customer’s needs during the purchase and delivery of the product in order to obtain and sustain substantial customer experience. As a result, this also benefits from reducing returns, which means less waste and reduced production of product and service resources that would otherwise replace the returned one. Hence, our paper takes into account how customer orientation contributes to organizational sustainability. (Vimarlund, 2017) uses customer orientation as a critical success factor to commits a government to invest in service innovation (e.g., e-health service) and correspond intermediary platforms which are a part of open innovation through smart service (Abbate et al., 2015). Thus, customer orientation is used to manage the interaction between a firm and its current and future customers, indicating that the firm performance is influenced by customer management (Soltani, Zareie, Milani, & Navimipour, 2018). In interconnection between customer and sustainability, (Lee, Arokiasamy, & Marn, 2018) find that ethical customer management positively affects organization sustainability in that firms can sustain their business and product on the ethical issues in customer management. Similarly, (Cai, Feng, Jiang, & Li, 2017) find that customer orientation of employees, which is the degree to which employees are engaged in manners of customer needs to be identified and met, they may involve “shortcut” behavior which is not likely to conduct the development of organizational sustainability, leading to unethical decisions making. In online terms, (Zhang, Gupta, Sun, & Zou, 2019) suggest that firms manage the effects of social media when they use social media to link between customers and business firms in the new, innovative product development process as well as between co-creation and innovation outcomes. It can be concluded that small firms, to improve the performance, should focus on understanding customers, take notice of competitor behavior who comes up with comparable products, concentrate on inter-functional coordination to enhance the (innovative) product lines (Ho, Nguyen, Adhikari, Miles, & Bonney, 2018), gather timely customer feedback, create personalized customer value (Jiang, Feng, & Lu, 2019), and improve customer service process and strategy (Hsiao, 2019; Thongsri & Chang, 2019); the overall will bring organizational sustainability to firm and innovation performance. Accordingly, we develop the following hypothesis:

H8: Customer-oriented management positively influences organizational sustainability

2.11. Monitoring & evaluation
According to (Nah, Zuckweiler, & Lau, 2003), the performance for sustainability can be monitored and evaluated throughout the firms to earn the benefits. The result of this study shows that monitoring and evaluation can play a decisive role in the utilization of enterprise resources so that the firms can continue to operate. Firms use the aspects of sustainable development in their reports. The evidence of the monitoring and evaluation activities is represented as a sustainability audit (Nitin & Brooks, 1998) and corporate code of conduct (Bondy, Moon, & Matten, 2012) to improve and innovate in proper behavior. In supply chain terms, (Bai, Sarkis, Wei, & Koh, 2012) analyze that the monitoring and evaluation of supply chain performance are vital to organizational sustainability. While (Eschenfelder et al., 2019) indicate that organizational sustainability discussing in the dimensions of technology, finance, and management should be paid attention to formal evaluation and the need for fund planning and monitoring. Consequently, the hypothesis is proposed as follows:

H9: Monitoring & Evaluation positively influence organizational sustainability

2.12. Open innovation performance management
The term open innovation (OI) was first coined by (Chesbrough, 2003), which is the process or paradigm by which firms open interior ideas to external knowledge in order to create innovation to the market. This can be shaped like a new business model and, therefore, be the answer to
business growth and driving the economy in the digital age. The key impact of open innovation is to increase firm performance (Ahn, Minshall, & Mortara, 2015) and sourcing choices in new product development (NPD) (Thakur-Wernz, Bruyaka, & Contractor, 2019). Open innovation provides the benefit from increasing market share and revenue; expanding external innovation markets; and building ecosystems that provide clients with new experiences and added value. This is, therefore, how small innovative firms gain benefits from interacting with such an ecosystem (Fasnacht, 2018). Recently, (European Commission, 2014, 2015, 2016, 2018) has developed and extended the original work “Open Innovation 1.0” of (Chesbrough, 2003) by explaining a new paradigm based on a Quadruple Helix Model and underlying principles of integrated collaboration, co-creation on shared value, innovation with ecosystems, the relief of exponential technologies, and rapid and sustained adoption (Curley & Salmelin, 2018). Hence, our paper uses the base of “innovation performance” which refers to the continuous improvement of organizational and operational activities (Wang & Lin, 2012) across firm boundaries, in which each can be managed through firm’s capability to perform a sub-process of open innovation with tracking and evaluation. Alternatively, we attempt to propose sustainable growth enabled through open innovation. Next, we will examine the two main streams of our paper. (1) How organizational culture affects organizational sustainability and when we set up their relationship successful, thus, (2) how organizational sustainability interacts well with open innovation performance management.

2.13. Organizational culture, organizational sustainability, open innovation performance management

From developing new business model innovation (i.e. open innovation) to designing organizations based on the economic benefits, organizational sustainability and culture are the ways available for enterprises’ growth. (Lewis, 2003) explications that when the project-based firm takes structures, processes, and resources into account of organizational culture; this can help understand and expose the complex roots of sustainability problems. This means that the firm can see the link between the micro and macro dimensions of the operations of a development project and the actors involved. Meanwhile, (Linnenluecke, Russell, & Griffiths, 2009) indicate that employees who report their high-perceived internal process culture tend to perform and support the economic understanding of sustainability much. A focus on organizational culture, when combined with other areas of organizational analysis into structures and resources, can help to reveal the complex roots of sustainability problems. Alternatively, (Smith & Sharicz, 2011) identify that in case that firms do not take corporate social responsibility (CSR) into account of triple-bottom-line sustainability (i.e., economic, social, and environmental pillars), another critical way is that developing and monitoring the following subsections of sustainability as governance, leadership, business plan, measure and report, organization learning, culture, and information system. In particular, the development of the competencies and knowledge should be related to the adoption of sustainability, and then clarify the cultural characteristics that nurture such attributes or how to motivate all levels to become sustainable practitioners. All things having been considered, we can formulate the following hypothesis:

H10: Organizational culture positively influences organizational sustainability.

Managing organizational culture reveals innovativeness in the case firm that is imperative for sustainability (Matinaro & Liu, 2017). Management innovation and technological innovation positively promote sustainability and firm performance. (Zhang, Khan, Lee, & Salik, 2019) suggest CEOs and top managers involving due consideration to management innovation and technological innovation in order to enhance sustainability and survive the long run. This can be described in that management innovation happens when firms understand their processes for technological innovation well. However, (Bagheri, Mitchelmore, Bamiatzi, & Nikolopoulos, 2019) pinpoint that although technological innovation demonstrates myriad benefits for SMEs, this can be risky as a result of a large amount of investment in R&D and patents, revealing that the linkage may hurt
the adoption of technology, as well as the sub-processes to perform it in a concrete way of innovativeness. To solve this, (Shin, Park, & Park, 2019) show that partnership-based supply chain collaboration (e.g., suppliers, customers, etc.) can increase the level of innovation through various collaborative partners for sustainability, indicating that positive relationships between both investment and contractual-based partnership orientation positively contribute to partnership commitment, innovation, and operational performance. By doing so, an open innovation model of sustainable interrelation to firms represents the promotion of knowledge management (through research and people engagement for a change) and open innovation (through network collaboration, exchange of ideas, and sharing technology).

Therefore, (Lopes et al., 2017) confirm their finding that organizational sustainability and open innovation can be interchanged to interact with one another. They also identify understanding organizational sustainability, coupled with culture alignment efforts, in a broad sense (i.e., the environmental, social, and economic impacts of the company businesses and production processes and products) can posit to apply to the content of activities, structure, and governance of a firm. Based on their study, we can summarize that organizational sustainability occurs within during the open innovation process, leading to (1) the sustainable creation and tracking throughout all sub-processes performed and (2) sustainable innovation. We propose that:

H11: Organizational sustainability positively influences open innovation performance management.

After all 11 hypotheses, research came up with research conceptual framework shown in Figure 1.

3. Research methodology

3.1. Data collection and sample

Our paper is based on primary data sources, where the data were collected in both Thailand and China. The first data source used is the Office of Small and Medium Enterprises Promotion (OSMEP) where the number of SMEs was given, while the data list of SMEs came from the Department of Business Development (DBD) data warehouse. First, the phone calls were made to request for firms’ permission. After confirmed, we wrote an email with the study description and...
questionnaire. The second data source used in our paper is the China Association of Small and Medium Enterprises (CASME). We used the external reliable business network agent to collect the data from Chinese SMEs.

Since our paper focuses on the small and medium enterprise (SME) sector in Thailand—one of the key contributors to generate income for the country's economic growth. The government has attempted to build an ecosystem for SMEs and startups and to drive SMEs to become smart SMEs, which apply higher technology and innovation in production processes and upgrade their absorptive capability of knowledge to trade in the global market via online channels. This indicates the firm's processes search for business opportunities, technology, knowledge, collaborative partners, and R&D and then expand its market to China, Japan, etc. Such a sector presents innovative product and service orientations. In 2019, 3 million SMEs are making up 99.7% of Thai businesses. Those SMEs employ 10 million people, which the employment opportunity occurs.

The whole population of Thai SME is approximated to 3,013,722 firms and that of Chinese SMEs is about 40,001, 212 firms. Using the structural equation model for empirical analysis, (Nunnally et al., 1994; Wolf, Harrington, Clark, & Miller, 2013) has been suggested ten times a questionnaire item. The number of samples should be 370 (37*10) SMEs from different geographical areas were selected but only 300 SMEs were usable. A sample of 105 SMEs was drawn from Thailand and the remainder of 195 SMEs were selected from China. A response rate of 81.1 % (300/370 = 0.811) for this sample owns to the fact that only top management positions/roles (e.g., the mangers, entrepreneurs, or SME owners) fill the questionnaire.

The data has been collected from September 2018 to December 2018. When the survey was conducted during that period, the strong impact supporting this study is that an increase in the number of SMEs which registers and participates in the incentive program by government-and-private funds (e.g., NIA and even SCG) for innovative business development in Thailand. This allows us to examine the interaction of open innovation performance, which may be influenced.

3.2. Measures
We used a seven-point Likert scales, ranging from “mostly disagree” (1), disagree (2), more or less disagree (3), undecided (4), more or less agree (5), agree (6), to mostly agree (7). All key constructs were adapted from prior studies appear in appendix 1.

The latent exogenous variable, organizational culture, is indirectly assessed through its multi-dimensional constructs such as leadership, teamwork, climate, and empowerment. These constructs, defined as the latent endogenous variables, are measured through their indicators or manifest variables in detail below. First, leadership refers to the extent to which leaders influence the efforts of others to achieve objectives and goals. We adapted (Naqshbandi & Tabche, 2018) three-item scale, which measures activities relevant to (1) the strategic decision and positive climate feedback, (2) task-handling, and (3) the promotion of creativity and innovation. Second, teamwork refers to the degree of the collaborative efforts of team members to meet each other's demands and goals. Three items were adapted from (Laforet, 2008, 2009; Naqshbandi & Tabche, 2018; Salas & Cannon-Bowers, 2001) to capture the following activities: (1) the team encourage to perform tasks, (2) being friendly and approachable, and (3) the creation of explicit practices. Third, organizational climate refers to the extent of internal routines in which organizational members are experiencing the work environment. The three-item scale was based on research by (Naqshbandi & Tabche, 2018), which measures (1) social gathering, (2) listening, and (3) frank discussion and exchange of views. Fourth, employee empowerment refers to the extent of autonomy and responsibility for decision-making regarding specific firm tasks. The activities of employee empowerment, adapted from (Çakar & Ertürk, 2010; Naqshbandi & Tabche, 2018), can be done by (1) the authority to control work, (2) interdependence and freedom do a task, and (3) the encouragement of sharing resources and information.
The latent exogenous variable, organizational sustainability, is a composite of five latent endogenous variables such as organizational operations, marketing, capital management, customer-oriented management, and monitoring & evaluation. First, we define the scope of organizational operations as the extent of day-to-day business routine activities to achieve core objectives. Three items of sustainable operations were modified and adapted from the previous study of (Machado, Pinheiro de Lima, Gouvea da Costa, Angelis, & Mattioda, 2017), which measures activities involved in (1) reverse logistics and closed-loop supply chain, (2) information, health and safety, quality, and environmental management systems, and (3) suppliers development program and stakeholder engagement. Second, we adopted three items of marketing from (Tollin & Christensen, 2017), which refers to the degree of marketing capabilities oriented on exploration. The measures are based on (1) integrating knowledge of consumer values and processes, (2) integrating strategic value chain partners into innovative projects, and (3) developing new products and services in conjunction with our customers. Third, capital management refers to the degree of resources managed in terms of financial, human, and social capital. The measurement activities that we modified based on research (Fili et al., 2013; Gannon & Roberts, 2018; Maack & Davidsdottir, 2015) include (1) reasonably allocating human resources into a project, (2) attending education/training course, and (3) wisely managing diverse sources of fund in innovative project. Forth, customer-oriented management was measured with three items adapted from (Jeong, Pae, & Zhou, 2006), including (1) understanding our customers’ need and behavior, (2) monitoring our level of commitment and orientation toward customers, and (3) focusing on customer satisfaction to drive firm’s objectives. Fifth, monitoring & evaluation modified with three items from (Nah et al., 2003; Nitkin & Brooks, 1998), which measure activities associated with (1) collecting and analyzing relevant progress and performance information on a regular basis, (2) a sound regulatory system, and (3) an information gathering system.

The endogenous/dependent variable, open innovation performance management, refers to the intensity of outside-in and inside-out flows of knowledge and technology. Ten items adapted from (Lichtenthaler, 2009; Naqshbandi & Tabche, 2018) reveal the tendency of open innovation can be performed as follows: (1) the introduction of new products/services to the market, (2) the introduction of new concepts and ideas in the product development process, (3) the continuous search for the external environment, (4) the use of external sources, (5) active participation in other’s innovation projects, (6) technology commercialization to outside firms, (7) technology or intellectual property or know-how, (8) changes made in existing processes and technologies, (9) cost reduction, and (10) selling existing products in the new market.

The targeted SMEs were controlled by using seven criteria: firm size, firm age, regional areas, country, types of industry, and seniority. The first, firm size by the number of employees, is classified into 0–10 employees (micro-enterprises), 11–50 employees (small-sized enterprises), 51–250 employees (medium-sized enterprises), which all sizes are associated with innovation performance. The second, firm age, was measured in years. A range of age was controlled the length which firms mitigate any effects of their establishment over time. The third, regional areas, was used to ensure a wide range of questionnaire distribution. The forth, country, included Thailand and China. The fifth, type of industry, was used to check what industry SMEs operates their businesses in. The sixth, respondents’ position, was associated with Confirm how the person responding to the survey was selected, and the type of role they have in the firm. The final factor, seniority, are measured the length of service with a respondent.

3.3. Descriptive statistics
Table 1 shows the characteristics and distribution of the targeted sample. We attempt to see the distribution in each size of SMEs: a majority of firm size ranging from 51 to 250 employees (medium-sized enterprises) accounts for 36% (108 firms), ahead of micro-enterprises containing less than 10 employees, in second place on 34.33% (105 firms). The small-sized enterprises are far behind on 29.67% (89 firms). The table also provides information on firm age. Firms operating less than 10 years is the highest distribution of 149 firms (49.67%), less than 20 years but more than
Table 1. Characteristics and distribution of the sample (n = 300)

| Characteristics                  | Frequency | (%)  |
|----------------------------------|-----------|------|
| Firm size                        |           |      |
| 1–10 employees                   | 103       | 34.33%|
| 11–50 employees                  | 89        | 29.67%|
| 51–250 employees                 | 108       | 36%  |
| Firm Age                         |           |      |
| 0–10 years                       | 149       | 49.67%|
| 11–20 years                      | 68        | 22.66%|
| 21–30 years                      | 38        | 12.67%|
| 31–40 years                      | 12        | 4%    |
| Above 40 years                   | 33        | 11%   |
| Regional areas                   |           |      |
| The North Region                 | 34        | 11.33%|
| The Northeast Region             | 79        | 26.33%|
| The Central Region               | 58        | 19.34%|
| The East Region                  | 41        | 13.67%|
| The West Region                  | 12        | 4%    |
| The South Region                 | 76        | 25.33%|
| Country                          |           |      |
| Thailand                         | 105       | 35%  |
| China                            | 195       | 65%  |
| Types of industry                |           |      |
| Food/beverage                     | 63        | 21%  |
| Plastic                          | 13        | 4.33%|
| Textile/fiber                    | 15        | 5%    |
| Machinery                        | 19        | 6.33%|
| Chemistry                        | 8         | 2.67%|
| Papermaking                      | 2         | 0.67%|
| Steel                            | 8         | 2.67%|
| Rubber                           | 2         | 0.67%|
| Transportation                   | 10        | 3.33%|
| Electronics                      | 17        | 5.67%|
| Electric equipment and cable     | 3         | 1%    |
| Others                           | 140       | 46.66%|
| Respondents’ position            |           |      |
| CEO, Entrepreneurs, Business     | 300       | 100% |
| owners, managers, or other top or|
| middle positions                 |           |      |
| Lower than positions mentioned   | 0         | 0%   |
| above                           |           |      |
| Seniority                        |           |      |
| 0-5 years                        | 185       | 61.66%|
| 6-10 years                       | 71        | 23.67%|
| 11-15 years                      | 14        | 4.67%|
| Above 15 years                   | 30        | 10%  |
10 years in second place on 68 firms (22.66%). The next two years incorporated around 21–30 years (38 firms) and more than 40 years (33 firms) are 12.67% and 11% respectively. There are 12 firms with around 31–40 years of operation that are far behind on 4%. For firms’ location, 26.33% of the firms are located in the Northeast region, followed by The South region (25.33%). The other 4 regions are The Central Region (19.34%), the East region (13.6%), the North region (11.33%), and the West Region (4%). When looking at the business industry that firms are profiled, the biggest portion of firms (46.66%) are classified in the “others” category. Those are such as pharmaceutical products, software, ceramic, waste segregation, healthcare products and services, science services, cosmetic products, agricultural products, tourism, trading, consultants, retailing, and others. The next five largest industry types firms are as follows; the food and beverage (21%), machinery (19%), electronics (5.67%), textile and fiber (5%), and plastic (4.33%). The remaining was dominated by transportation (3.33%), chemistry and steel both on (2.67%), and electric equipment and cable (1%). The last two types of business industry, paper-making and rubber, are far behind on 0.67% each. Of the highlighted respondents’ position, they totally match 100%, being CEOs, Entrepreneurs, Business owners, managers, or other top executive positions. The last factor, seniority, provides information on the majority of top management respondents who have time on their specific job are 0 to 5 years (61.66%), 6 to 10 years (23.67%), more than 15 years (10%), and 11 to 15 years (4.67%) respectively. However, in terms of results, additional analysis will be conducted to see the association between firm size and geographical region.

With sets of such categorical data to evaluate how likely it is that any observed difference between the sets arose by chance, cross-tabulation by geographical regions and firm size is shown in Table 2. For instance, to test the assumption that a random sample of 300 SMEs has been drawn from a population in which firm size and geographical locations are slightly distributed in the close frequency, giving a chi-squared probability of less than 0.001 (Pearson, 1900). To gain more insight, this result can be implied that firm sizes are associative with geographical regions. To run the business, the sizes are an important dimension reviewed by business owners or managers when assessing the locations for business. Hence, the attempt of cities and towns to attract new businesses into their areas needs to consider the factors that are crucial to firms planning to relocate or open up new branches. For example, the central region still experienced an impact from the world economy; however, several industries saw a positive trend (Karakaya & Canel, 1998; The Office of Small and Medium Enterprises Promotion [OSMEP], 2017). Therefore, the size of the firm may be bigger than that of other regions.

### Table 2. Cross-tabulation showing the characteristics of various variables (n = 300)

| Geographical Region | Firm Size | Total |
|---------------------|-----------|-------|
|                     | 1–10 employees | 11–50 employees | 51–250 employees |   |
| The North Region    | 12 (11.6%) | 7 (7.87%) | 15 (13.8%) | 34 |
| The Northeast Region| 46 (44.6%) | 27 (30.3%) | 6 (5.56%) | 79 |
| The Central Region  | 16 (15.5%) | 18 (20.2%) | 24 (22.2%) | 58 |
| The East Region     | 6 (5.82%) | 13 (14.6%) | 22 (20.4%) | 41 |
| The West Region     | 3 (2.91%) | 5 (5.61%) | 4 (3.7%) | 12 |
| The South Region    | 20 (19.4%) | 19 (21.3%) | 37 (34.3%) | 76 |
| **Total**           | 103 (100%) | 89 (100%) | 108 (100%) | 300 |

Note: Pearson Chi-Square = 48.764 (P ≤ 0.001); Df = 10
3.4. Measurement model: validity and reliability

We performed (1) descriptive statistics of key constructs, (2) bivariate correlation analysis based on Spearman, (3) intraclass correlation coefficient, (4) confirmatory factor analysis (CFA), (5) convergent validity and reliability, (6) discriminant validity, and (7) structural measurement model and regression path analysis using SPSS Statistics 26 and SPSS Amos 26 software. Initially, we conducted descriptive statistics for key constructs, followed by Spearman rank-order correlation analysis to test the relationships among the key constructs measuring through the ordinal scale. Therefore, the Spearman correlation coefficient allows us to test the ranked values for each variable other than the raw data (Spearman, 1904). Next, we conducted the intraclass correlation coefficient to determine the reliability of self-reporting using the Likert scale or measures taken to address known biases (Bartko, 1966). We performed confirmatory factor analysis to determine whether leadership, teamwork, climate, employee empowerment, operations, marketing, customer orientation, capital management, and monitoring & evaluation were distinct constructs. After confirming all distinct constructs, convergent validity and reliability were conducted to measure factor loadings, the average variance extracted (AVE), composite reliability (CR), and Cronbach’s alpha. However, to ensure measures of constructs should not be highly related to each other, discriminant validity was performed. Lastly, Multicollinearity tests to determine the degree to which the score of each construct relies on that of the other constructs.

Table 3 shows the average for different variables range from (x = 5.42 to 5.74) and the standard deviation range between 1.28 to 1.45. The range of Max and Mode is 7. Each variable had a Median of 6 and Minimum value of 1. All variables have Skewness between ~0.80 to ~1.09 (negative). The kurtosis value ranges from 0.26 to 1.27, which is positive. All elements represent a small distribution. Moreover, the distribution of data is higher than the normal one. However, when considering skewness and kurtosis, they differ slightly but are all close to zero.

Necessarily considered in the evidence where the mode and median are the same for all the questions shows the results indicate that the response category exists to the right side of the scale. However, all types of data inevitably contain bias. Response bias shows up in many fields of behavioral and healthcare research where self-reported data are used. Thus, (Friedman, Herskovitz, & Pollack, 1993) have convinced that this is because of the effect of acquiescence bias in which the responses' cognitive effort to favorably worded scale (e.g., mostly agree or just agree) required some extent at which their effort to agree on the questions (when in doubt). To reflect the extent of reliability of self-report data among the sample of 300 SMEs, Table 5 exhibits intraclass correlation coefficient of this study is 0.654 for single measure, at which indicates moderate reliability (ranges from 0.50 and 0.75), while looking at average measure of the sample, its value is 0.983 indicating excellent reliability as suggested by (Koo & Li, 2016). To

| Table 3. Descriptive statistics for key constructs (n = 10) |
|----------------|-------------|---|---|---|---|---|---|---|---|
| Variance | Mean | S.D. | Max | Min | Mode | Median | Skewness | Kurtosis |
| TL | 5.54 | 1.40 | 7 | 1 | 7 | 6 | −0.94 | 0.52 |
| OCC | 5.42 | 1.45 | 7 | 1 | 7 | 6 | −0.80 | 0.26 |
| TW | 5.53 | 1.37 | 7 | 1 | 7 | 6 | −0.89 | 0.57 |
| EE | 5.62 | 1.34 | 7 | 1 | 7 | 6 | −1.08 | 1.14 |
| OOP | 5.64 | 1.31 | 7 | 1 | 7 | 6 | −1.01 | 0.99 |
| MK | 5.74 | 1.28 | 7 | 1 | 7 | 6 | −1.08 | 1.26 |
| CM | 5.53 | 1.35 | 7 | 1 | 7 | 6 | −0.87 | 0.53 |
| CS | 5.71 | 1.29 | 7 | 1 | 7 | 6 | −1.09 | 1.27 |
| ME | 5.59 | 1.35 | 7 | 1 | 7 | 6 | −0.95 | 0.64 |
| OIP | 5.59 | 1.35 | 7 | 1 | 7 | 6 | −0.97 | 0.79 |
confirm the inter-construct correlations, the discriminability of items phrasing is provided through the correlation matrix and discriminant validity. Table 4 shows that all variables have a significant Spearman correlation with each other because all of the P-values are below (p < 0.01). These correlations can be explained as positively strong since all of the Spearman rank correlation coefficients (ρ) of 0.50 and above, indicating a strong monotonic association between all key variables. For discriminant validity, Table 7 shows that an inference error of multicollinearity is likely to occur in the construct of organizational culture, that is to say, organizational culture (OC) to open innovation performance (OIP) outperform the constrained models of open innovation performance itself since diagonal elements (in bold) should not be over off-diagonal elements, giving the result of 0.934 > 0.85 8. However, this may imply that plugging in the interaction in Structural Equation Modeling (SEM) is probably unrelated between them, and this may cause a high chance of type 2 error.

3.5. Confirmatory factor analysis and its thresholds
Considered in the indices are CMIN/df, RMSEA, GFI, AGFI, NFI, CFI, IFI, TLI, and RMR. At first, (Bollen, 1989; Civelek, 2018) identify an acceptable value of CMIN/df is preferred not over 3.00. For Root mean square error of approximation (RMSEA), (MacCallum, Browne, & Sugawara, 1996) recommend below 0.08 represents a good fit. To measure the fitness of the hypothesized model and the observed covariance matrix, (Jöreskog & Sörbom, 1993) suggest the Goodness-of-Fit statistic (GFI) and the adjusted goodness-of-fit statistic (AGFI) values are over 0.9 generally indicating acceptable model fit. To analyze the discrepancy between the chi-squared value of the hypothesized model and the chi-squared value of the null model, (Bentler & Bonett, 1980) recommend a value of the normed fit index (NFI) be higher than 0.90 indicating a good fit. Revised from NFI, (Bentler, 1990) indicates the Comparative Fit Index (CFI) to measure the non-centrality measure, given a good model fit would provide a result at over 0.90. For the Tucker–Lewis index (TLI), Tucker and

| Table 4. Bivariate correlation matrix for key constructs (n = 10) |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|
| OIP             | 0.82** | OOP | ME     | CS     | CM     | MK     | EE     | TW     | OCL     |
| OOP             |      | 0.93** | 0.89** |       |       |       |       |       |         |
| ME              | 0.91** |     | 0.92** | 0.94** |       |       |       |       |         |
| CS              | 0.92** | 0.87** | 0.92** | 0.94** |       |       |       |       |         |
| CM              | 0.88** | 0.91** | 0.90** | 0.95** | 0.91** |       |       |       |         |
| MK              | 0.80** | 0.85** | 0.83** | 0.84** | 0.82** | 0.85** |       |       |         |
| EE              | 0.78** | 0.85** | 0.80** | 0.84** | 0.82** | 0.81** | 0.82** |       |         |
| TW              | 0.77** | 0.83** | 0.79** | 0.82** | 0.81** | 0.78** | 0.93** |       |         |
| OCL             | 0.77** | 0.81** | 0.81** | 0.83** | 0.80** | 0.81** | 0.78** | 0.85** | 0.84** |

**Correlation is significant at the 0.01 level.
Note: Spearman ranked correlation coefficients

| Table 5. Intraclass Correlation Coefficient |
|-------------------------------------------|
| Intraclass Correlation                     | 95% Confidence Interval | F Test with True Value 0 |
|                                           | Low Bound | Upper Bound | Value | Df1 | Df2 | Sig   |
| Single Measures                           | 0.654     | 0.617     | 0.691 | 71.921 | 299 | 10,764 | 0.000*** |
| Average Measure                           | 0.986     | 0.983     | 0.988 | 71.921 | 299 | 10,764 | 0.000*** |

***P-value ≤ 0.001
| Constructs                  | Indicators | Loadings | AVE | CR   | alpha |
|----------------------------|------------|----------|-----|------|-------|
| Organizational culture     |            |          | 0.916 | 0.975 |       |
| Leadership                 | TL3        | 0.924    |      |      |       |
|                            | TL2        | 0.912    |      |      |       |
|                            | TL1        | 0.902    | 0.833 | 0.926 | 0.937 |
| Organizational climate     | OCL3       | 0.888    |      |      |       |
|                            | OCL2       | 0.897    |      |      |       |
|                            | OCL1       | 0.818    | 0.754 | 0.874 | 0.899 |
| Teamwork                   | TW3        | 0.93     |      |      |       |
|                            | TW2        | 0.882    |      |      |       |
|                            | TW1        | 0.897    | 0.816 | 0.916 | 0.930 |
| Employee empowerment       | EE3        | 0.855    |      |      |       |
|                            | EE2        | 0.875    |      |      |       |
|                            | EE1        | 0.906    | 0.772 | 0.887 | 0.907 |
| Organizational sustainability |            |          | 0.958 | 0.991 |       |
| Marketing                  | MK1        | 0.814    |      |      |       |
|                            | MK2        | 0.899    |      |      |       |
|                            | MK3        | 0.905    | 0.763 | 0.881 | 0.898 |
| Customer-oriented management | CM1       | 0.871    |      |      |       |
|                            | CM2        | 0.916    |      |      |       |
|                            | CM3        | 0.834    | 0.764 | 0.882 | 0.905 |
| Capital management         | CS1        | 0.897    |      |      |       |
|                            | CS2        | 0.858    |      |      |       |
|                            | CS3        | 0.833    | 0.745 | 0.867 | 0.897 |
| Monitoring & Evaluation    | ME1        | 0.907    |      |      |       |
|                            | ME2        | 0.884    |      |      |       |
|                            | ME3        | 0.888    | 0.798 | 0.904 | 0.921 |
| Organizational operations  | OOP1       | 0.896    |      |      |       |
|                            | OOP2       | 0.831    |      |      |       |
|                            | OOP3       | 0.864    | 0.747 | 0.868 |       |
| Open Innovation performance | OIP10      | 0.861    |      |      |       |
|                            | OIP9       | 0.786    |      |      |       |
|                            | OIP8       | 0.888    |      |      |       |
|                            | OIP7       | 0.867    |      |      |       |
|                            | OIP6       | 0.891    |      |      |       |
|                            | OIP5       | 0.859    |      |      |       |
|                            | OIP4       | 0.878    |      |      |       |
|                            | OIP3       | 0.82     |      |      |       |
|                            | OIP2       | 0.882    |      |      |       |
|                            | OIP1       | 0.843    | 0.736 | 0.954 | 0.965 |
Lewis (1973) recommend a cutoff of 0.95 or higher indicating a good model fit. The Root Mean Square Residual (RMR) is recommended that a good-fit model obtain values less than 0.08 (Civelek, 2018). Lastly, to evaluate how relatively insensitive sample size is, values of Incremental Fit Index (IFI) that exceed 0.90 are regarded as acceptable (Jöreskog & Sörbom, 1993).

A confirmatory factor analysis (CFA) was used to evaluate the validity of the project, and the nine factors in the measurement model were evaluated for validity. Furthermore, Confirmatory factor analysis (CFA) is applied to determine how fit a set of observed variables (i.e., indicators of each variable) are presented as evidence of one or more pre-determined latent factors in this study as exhibited in Figure 2, plus, the overall measurement model indices are exhibited in Table 8. Next, construct validity was evaluated to use the test for convergent and discriminant validity. Convergent validity estimated factor loading, average variance extracted (AVE), and construct reliability (CR). This part shows a confirmatory factor analysis (CFA) on fit index model. Table 6 Factor Loadings, AVE, item reliability, and construct reliability of the Nine-Factor CFA Model. Since all factor loads are above the threshold of 0.70, all ratio terms, including CR, are above 0.70, indicating good reliability and convergence validity. Besides, we assessed reliability of the scales using Cronbach’s alpha, to be greater than 0.80 for the variables, indicating that the scale items are dimensional (Hair, Black, Babin, & Anderson, 2010). All AVE values for the nine factors in the model are above 0.50, and the reliability of each indicator’s project. The AVE and Squared Correlation Estimates are posted in Table 7.

### Table 7. Discriminant validity

| Construct | AVE | OC     | OS     | OIP     |
|-----------|-----|--------|--------|---------|
| OC        | 0.916 | 0.957  |        |         |
| OS        | 0.958 | 0.926  | 0.979  |         |
| OIP       | 0.736 | 0.934  | 0.846  | 0.858   |

Lewis (1973) recommend a cutoff of 0.95 or higher indicating a good model fit. The Root Mean Square Residual (RMR) is recommended that a good-fit model obtain values less than 0.08 (Civelek, 2018). Lastly, to evaluate how relatively insensitive sample size is, values of Incremental Fit Index (IFI) that exceed 0.90 are regarded as acceptable (Jöreskog & Sörbom, 1993).

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3.6. The analytical results of a structural equation modeling

The researcher also analyzed data for a causal relationship between organizational sustainability, organizational culture, and open innovation. Figure 3 and Table 9 shows relationship models that organizational sustainability mediates the effect of organizational culture on open innovation. However, there is a fit with empirical approach based on the statistical values $\chi^2/df = 2.259$, CFI = 0.940, AGFI = 0.837, RMR = 0.070, TLI = 0.936, RMSEA = 0.065. They have 6 fit index that meet the criteria; $\chi^2/df = 2.259$, CFI = 0.940, AGFI = 0.837, RMR = 0.048, TLI = 0.973, and NFI = 0.936. It can be concluded that all indices suggest a good fit.

3.7. Hypotheses testing

Table 10 presents the results of the regression path. From the hypothesis 1 to 4, these hypotheses have been supported that leadership ($\beta = 0.90; t = 15.167; p < 0.001$), organizational climate ($\beta = 0.93; t = 15.167; p < 0.001$), teamwork ($\beta = 0.95; t = 15.055; p < 0.001$), and employee empowerment ($\beta = 0.88; t = 14.588; p < 0.001$) positively influence organizational culture. On the other hand, these hypotheses represent that organizational culture is a second-order factor, consisting of the sub-dimensions of leadership, teamwork, organizational climate, and employee empowerment. Likewise, since organizational sustainability has five dimensions, we found that organizational operations ($\beta = 0.93; t = 15.292; p < 0.001$), marketing ($\beta = 0.95; t = 15.292; p < 0.001$), customer-oriented management ($\beta = 0.98; t = 15.688; p < 0.001$), capital management ($\beta = 0.96; t = 15.468; p < 0.001$), and monitoring & evaluation ($\beta = 0.96; t = 15.443; p < 0.001$) relate positively and significantly to organizational sustainability. However, we decided to delve more in-depth and understand how organizational culture relates to organizational sustainability, given to

![Figure 3. Structural model.](image-url)
Hypothesis 10 tests the effect of organizational culture on sustainability. It is also supported ($\beta = 0.92; t = 13.463; p < 0.001$). After confirming H10, Hypothesis 11 ($\beta = 0.93; t = 15.243; p < 0.001$) was supported to investigate the influence of organizational sustainability on open innovation performance.

4. Discussion
Transformational leadership, as a factor, greatly influences OC. In this study, the outcomes of SEM point to transformational leadership positively and correlate with OC. The respondents in this study believe that leaders are critical to the organization as leadership influence employees’ perceptions of the importance of work, to instill positive enthusiasm, and to promote mutual trust and cooperation between employees and management, which leaders create an organizational culture and shape organizational culture (Tsui et al., 2006). Through transformational leadership, leaders help the company to build an influential culture and a positive organizational climate. Organizational climate, as a factor, greatly influences OC.

Regardless of how well an organization does in hiring employees, new employees are not fully responsive to organizational culture, perhaps because they are the least familiar with the organizational culture. The potential of new employees is enough to disrupt the beliefs and customs that prevail in the organization, so the management needs to help new employees to adapt to the existing culture. It establishes and strengthens organizational culture behavior, so the organizational climate has a significant impact on employee performance because it has a significant impact on employee motivation and job satisfaction. The organizational climate determines the

### Table 9. Overall measurement model indices for SEM

| Fit Indices                              | Recommended value | Measurable Index |
|------------------------------------------|-------------------|------------------|
| CMIN/DF ($\chi^2$/df)                   | $\chi^2$/df < 3   | 2.259            |
| Incremental Fit Index (IFI)              | IFI $\geq$ 0.90   | 0.941            |
| Comparative Fit Index (CFI)              | CFI $\geq$ 0.90   | 0.940            |
| Tucker Lewis Index (TLI)                 | TLI $\geq$ 0.95   | 0.936            |
| Root Mean Square Error of Approximation (RMSEA) | RMSEA < 0.08 | 0.065            |

### Table 10. Regression path

| Path          | Path coefficient | Critical Values (P-value) | Hypothesis | Results |
|---------------|------------------|---------------------------|------------|---------|
| TL $\rightarrow$ OC | 0.90             | 15.167 ($P \leq 0.001$)*** | H1 Supported |
| OCL $\rightarrow$ OC | 0.93             | 15.167 ($P \leq 0.001$)*** | H2 Supported |
| TW $\rightarrow$ OC | 0.95             | 15.055 ($P \leq 0.001$)*** | H3 Supported |
| EE $\rightarrow$ OC | 0.88             | 14.588 ($P \leq 0.001$)*** | H4 Supported |
| OOP $\rightarrow$ OS | 0.93             | 15.292 ($P \leq 0.001$)*** | H5 Supported |
| MK $\rightarrow$ OS | 0.95             | 15.292 ($P \leq 0.001$)*** | H6 Supported |
| CO $\rightarrow$ OS | 0.98             | 15.668 ($P \leq 0.001$)*** | H7 Supported |
| CM $\rightarrow$ OS | 0.96             | 15.488 ($P \leq 0.001$)*** | H8 Supported |
| ME $\rightarrow$ OS | 0.96             | 15.443 ($P \leq 0.001$)*** | H9 Supported |
| OC $\rightarrow$ OIP | 0.92             | 13.463 ($P \leq 0.001$)*** | H10 Supported |
| OIS $\rightarrow$ OIP | 0.93             | 15.243 ($P \leq 0.001$)*** | H11 Supported |

***p < 0.001

Hypothesis 10 tests the effect of organizational culture on sustainability. It is also supported ($\beta = 0.92; t = 13.463; p < 0.001$). After confirming H10, Hypothesis 11 ($\beta = 0.93; t = 15.243; p < 0.001$) was supported to investigate the influence of organizational sustainability on open innovation performance.
work environment in which employees are satisfied or dissatisfied. This is in line with the research by (Schneider, Ehrhart, & Macey, 2010). The findings of the research showed that organizational climate determines the collective attitudes and behaviors of employees in organizational culture, which leads to organizational success.

Teamwork, as a factor, greatly influences OC. In this study, the outcomes of SEM point to Teamwork positively and correlate with OC. The Respondents in this study held the opinion that teamwork is a factor within an organizational culture that values collaboration. Such collaboration assists in understanding and trusting colleagues in a team-based environment. Organizational culture plays an important role. This finding is in line with the study by (Crossman & Lee-Kelley, 2004). The survey results show that in organizations that value teamwork, employees have more sense of commitment to their organization. The findings of this research showed a positive correlation between teamwork and organizational culture.

Organizational operation principle as a factor greatly influences organizational sustainability. In this study, the Organizational operation principle was found to relate to organizational sustainability positively. Organizational, operational principles integrate ideas, values, and cultural systems into business processes and maximize organizational profitability. The second sample consisted of 154 start-up management teams from Dun and Bradstreet, who compiled the most extensive database. The result of the study found that organizational operation principles provide enterprises with a full range of operational directions and influence organizational sustainability positively.

Marketing, as a factor, influences organizational sustainability. It was found in this study that marketing has a positive relationship with organizational sustainability. In a study conducted by Kalyan Sengupta and British Chattopadhyay (1984), appropriate marketing strategies play a role in organizational sustainability.

Capital management is another factor that influences organizational sustainability. The result of this study reveals that capital management influences organizational sustainability positively. The finding is related to the research of Hatch and Dyer. The research adopts the triangulation process combined with other channels. By calculating the primary descriptive statistical data of each variable, they show that human capital can be used as scarce resources of an organization and become an essential factor of organizational sustainability. On the other side, capital management plays a direct or indirect role in enterprise strategy.

Customer-oriented management is yet another factor that influences organizational sustainability. It was found in this study that customer satisfaction and service quality have a positive relationship with organizational sustainability. Service quality can serve as an organization’s competitive advantage to better meet customer needs and expectations, revealing that customer orientation leads to firm and innovation performance and has a positive relationship with organizational sustainability.

Monitoring & Evaluation is also a factor that influences organizational sustainability. The result of this research revealed that monitoring and evaluation influence organizational sustainability positively. This finding is related to ERP implementation and assesses the key success factors for CIO’s implementation of the ERP view. In the Zuckweiler, and Lau study, monitoring and evaluation can play a decisive role in the utilization of corporate resources. The research results show that the successful implementation of enterprise resource planning has an inseparable relationship with supervision and evaluation.

Organizational sustainability is a factor that influences open innovation performance. The result of this study reveals that OS has a positive relationship with open innovation performance. From this study, organizational sustainability can influence the performance of open innovation,
representing that there is a close relationship between organizational sustainability and open innovation performance. Besides, the triple bottom line concept also refers to organizational sustainability, new product development related to organizational sustainability, including innovation, organizational sustainability that hinders open innovation, and a positive impact on organizational performance.

5. Theoretical and managerial implications
The purpose of this study was to provide insights into how organizational sustainability and organizational culture drive the performance of open innovation. The implication of this study is based on the empirical evidence that the dynamic interaction of organizational culture dimensions mediates the contribution of organizational sustainability towards open innovation performance. To obtain the high performance of open innovation, the innovation-project managers need to pay attention to the internal climate of the OC concept within the organization to support a particular goal such as performing an innovation-project with external players (e.g., university, governmental institution etc.). Managers and their staff, at marketing levels, should operationalize the market-oriented values and ensure that such innovative ideas/products/services can provide the pain-point solution, in particular being tailored with the change of customer needs while firms perform their innovation project, which helps to sustain organizations.

6. Conclusion and recommendation
In this study, an analysis the interplay between organizational sustainability (OS), organizational culture (OC) and open innovation performance (OIP) reports the results of study about OIP of SME identifies the factors influence that can be classified into the major categories organizational sustainability are operational operation principle, marketing, customer service, capital management and monitoring & evaluation in the company that have positively and directly the relationship to OIP. Moreover, organizational culture has an indirect relationship with OIP through organizational sustainability is the mediator supported by transformational leadership, organizational climate, and teamwork and employee empowerment.

As pointed out in the section of method and analysis, the most striking differences in SMEs size in terms of the number and employment of employees is a significant determinant of performance. While their located areas of business matter in creating and commercializing innovative ideas. This is how the cluster-specific environment, which is the geographic location of interconnected SMEs, supporting the innovation performance in terms of competitiveness.

Recommendations of this study are beneficial in SMEs for improving and developing of OIP. The research recommended to the organization. Firstly, a company should focus on organizational culture on the Theory of Organizational citizen behavior about leadership that Leaders behave as role models as confidence, communication, and performance and have a broad vision and can convey to employees. Organizational climate should have social gatherings where everyone in the firm comes together and take the time to listen to each other. Teamwork, a member should help each other to get the work and encourage each other to succeed when performing the task. Employee empowerment, a leader, considers the appropriate decisions to the employee and allows interdependence and freedom to the employee. Moreover, a company should pay attention and realizes the other crucial elements of organizational culture. Secondary, a company should develop organizational sustainability in the firm that leading to have an excellent output of performance for SME, organization or company. Operational operation principle that an organization should have a common goal and clear responsibilities and obligations. The company should accurate market positioning, create, communicate and deliver value to customers in marketing and customer service, Capital management the organization needs a clear reward and punishment system, human resources and organization should have excellent talents and monitoring & evaluation, organizations need to collect and analyze relevant progress and performance information on a regular basis.
The OIP’s organization gain a competitive advantage in the company to develop processes, products, services, and technologies and assist market business development, the business models for current and future. With the focal scope of this study, it inevitably contains some limitations. First, this study provides a size of 300 SMEs as shown in the recent findings; therefore, the team intends to develop cross-sectional data to panel data in a longitudinal study on this field for future validation. Consequently, this study takes into consideration the context of the effect of inter-firm competition which may reveal the effect of organizational sustainability. This is encouraged to consider in further research. What’s more, the further researcher creates the measurement of parameters of the results of open innovation performance. It is also encouraged to take sustainability accounting as opportunity costs in contrast to the field of firm operations have largely ignored practice within firms with detrimental results.

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Appendix 1. The survey questions

Leadership

We often consult individuals on the strategic decision and give positive-climate feedback during the open innovation process

We often make decisions to handle tasks with individuals involved in the open innovation project

We often promote creativity and innovation within our firms

Teamwork

Our team members encourage each other to succeed when performing the task.

Our team members are friendly and approachable

Creating and preserving clear and explicit practices are essential to us
Organizational climate
We have social gatherings where everyone in the firm comes together.
   We take the time to listen to each other.
   We are frank with each other (i.e., a frank discussion, a frank exchange of views, frank advice, etc.).

Employee empowerment
We give individuals the authority for the appropriate decision makings on their task.
   We give considerable opportunities for interdependence and freedom to do their tasks.
   We encourage the sharing of resources and information.

Organizational operations
We prioritize reverse logistics and closed-loop supply chain
We prioritize information, health and safety, quality, and environmental management systems
We prioritize suppliers development program and stakeholder engagement

Marketing
We integrate the knowledge of consumer values and processes into the innovative project
We integrate strategic value chain partners into innovative projects
We keep developing new products and services in conjunction with our customers

Capital management
We reasonably allocate human resources into a project
We often attend education/training courses
We often manage diverse sources of funds in the innovative project wisely.

Customer-oriented management
We create our competitive advantage strategy by understanding our customers' need and behavior
We constantly monitor our level of commitment and orientation toward customers.
Customer satisfaction primarily drives our objectives

Monitoring & Evaluation
We often collect and analyze relevant progress and performance information on a regular basis.
We have a sound regulatory system.
We have an information gathering system.

Open Innovation Performance
Our firm often introduces new products/services to the market.
Our firm often introduces new concepts and ideas in the process of product development.
Our firm continually scans/search for the external environment for inputs such as technology, information, ideas, knowledge, etc
Our firm often uses external sources (e.g., research groups, universities, suppliers, customers, competitors, etc.) to complement our own R&D.
We actively participate in other's innovation projects.
Generally, we perform to commercialize all technologies to outside firms
Our firm often seeks out technologies or intellectual property or know-how
Our firm often makes changes and improvements in existing processes and technologies.
Our firm is committed to reducing the cost of existing products/services.
Our firm seeks to sell our existing products into new markets.
