Open Innovation Pathway to Firm Performance: the Role of Dynamic Marketing Capability in Malaysian Entrepreneurial Firms

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Abstract

Purpose: This study investigates how firms build strong dynamic marketing capability (DMC) from open innovation (OI) to enhance the performance of entrepreneurial firms. Moreover, this study unfolds DMC's mediating and moderating mechanisms underlying inbound and outbound OI and performance relationships, respectively.

Research methodology: To test the research model and hypotheses, this study drew a sample of 251 firms operating in Malaysia using the time-lagged survey method. Structural equation modelling was used in this study to investigate the model relationships.

Findings: The findings of this study reveal the positive interplay between inbound OI (knowledge acquisition) and DMC. The outbound OI (knowledge exploitation) in this study is found to mediate the relationship between inbound OI and firm performance. In addition, while the DMC has a mediating effect in the relationship between inbound OI and firm performance, such a capability reinforces the positive relationship between outbound OI and performance.

Originality: This study provides a noble insight into the complex interplay between OI and entrepreneurial firms' performance by developing and testing an integrated framework underpinned by a knowledge-based view and dynamic capability theory. The findings highlight the significance of taking an interdisciplinary and integrated approach to better understand the determinants of entrepreneurial firms' performance in an emerging country context.

Keywords: Open innovation; knowledge acquisition; knowledge exploitation; dynamic marketing capability.

1. Introduction

This study integrates insights from knowledge-based theory (KBT) and dynamic capability (DC) to explain a complex interplay between open innovation (OI) and entrepreneurial firms' performance. OI is defined as ''the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively'' (Chesbrough 2006, p.1). OI aids ideas and knowledge to flow purposively in the innovation process within organizational boundaries (Oltra, Flor and Alfaro, 2018). Thereby, it turns out to be a winning strategy for firms' superior performance (Ahn *et al*., 2016). However, while opening up the innovation process can be advantageous, firms differ in their ability to benefit from OI, and it does not always contribute to positive outcomes (Chen *et al*., 2011; Oltra *et al*., 2018), as evident in a number of studies which report OI's negative effects (Laursen and Salter, 2006; Torkkeli *et al*., 2009; Vega-Jurado *et al*. 2009) and positive effects on performance outcomes (Cheng and Huizingh, 2014; Friesl, 2012; Xie *et al*., 2018). Hence, concerning OI, ''there has been no consensus on the direction of this relationship, as results arising from different research efforts are inconclusive'' (Cheng and Shiu, 2015; p.626). Therefore, scholars continue to call for a critical investigation of OI to explore its differential effects on various strategic outcomes (Cheng and Shiu, 2015, Xie *et al*., 2018) and also urge an investigation of how OI can be operationalised in entrepreneurial firms to yield benefit from its innovation efforts (Flamini *et al*., 2021).

Innovation and entrepreneurship can be considered as continuous and complementary processes (Schmitz *et al*., 2017). However, what is missing in the literature is the nuances of OI mechanisms that entrepreneurial firms capitalise on to generate economic values (Nambisan *et al*., 2018) and, unfortunately, situates this line of research at the conceptual level (Hung and Chou, 2013). Moreover, interdisciplinary research in entrepreneurship literature, such as the nexus between innovation efforts and marketing strategies is yet to be discovered (Leonidou *et al*., 2020). This study seeks to address these voids in the literature by taking an interdisciplinary approach in entrepreneurship research[1], as they retain the potential

[1] While open innovation has been central element of innovation literature, dynamic marketing capability has positioned itself as an important variable among marketing scholars.

to advance theoretical knowledge and provide important guidelines for practitioners (Ahmed and Brennan, 2019a). In particular, the current study examines the direct effect of knowledge acquisition on DMC and its indirect effects on entrepreneurial firms' performance via knowledge exploitation and DMC. The moderating effect of DMC on the hypothesised relationship between knowledge exploitation and performance is also considered.

To become competitive in the market, researchers urge the necessity of DCs among entrepreneurial firms (Teece, 2012), that is, "the ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" (p.516) (Teece *et al.*, 1997). DMC is a functional dimension of DC (Xu *et al*., 2018). To create customer values, possessing DMC is critical because it promises a unique process of *responsiveness* and *efficiency* of cross-functional business processes to satisfy customers' demands (Fang and Zou, 2009). The necessity of DMC has become increasingly crucial for entrepreneurial firms in an emerging economy such as Malaysia (Lee and Falahat, 2019). Because intense competition (Li *et al.*, 2008) and a high level of business uncertainties (Pillania, 2011) make it difficult for emerging economy firms to achieve success in marketing activities (Dadzie *et al*., 2017). It is even more required among Malaysian entrepreneurial firms, because DMC has the strength to channel forward-looking entrepreneurial efforts into competitive advantages (Pratono and Mahmood, 2015). However, it is imprecise in the literature regarding the antecedents to DMC that facilitate entrepreneurial firms to create a favourable market for new and upgraded products and/or services with the goal of satisfying customer demand ultimately. Prior research is replete primarily with the consequences of DMC on various performance outcomes (Bruni and Verona, 2009; Buccieri *et al.*, 2020a; Hoque *et al.,* 2021; Hoque *et al.,* 2022), but overlooks the fact that how DMC is originated. This study also addresses this critical research gap and examines the antecedents to generating DMC from both internal and external OI perspectives. Following Nieves and Haller's (2014) argument that knowledge results in DC, the authors expect that optimum DMC also requires a seamless flow of knowledge resources to function efficaciously.

To achieve successful marketing and create superior customer values, firms need to be innovative and invest a significant amount of capital in various activities such as data accumulation, market research,

online search optimization, and valuable intel to enable data-driven marketing actions (Bloom *et al*., 2014). The processes are analogous to entrepreneurial firms and require them to innovate more compared to traditional firms in catering to diverse markets and customers (Arias and Cruz, 2019), thus, showcasing a premise of OI (Flamini *et al*., 2021). OI allows valuable knowledge-flow within an organization, either inwardly or outwardly, comprising of *knowledge acquisition* (inbound OI) and *knowledge exploitation* (outbound OI) (Hung and Chou, 2013). Malaysian entrepreneurial firms are capable of managing knowledge (Mostafiz *et al.,* 2021). However, functioning OI is a complex process. The inbound OI propels knowledge flow into the firms' knowledge repository from outside of the organization (such as knowledge on market changes, suppliers networks, customer needs, and innovative ideas) and coupling with existing knowledge to create value for customers (Chesbrough, 2003). In contrast, outbound OI allows knowledge flowing out from firms to the market purposively to obtain monetary or non-monetary benefits through selling licenses of intellectual properties or uplifting existing products/services through sharing knowledge or co-developing new products/services with competitors or potential external partners (Lichtenthaler, 2009).

While inbound OI achieved empirical attention (De Paulo *et al*., 2017); however, outbound OI has been remained at a conceptual level (Hung and Chou, 2013) also in the entrepreneurship context (Nambisan, Siegel, and Kenney, 2018). The process and the purpose of both OI are distinct from each other and require careful unearthing to operationalise adequately (Lichtenthaler, 2009; Kim and Park, 2010). Two logics, on the one hand, the inbound OI (i.e. knowledge acquisition) requires dynamic capability as a launchpad for successful mobilization (Lee and Yoo, 2019); on the other hand, outbound OI (i.e. knowledge exploitation) demands DCs as contingencies to uplift the benefits of outbound OI through positioning the products/services correctly (Hoque *et al*., 2022). Following the first logic, the authors expect that inbound OI complements firm performance through DMC. In other words, DMC to be originated from inbound OI (based on acquired knowledge) that will mediate the inbound OI and firm performance relationship.

Malaysian entrepreneurial firms are highly proactive (Falahat *et al.*, 2018) and have the tendency to acquire knowledge (Mostafiz *et al*., 2021). In that case, the necessity of outbound OI is paramount to

generate economic value from excess or unused knowledge, if any (Chesbrough and Garman, 2009). Because knowledge is a perishable resource needed to be mobilized at the right time and place (Wilde, 2011). Therefore, following the second logic mentioned above, the authors propose that entrepreneurial firms that own excess or unused knowledge as a result of inbound OI; require outbound OI to generate monetary or non-monetary benefits from that knowledge. In other words, the authors expect the outbound OI to mediate the inbound OI and firm performance relationship. However, the authors also do not expect firms to linearly increase the performance from this mediation mechanism. Because, in reality, often innovation implies high risk and uncertainties (Song and Parry, 1997). Moreover, in the products/services co-creation and marketing processes, entrepreneurs can position products/services in the market weakly, target the wrong customers, and launch the products/services leanly will hamper focal firms from realising the benefits of outbound OI fully. Therefore, a DC is needed to bear on the risks and uncertainties (Arunachalam *et al*., 2018). Hence, the study proposes that the DMC originated from inbound OI to moderate the outbound OI and firm performance relationship. At a high level of outbound OI, firms can exploit and co-develop various new products/services; therefore, it would require a high level of DMC to successfully commercialise those products/services developed from outbound OI to deliver greater customer value.

The contributions of this study are manifold. First, following the KBT of the firms, this study explains how DMC originated from inbound OI. The KBT promises a competitive advantage by effectively organising knowledge recourses as input to DC (Denford, 2013; de Bem Machado *et al*., 2022). The advantages derived from the firm's capability to organise knowledge resources reflect the access to and integration of superior knowledge resources (Grant, 1996). In this process, firms are knowledge repositories used to generate capabilities to confirm superior competitive advantages (Gonzalez, 2021). Therefore, based on the KBT of the firm, this study contributes to the current debate on OI by offering empirical evidence explaining the effects of inbound OI on DMC, that also clarifies the subtle influence (two views) of the two dimensions of OI (Hung and Chou, 2013). Because the purpose and the objective of inbound and outbound OI are distinct and must be functionalised differently. Thereby, in the first view, this study

explains the necessity of inbound OI that enriches the firm's existing knowledge repositories and inputs (i.e. knowledge resources) to build DMC. The second view sees that inbound OI can lead entrepreneurial firms to acquire excess knowledge. In that case, firms require outbound OI (i.e. knowledge exploitation) to realise the benefits of those excess or unused knowledge by sharing or co-developing new products/services with external partners. Therefore, this study contributes to the OI-related research by carefully articulating and solving the puzzles surrounding the subtle mechanisms of OI dimensions' functionality in the entrepreneurship context (Flamini *et al*., 2021).

Following the logic by Lichtenthaler (2008) on OI processes as "systematically relying on a firm's DCs of internally and externally carrying out management task" (p. 148) to create customer values, this study draws out the third and fourth contributions. The relationship between inbound OI (i.e. knowledge acquisition) and firm performance requires a launchpad to channel knowledge resources to superior firm performance. Based on the DC of entrepreneurship (Teece, 2012), the current research argues that DMC delivers the cross-functionalities of business processes developed from knowledge resources resulting from inbound OI to enhance firm performance. In other words, the value creation from inbound OI heavily depends on the successful implementation of three cross-functional processes of products/services management, supply chain management, and customer relationship management of DMC. Finally, this study saturates the research model by arguing the contingency role of DMC (i.e. originated from inbound OI) between outbound OI and firm performance relationship. Emerging economies are highly competitive, and wrong marketing strategies eventually question firms' survival (Hanssens and Pauwels, 2016). Therefore, for successful commercialisation of products/services (i.e. outcomes of outbound OI), entrepreneurial firms should capitalise on DMC as a contingency to reduce apparent tensions of failure in the emerging economy markets. Given that, the study directs Malaysian entrepreneurial firms in effectuating OI and creates value from both inbound and outbound OI; not limited to, this study also elucidates the capability creation process, as DMC from OI to dictate in the market, outperform competitors and succeed.

The remainder of this paper is structured as follows. The following section begins by developing the theoretical basis and hypotheses for why and how OI influences performance. The third section describes the research methods and data. Next, the study's results are reported. Finally, the discussion of findings and academic and practical implications are presented, followed by the limitations and directions for future research.

2. Theoretical background

Knowledge-based theory of entrepreneurship and open innovation

KBT has the potential to explain the origin and sustenance of OI. Unlike the resource-based view, which treats knowledge as a transferable commodity of the firms, KBT extends the annotation and articulate knowledge as a *process term* (Spender, 1996) that is capable of explaining the process of enriching the knowledge repository of the firms to create value (Felin and Hesterly, 2007). This study takes this as the vantage point and argues that OI is the process mechanism to develop the knowledge repositories of the firms. Through OI, the firm "uses external ideas as well as internal ideas, and internal and external paths to market" (Chesbrough, 2003, p. xxiv) – lies on a continuum with the manifestation of inbound and outbound OI.

With inbound OI, the firm capitalises on *knowledge acquisition* from available markets to complement the existing knowledge repository (Hung and Chou, 2013). This knowledge includes information on the market change, suppliers, customer needs, intellectual properties, external knowledge sources and innovative ideas (Chesbrough, 2003; Pustovrh *et al.*, 2020). KBT, in the entrepreneurial context, catalysts this process as the mechanism for knowledge production to enrich the knowledge repository of the firms (Hughes *et al*., 2021). Likewise, KBT also promises successful knowledge exploitation among entrepreneurial firms (Han and Ko, 2017), as the fundamental theoretical tenet of KBT is to confirm adequate knowledge utilisation to achieve competitive advantage (Hayter, 2016). Hence, with outbound OI, the firm capitalises on *knowledge exploitation,* intending to commercialise knowledge and share that with the market to obtain monetary or non-monetary benefits (Lichtenthaler, 2009). The process

includes firms channelling knowledge to other firms by licencing intellectual properties (i.e. mostly underutilised), sharing innovative ideas, exclusive intel about the market (i.e. valuable research outputs), and co-develop new products/services in pursuit of creating an attractive market for focal firms (Chesbrough and Crowther, 2006). Since knowledge acquisition and exploitation offer competitiveness to the organisation, the theoretical argument based on KBT of entrepreneurial firms (Hughes *et al*., 2021) offers convincing underpinnings to leverage knowledge resources as OI and link that to DC (Denford, 2013). Because DCs require the investment of knowledge resources to function productively to outperform competitors (Bierly *et al.*, 2009).

Dynamic marketing capability as a dynamic capability

DMC emerged from DC theory (Xu *et al*., 2018). While ordinary capabilities are rooted in a firm's routine to carry out day-to-day activities, DC enables entrepreneurial firms to "determine the speed at, and the degree to which, the firm's particular resources can be aligned and realigned to match the requirements and opportunities of the business environment to generate sustained abnormal (positive) returns" (Teece, 2012, p. 1395). In line with the DC theory, Fang and Zou (2009) define DMC as responsiveness and efficiency of cross-functional business processes to determine successful product development management, supply chain management, and customer relationship management (Srivastava *et al.,* 1999) to create and deliver great customer values in response to market changes (Xu *et al*., 2018). The process of product development requires designing, developing, and launching new products/services to satisfy customer needs. DMC can enable entrepreneurial firms to achieve these cross-functional processes by ascertaining customer needs, locating new ideas and design protocols for products/services, and manufacturing and launching those in existing and new markets (Day, 2011; Fang and Zou, 2009). The supply chain management process includes "designing, managing, and integrating the firm's supply chain with those of its suppliers and customers" (Xu *et al*., 2018, p. 142) to improve cost-structure and acceptance of new products (Graves and Willems, 2005). Finally, the customer relationship management process encompasses progressing customer relationships and directing firms to learn customer needs and find ways to satisfy them. Entrepreneurial firms not only satisfy existing customer demands, but also anticipate

emerging demands to stay competitive (Arunachalam *et al*., 2018) by utilising data-driven knowledge on products or services, innovative ideas and market research (Hanssens and Pauwels, 2016).

Some scholars conceptualise DMC as an extension of DC (Bruni and Verona, 2009) because of its responsiveness and assimilation of market knowledge and integration throughout the organization (Roach *et al*., 2018). In this notion, DMC can be misinterpreted with *market orientation* concerning responsiveness, assimilation, and integration characteristics. However, "market orientation is related to firm's overall value and business philosophy about the importance of serving customer's needs, while DMC is about a firm's capability regarding specific functional areas of marketing "to respond to market changes, and are reflected through the speed and efficiency of firm's cross-functional business processes" (Fang and Zou, 2009, p. 744). Therefore, as a functional dimension of DC, DMC enables entrepreneurial firms to quickly reconfigure resources to align marketing management processes with customer demand (Buccieri *et al*., 2020a) and be competitive in an emerging economy (Konwar *et al*., 2017). Figure 1 highlights the conceptual framework of the paper.

[Insert Figure 1 about here]

2.1 Hypotheses development

Inbound OI enables entrepreneurial firms to engage with external markets when seeking valuable intel in fostering innovation (Nambisan *et al*., 2018). The process is also common among emerging economy firms (Chaston and Scott, 2012; Yun *et al.*, 2018). Because through OI, emerging economy firms can get access to new knowledge, permitting the evolution of new strategies adequately to respond to market volatilities and outperform competitors (Bogers *et al*., 2019a). De Paulo *et al*. (2017) argue that OI leads to business growth by enabling firms to leverage a variety of context-specific capabilities. For instance, Lee and Yoo (2019) prove that OI delivers product innovation capability as DC by acquiring knowledge outside of the organisation, fusing it with the existing knowledge, thereby, enriching the firm's comprehensive knowledge repository to generate new strategic capabilities. Likewise, Kim and Park (2010) also reached to a similar conclusion that OI increases the innovation capabilities of SMEs where external collaboration with other organisations engenders various innovation activities such as new product development.

Similarly, Urde, Baumgarth, and Merrilees (2013) emphasise the necessity of outside-in innovation (i.e. market knowledge) to enhance the brand management capability of the firm.

Successful commercialisation of products/services requires functional DCs. Hoque *et al*. (2021) argue that DMC will not function adequately without valuable knowledge as a resource. Because DMC absorbs knowledge from the market (Bruni and Verona, 2009), it requires firms to capitalise on knowledge acquisition (Bogers *et al*., 2019b). The authors expect that entrepreneurial firms prudent in acquiring knowledge can enjoy a rich knowledge repository, which eventually builds outstanding DMC to satisfy market demands. Market knowledge is an economic good for marketing (Hanssens and Pauwels, 2016), and exchange between firms and other parties (Lichtenthaler, 2011) can abate the uncertainties emerging economy's entrepreneurial firms face. The flow of knowledge-in can facilitate entrepreneurial firms to reduce information asymmetry and innovate internally (Yulianto, 2021). This knowledge includes information on emerging customer trends and needs, new product development, manufacturing processes, channel members, logistics and supply chain intel, etc., eventually enabling them to build efficacious cross-functional processes of DMC to yield greater customer values.

Knowledge acquisition. Knowledge is an essential resource that firms capitalise on, mainly accumulated from external partners, to stay competitive in the market (Nielsen, 2006). New knowledge from external parties and the market increase the utility of existing knowledge (Katila and Ahuja, 2002; Laursen and Salter, 2006). Firms create external values by acquiring knowledge and skills from partners to complement the internal capabilities informed by existing knowledge (Love *et al*., 2002). Lee and Yoo (2019) argue that knowledge deriving from the outside profoundly affects the capability and competence of firms that develop innovative products. Theoretically, the DC maintains that a firm's ability to continuously acquire, create, integrate, transfer and use knowledge resources underpins its capabilities and competitive advantage (Teece, 1998). The more knowledge resources a firm can accumulate, the greater the DCs it can develop (Chien and Tsai, 2012).

Knowledge acquisition is a continuous process that firms invest in to achieve market success (Siachou *et al*., 2021). Knowledge acquisition in marketing incorporates the search for unique and diverse

information that takes the firm beyond the scope of its expertise and experimentation (Madhavaram *et al.*, 2014), thereby may contribute to the development of its DMC. When adapting to changing business environments, customer-related and competitor-related knowledge resources are of great value to the development DCs (Chien and Tsai, 2012). Prior study evident that knowledge acquired from the market complements the innovation process of the firms (Corral de Zubielqui *et al*., 2019), successful product commercialisation (Heirati and O'Cass, 2016), brand innovation (Nguyen *et al*., 2015) and customer values (Martelo-Landroguez and Cegarra-Navarro, 2014). With an effort to acquire knowledge, entrepreneurial firms can enjoy distinctive new variations and combinations of knowledge for creating wealthy values with unique benefits (Atuahene-Gima *et al.*, 2005). Hence, entrepreneurial firms actively seeking new knowledge to enrich their existing knowledge repository as a part of inbound OI can build new capabilities to relish advantages over competitors that direct everything in-house while competing in the product/service markets (Chesbrough *et al.,* 2006; Hung and Chou, 2013). Therefore, the study proposes the following hypothesis:

H1*: Knowledge acquisition positively affects the dynamic marketing capability of the firms.*

Mediating role of dynamic marketing capability

The central premise of DC is firms' ability to respond efficiently and promptly to the changes in their external environments. Theoretically, firms' ability to integrate, combine and reconfigure resources and competencies to deal with environmental dynamism are key narratives of the DC (Fang and Zou, 2009; Teece *et al*., 1997). Value-generating resources and capabilities tend to become obsolete because of market changes (Nieves and Haller, 2014), and that greater volatility pushes firms to develop new DCs (Wang and Ahmed, 2007). It is evident that knowledge acquisition is critical to the development of higher-order DCs (Kaur and Mehta, 2016), which is eventually linked to firm performance (Teece, 2012).

Following this logic, DMC and firm performance relationship is well-established, too (Buccieri *et al*., 2020a; Fang and Zou, 2009). Teece *et al*. (1997) opined that resources alone could not be a direct source of a firm's competitive advantage; they must be translated into DCs to realise a competitive advantage and

enhance financial performance. Firms achieve performance success by carrying out three cross-functional processes (i.e. product development management, supply chain management, and customer relationship management) efficaciously, leading to superior DMC (Srivastava *et al*., 1999). Note that the variation happens in the DMC when rhetoricated with valuable information as knowledge (Hanssens and Pauwels, 2016). The authors argue that DMC is a functional dimension of DC that requires resources to function effectively. Through DMC, firms anticipate and respond to the external environmental change positively, prudently sense customer requirements, facilitate frequent interactions with them, and eventually increase the acceptance of the products/services offered (Mu, 2015; Teece, 2007). Following this logic, DMC originated from knowledge resources (i.e. inbound OI) that should assist firms to commercialise new products/services to meet the market demands and increase profitability and sales performance. Prior empirical studies in the entrepreneurship context also emphasise the utility of marketing capability in mediating the sources of knowledge and firm performance, such as entrepreneurial orientation as a mechanism to create new knowledge and firm performance (Jin *et al.,* 2018; Sok *et al.,* 2017) and RandD integration and business performance (Ali and Matsuno, 2018). These arguments suggest that DMC among entrepreneurial firms requires valuable knowledge to function efficaciously; in other words, DMC channels inbound OI as knowledge acquisition by entrepreneurial firms to superior firm performance. Therefore, the study proposes the following hypothesis:

> ***H2****: Dynamic marketing capability positively mediates the relationship between knowledge acquisition and firm performance.*

The mediating role of outbound open innovation

Knowledge exploitation in OI (also termed as outbound OI) refers to the willingness of the firms to co-exploit knowledge purposefully outside of the firm's boundaries. Firms do this by commercialising knowledge (i.e. mainly the excess or unused one) or co-exploit it by sharing the knowledge with a different organization or independent entity (Chesbrough and Garman, 2009; Mention, 2011). According to Xie *et al*. (2018, p.291), 'if there is no knowledge acquisition, any follow-up process will cease to exist. Thus, the

effectiveness of knowledge exploitation depends on a firm's knowledge acquisition capacity'. Successful knowledge exploitation only happens after the successful institutionalisation of knowledge acquisition (Chiaroni *et al.*, 2011). Following this line of reasoning, the authors expect knowledge exploitation to mediate the relationship between knowledge acquisition and firm performance. Because in the knowledge exploitation process, an entrepreneurial firm can only commercialise the knowledge it has developed based on the acquired knowledge from the external environment. When firms successfully accumulate intellectual assets, however, they are unsuccessful in realising that, then they are required outbound OI to exploit the unused knowledge to generate economic values (Chesbrough and Garman, 2009). In this process, entrepreneurial firms exploit their knowledge outside of their boundary and co-exploit that with external partners to facilitate valuable strategic know-how (Chesbrough *et al*., 2006; Biancone *et al*., 2019).

The prior empirical study establishes that knowledge exploitation has financial advantages (Lichtenthaler, 2008). Firms can generate perpetuate benefits (i.e. long-term) by issuing licences of their intellectual assets to other firms (Chesbrough, 2003). Regarding strategic benefits, entrepreneurs can share valuable knowledge to co-develop a market they intend to penetrate in the future. It can offer new business opportunities to be recognised and a prosperous growth continuum for entrepreneurial firms (Teece, 2012). Such action also drives entrepreneurial firms to develop unique products/services that can be commercialised to outperform potential competitors. Due to the high proactive and risk-taking attitude among entrepreneurial firms, they pose higher knowledge-sharing behaviour (De Clercq *et al.,* 2013) and have high possibilities to exploit knowledge successfully. Knowledge acquisition complements firms' existing knowledge repositories by accumulating novel ideas, information and valuable intel from the market (March, 1991); however, when unused or excess knowledge, it might require the external partnership to generate economic benefit from that unused or excess knowledge. Therefore, based on the arguments, the study hypothesises:

H3: *Knowledge exploitation positively mediates the relationship between knowledge acquisition and firm performance.*

Moderating role of dynamic marketing capability

Firm has the tendency to accumulate excess knowledge (Lecuona and Reitzig, 2014). And it is not an expectation for entrepreneurial firms (Sutter and Stough, 2009) due to their higher proclivity toward market capitalisation (Eerme and Nummela, 2019). The authors bring the second view of outbound OI where entrepreneurial firms purposely (or accidentally) accumulate excess knowledge and willingly share that with external partners to co-develop new products/services (Chesbrough, 2003). Prior studies note that successful knowledge exploitation requires marketing capability (Hoque *et al*., 2022). Following this logic, the study expects contingency effects of DMC between the outbound OI and firm performance relationship[2]. By virtue of proactiveness, the propensity to exploit knowledge among entrepreneurial firms is higher (Yli-Renko *et al.,* 2001). At a high level of outbound OI, firms will co-develop a range of new products and services (Hung and Chou, 2013), requiring firms to manifest a high level of DMC by increasing the cross-functional processes to commercialise those products/services developed from knowledge exploitation. In entrepreneurship, the central tenet of DC is that firms strategically deploy resources and utilise their ability to achieve superior competitive advantages (Teece, 2012). Therefore, firms need to develop marketing capability informed with in-depth knowledge about the customer, external conditions, and internal aspects such as advertising functions, sales teams, and management support systems (Vorhies and Morgan, 2005). Following this argument, the authors expect DMC originated from inbound OI (i.e. knowledge acquisition) to moderate the relationship between outbound OI (i.e. knowledge exploitation) and firm performance.

The mediating effects of DMC (*H2*) can lead to greater performance linearly. However, it is a complex process and may not present the reality. Outbound OI is a risky and uncertain project (Bogers *et al*., 2019a). Therefore, the need for a DC is paramount to bear on the entrepreneurial process of the firm (i.e. open innovation) (Arunachalam *et al*., 2018). Prior empirical studies such as Morgan, Vorhies, and

[2] Since the study already proposed the mediating role of outbound OI (i.e. knowledge exploitation) between knowledge accumulation and firm performance (H2), therefore, the authors eliminate the need for a baseline hypothesis between outbound OI (i.e. knowledge exploitation) and firm performance to propose the contingency hypothesis (H4).

Mason (2009) argue that firms with superior DMC deploy resources efficiently and conduct successful marketing implementations to achieve optimal market performance. In this vein, entrepreneurial firms with high DMC can leverage innovation output resulting from outbound OI more profitably than firms with poor DMC. However, because lack of cross-functional abilities regarding product development management, supply chain management, and customer relationship management shoves firms to a soft market launch with lower acceptance of new products/services, hampers firms' ability to extract value from the outbound OI outputs, eventually leading firms to a fiasco (Song and Parry, 1997). Empirical study establishes that greater customer relationships, seamless supply-chain management, and effective product positioning and targeting deliver the launchpad for successful commercialisation of the products/services (Xu *et al*., 2018), co-developed by firms as a result of outbound OI. As DMC increases, the ability of the firms to promote outbound OI outputs and position them in customers' minds improves, and the ability to channel products/services co-developed through outbound OI to its customers' increases, resulting in the successful commercialisation of outbound OI outputs. Based on these arguments, the study proposes the following hypothesis:

> ***H4:*** *Dynamic marketing capability positively moderates the relationship between knowledge exploitation and firm performance.*

3. Research methods

Research context, sample and data collection

This study is based on time-lagged survey data from Malaysian (i.e., an emerging economy) entrepreneurial firms operating in the manufacturing and service sectors. Malaysia provides an interesting setting for understanding entrepreneurial activities because of its unique economic growth trajectory as well as distinct cultural, political and social environments (Ahmad and Xavier, 2012). According to the World Bank (2022), 'As an upper middle-income country, Malaysia is both a contributor to the development of low- and middle-income countries and a beneficiary of global experience in its own journey towards high-income and developed nation status'. The growth ambition of becoming a high-income and developed

nation in the coming years makes entrepreneurial environments in Malaysia unique from other emerging countries in the region. Evidence suggests that to achieve this growth trajectory, the World Bank's Inclusive Growth and Sustainable Finance Hub in Malaysia has been supporting the Malaysian government and people to implement reforms in several areas (World Bank, 2022). For example, the key achievements over the past five years include engaging the government and the private sector in policy reforms that have: increased competition, reduced prices, increased broadband speed, established a new asset class for the world with the Green Sukuk (an Islamic green bond, introduced by Bank Negara Malaysia and the Securities Commission with the support of the World Bank Group); reduced the costs of doing business in Malaysia through advisory support, and workshops provided to the PEMUDAH special task force to responsible for facilitating entrepreneurial activities (World Bank, 2022). It is anticipated that half of the total gross domestic product (GDP) of Malaysia will originate from entrepreneurial activities by 2030 (New Strait Times, 2019), therefore, there has been strong encouragement from the government to pursue an entrepreneurial career after graduation (Hassan *et al.,* 2020).

Literature suggests that manufacturing and service sectors have been booming in driving the country's economic growth, shifting Malaysia from a low-cost exporting nation to an innovative and higher value-added products and services specialists (Hodgkinson *et al.,* 2016). These innovative actions include improving manufacturing processes, sourcing new technologies, introducing new products and services, and R&D investment (MOSTI, 2018). Moreover, these Malaysian firms are highly proactive, forward-looking, and risk-taker, therefore, posing rich entrepreneurial behaviour (Falahat *et al.,* 2018; Falahat *et al.,* 2021) and significantly pouring resources into innovation to become competitive and successful (Chong *et al.,* 2019; Mamun, 2017). The Malaysian government is also restructuring existing policies such as R&D expenditures, foreign collaboration, and trade and liberalisation laws (MASTIC, 2019) to create a knowledge-based economy by undertaking various promotional initiatives (MTE, 2020) to form an entrepreneurial ecosystem in Malaysia. Hence, the Malaysian context provides excellent suitability for investigating the research questions and understanding the performance determinants of its entrepreneurial firms for theory and policy development.

The authors selected the sample firms from MEDAC (2018) directory. To date, 28964 entrepreneurial firms have been registered with the association. Then the authors randomly selected and contacted 3000 firms through telephone to verify their existence and willingness to participate in this research. In total, 263 firms responded and agreed to participate in the study. The response rate was 8.6%. Then the authors administered the questionnaire in English to these firms to collect data on OI-related activities and DMC from the founder who played the role of the CEO. In some cases (total 29) where the founder is not holding the CEO position, the authors contacted and collected the data from the CEO. Prior studies confirm that, in Malaysia, an entrepreneur normally holds the CEO position and makes all strategic decisions (Falahat *et al*., 2018; 2021; Mostafiz *et al*., 2021). After three months, the authors contacted these firms again to collect data on firm performance from finance managers. In 68 cases, the firms did not have finance managers; therefore, in those cases, the authors collected data from the operational or general manager on firm performance. In the second round of data collection, 251 responses were collected. The authors did multiple follow-ups; however, 12 firms did not respond to the call.

This research followed Buccieri *et al.,* (2020b) to collect data from a key informant, as the method is often advised in the emerging economy context. To achieve more accuracy in the data collection, the authors contacted another key person (e.g. deputy-general manager/assistant manager) in the company to review the responses in both waves. This mechanism also helps us to control social desirability bias (Zahra and Covin, 1995). For non-response bias, the authors performed a t-test of the key variables by following Armstrong and Overton (1977), comparing the first 7% of the dataset against the last 7% of the sample in both waves. The results show no statistically significant bias among the results. Finally, during the data collection, the authors asked the respondent regarding their knowledge of the organization to assess the informant's competence on a five-point scale in both waves (Heide and Weiss, 1995). The mean value of 4.49 and 4.68, respectively, confirm that the respondents in this research are knowledgeable regarding firms' operations on OI, DMC and firm performance and provide accurate information.

Measurement

All constructs and their properties are highlighted in Table 1.

Firm performance. Boso *et al.,* (2013) and Menguc and Auh (2008) were followed to operationalise firm performance. Two sub-dimensions, profitability (three items) and sales performance (three items), were used to measure the subjective performance of the firms on a five-point Likert scale ranging from 1=very low and 5=very high. Objective performance measure has the advantage of avoiding potential issues pertinent to self-assessment. In contrast, subjective measures provide a comprehensive and substantive view of firm performance as items can be phrased to compel comparison against competitors (Cruz-González *et al*., 2014). Hence, it provides comprehensive insights into firm performance often advised in the emerging economy context (Kirca, 2011). In addition, the objective and subjective performance measures are strongly correlated with each other (Dess and Robinson Jr, 1984; Sidhu *et al.,* 2007), therefore, widely accepted in survey-based studies.

OI is a multidimensional construct consisting of inbound OI (i.e. knowledge acquisition) and outbound OI (i.e. knowledge exploitation), which are sourced from (Hung and Chou, 2013). Sample items of inbound OI are '*we often acquire valuable/unique/diverse knowledge from outside for our use*' and '*we regularly search for external ideas that may create value for us*'. Sample items of the outbound OI are '*we are proactive in managing outward knowledge flow*' and '*we welcome others to purchase and use our knowledge or intellectual property*'. These items are measured on a five-point Likert scale ranging from 1=highly disagree and 5=highly agree.

DMC is operationalised by following Xu *et al*. (2018). Three items are used to measure DMC on a five-point Likert scale ranging from 1=very low and 5=very high. Sample items are: '*ascertaining customer needs, designing tentative new product solutions and prototypes, manufacturing, and coordinating departmental relationships, with the objective of developing and producing products that enable the customers to experience maximum value and benefits*' and '*acquiring and leveraging customer information, establishing and maintaining relationships with customers and channel members, and providing after-sales*

service and support of managing relationships with customers, with the objective of learning about their needs and how to best satisfy them'.

Model controls. The authors used four variables to control other factors that may influence the results. Following Cruz-González *et al*. (2014), the study operationalised firm size and age by applying the natural logarithm. Firm size was measured based on the *number of employees,* and firm age was measured based on the years of operations. The authors also collected the data on environmental dynamism (i.e. five items) from Kreiser *et al*. (2013) and Miller and Friesen (1982), and munificence (i.e. four items) from Schultz *et al.,* (1995) and Kreiser *et al*. (2013) on five-point Likert scale ranging from 1=highly disagree and 5=highly agree. Sample items include current profitability of the industry, projected profitability (five-years or more) of the industry and projected long-term market growth rate (five-years and more). All items used in this study are previously validated constructs.

4. Analysis and results

Data characteristics and descriptive statistics

Table 2 highlights the results of correlation, mean values, standard deviation, normality and multicollinearity values. The results show that the samples are normally distributed. The VIF (variance inflated factor) values represent a minimal level of multicollinearity among constructs. The firm age ranges from two to thirteen years old; the firm size ranges from a minimum of 15 employees to 76 employees. The detailed demographics of the sample are presented in appendix 1.

[Insert Table 1 about here]

[Insert Table 2 about here]

Reliability and validity

Table 3 highlight the results of reliability and validity tests using SPSS. The Cronbach Alpha and composite reliability values are higher than 0.70, confirming internal consistency (Hair *et al*., 2010). The average variance extractor (AVE) values are higher than 0.50 for each construct, and the square root value of AVE (diagonal values in Table 1) are also higher than the corresponding correlations. In addition, the

standard loading values in Table 1 are higher than 0.70. Finally, the AVE values are higher than MSV values (Table 3). Based on these results, the study confirms that the measurements used are reliable and valid (confirm both convergent and discriminant validity) (Fornell and Larcker, 1981).

[Insert Table 3 about here]

Common method variance

This study took several measures to control the effects of common method variance (CMV) bias. First, the authors removed all barriers to phycological separation and included redundant questions into the questionnaire so that the respondents were unaware of the research goad. (Chang *et al.*, 2010). Second, the authors collected the data used in this study at two different time points. The approach also assists us in controlling the *ex-ante* threat of simultaneity bias (Guide and Ketokivi, 2015). Furthermore, the authors performed Harman's single-factor test. The percentage of the variance explained by the first component is less than 50%, accounting for 19.65%. In addition, the authors computed single latent factor analysis. The results are (x^2 = 3,620.634, df = 941, CMIN/df = 3.847, RMSEA = 0.158, CFI = 0.396) different from the four-factor confirmatory factor model (x^2 = 916.637, df = 520, CMIN/df = 1.76, RMSEA = 0.049, CFI = 0.912). Therefore, the study concludes that the effects of CMV are minimal in this study (Podsakoff *et al*., 2003).

Results of hypothesized relationships

The authors used AMOS 24 to perform the confirmatory factor analyses for model fit indices and structural equation modelling to test the hypotheses. The path relationship results are highlighted in Table 4. The model 1 shows the mediation results, and model 2 shows the moderation results. The fit indices for both measurement models satisfy the adequacy. For mediation (model 1), the study followed Hair *et al*. (2010) and performed the bootstrapping (with 5000 re-sampling) mediation analysis. The result shows that the effect of knowledge acquisition on DMC is positively significant (β=0.271, p=0.001). The effect of knowledge acquisition on knowledge exploitation is also positively significant (β=0.219, p=0.002). DMC and knowledge exploitation positively affect firm performance (β=0.208, p=0.002) and (β=0.266, p=0.001), respectively. Therefore, H1, H2, and H3 are supported. In model 2, the study identified that the moderating

effect of DMC between the relationship of knowledge exploitation and firm performance is positively significant (β=0.055, p=0.002). Therefore, H4 is also supported. Regarding the control variables, the study found that firm size and age have non-significant positive impacts on firm performance (β=0.019, p=0.548) and (β=0.011, p=0.605), respectively. And environmental dynamism has negative significant effects, and munificence has non-significant effects on firm performance, (β=-0.051, p=0.039) and (β=0.021, p=0.739), respectively.

[Insert Table 4 about here]

Robustness check

The authors performed multiple tests to check the robustness of the results. First, the authors split the sample into manufacturing (n= 148) and service (n= 106) firms and re-run both models. The robustness test has not shown any deviation from the results identified in the structural equation model on AMOS 24. Although the results of the control variables have changed; however, identified significant effects of firm age and size on performance. Second, the authors also performed multiple regression analysis using Baron and Kenny's (1986) mediation and moderation analyses on SPSS. Likewise, the multiple regression analyses also do not represent any contracted results. Finally, the authors also performed endogeneity tests, discussed in the next section.

Endogeneity analyses

The authors computed two endogeneity tests to examine the presence of endogeneity in this study. Following Yin *et al.,* (2020), the authors performed a missing variable test to reduce observation error. The study includes *innovation speed* as a new control variable, an alternative determinant of innovation to complement firm performance (Inkinen, 2016). However, the study could not identify any significant changes in the original results after introducing a new control variable. Second, using STATA, the study performed a Heckman second-stage test to examine self-selection bias (Zaefarian *et al*., 2017). Both models' Inverse Mills Ratio values were statistically non-significant (0.146 and 0.127, respectively) in all second-stage regressions. Therefore, based on the above results, this study confirms that endogeneity is not a challenge to this research.

5. Discussion of findings

As stated, this study examined OI's effect on entrepreneurial firms' performance using a sample from an emerging economy. In particular, this study examined the direct effect of knowledge acquisition on DMC and its indirect effects on entrepreneurial firms' performance via knowledge exploitation and DMC. The moderating effect of DMC on the hypothesised relationship between knowledge exploitation and performance is also considered. The findings reveal the positive interplay between inbound OI (knowledge acquisition) and DMC. The outbound OI (knowledge exploitation) in this study is found to mediate the relationship between inbound OI and firm performance. In addition, while the DMC has a mediating effect in the relationship between inbound OI and firm performance, such a capability is found to reinforce the positive relationship between outbound OI and performance.

As far as the direct and indirect effects of knowledge acquisition and exploitation are concerned, this study found that knowledge acquisition and exploitation affect performance outcomes. These findings coincide with several OI-related studies (Chandler and Lyon, 2009; Cheng and Huizingh, 2014; Friesl, 2012; Xie *et al*., 2018). For example, the performance implication of participation in knowledge acquisition activities by new entrepreneurial firms is evident in Chandler and Lyon's (2009) study. In addition, Xie *et al*. (2018) considered knowledge acquisition as an essential dimension of knowledge absorptive capacity, which in their study is shown to be a critical driver of firms' innovation performance.

The findings of this research further demonstrate that knowledge acquisition can affect both knowledge exploitation and DMC development. Previously, knowledge acquisition has been noted to influence capability development (Nielsen, 2006), knowledge exploitation and competitive advantage of entrepreneurial firms (Yli-Renko *et al*., 2001). Hilmersson *et al*. (2020) argued that capability development is an outcome of the combination of various knowledge sources, and they showed that the speed of capability development depends on knowledge acquisition strategy. Yli-Renko *et al*. (2001), in the context of high-tech entrepreneurial ventures, have shown that knowledge acquisition is positively associated with knowledge exploitation for competitive advantage through new product development, technological distinctiveness, and sales cost efficiency. In describing knowledge management activities, Nielsen (2006)

in a conceptual study, has shown how different knowledge management activities are related and result in different capability development. The findings on the direct and mediating effects of knowledge exploitation support Mostafiz *et al*.'s (2021) and Xie *et al*.'s (2018) studies, respectively. As Mostafiz *et al*. (2021) argue that effective knowledge utilisation is of great importance to the performance of Malaysian family firms, and Xie *et al*. (2018) have shown that knowledge exploitation capacity has a full mediating effect in the relationship between knowledge acquisition capacity and firm performance.

The positive interplay between DMC and performance aligns with the extant literature. For example, Buccieri *et al*. (2020a) concluded that DMC is a critical driver of new entrepreneurial firms' performance. Fang and Zou's (2009) study points toward the paramount importance of DMC in ensuring the performance and competitiveness of firms in an emerging economy. This study also hypothesized mediating effect of DMC on the knowledge acquisition-performance relationship. These findings support past research that notes that the relationship between firms' resources (owned internally and sourced externally) and firm performance is mediated by DC (Lin and Wu, 2014). As noted earlier, the KBV proposes knowledge as a critical resource of the firms. Marketing capabilities decipher the firm's marketing strategy into specific actions (Sanzo *et al*., 2012) to meet market-related needs by utilising available resources (Páez *et al*., 2022). This suggests the mediating mechanism of DMC in firms' resource repository and performance relationships. The mutually reinforcing interaction effect of DMC and knowledge acquisition also supports Easterby-Smith and Prieto's (2008) proposition.

6. Contribution, implication and conclusion

This research examines the relationships between inbound and outbound open innovation on firm performance by considering both the indirect (mediatory) and moderation effects of DMC. All hypotheses were supported and important theoretical and practical implications arise from these findings. We proceed to discuss these in turn.

Theoretical implications

The findings on the direct effect of knowledge acquisition on DMC and its indirect effects on performance via knowledge exploitation and DMC, along with DMC's moderating effect on the hypothesised relationship between knowledge exploitation and performance contribute to entrepreneurship, innovation, and marketing literature in four ways. First, this study integrates knowledge-based and DC-based explanations of entrepreneurial firms' performance. In doing so, this study provides a noble insight into the complex interplay between OI and entrepreneurial firm performance by developing and testing an integrated framework. The findings revealed that inbound OI (knowledge acquisition) affects outbound OI (knowledge exploitation) and DMC development, which in turn helps entrepreneurial firms generate superior performance. Moreover, this study established that the firm's DMC bolsters the effect of outbound OI on performance. Stemming from calls to empirically examine the antecedents to and outcome of DMC (Morgan *et al*., 2018) and to explore the differential effects of OI on firms' performance (Cheng and Shiu, 2015, Xie *et al*., 2018), this study advanced theoretical knowledge on the determinants of entrepreneurial firms' performance by empirically validating the proposed research model. Furthermore, the findings highlight the significance of taking an interdisciplinary and integrated approach to better understand the determinants of entrepreneurial firms' performance in the context of an emerging economy.

Second, given that the extant knowledge on the relationship between OI and performance remains contradictory, research has increasingly stressed the significance of examining their complex interplay (Cheng and Shiu, 2015; Xie *et al*., 2018). For example, Cheng and Shiu (2015) argued that although the research focusing on the relationship between OI activities and performance is growing, the nature and direction of their interplay are much more complex than initially thought, partly attributed to the existence of other organizational variables through which OI affects performance. Xie *et al*.'s (2018) study sheds some light on this issue. They note that the effectiveness of knowledge exploitation in affecting performance outcomes is mainly dependent on knowledge acquisition, as, without the latter, any follow-up process will cease to exist (Xie *et al*., 2018). However, it should be noted that this study differs from Xie *et al*. (2018) as it has shown the relevance of both mediating and moderated mechanisms of influence. In particular, this study contributes to and extends this stream of literature by examining and establishing a

mediating-moderated mechanism that exists in the OI-performance relationship. Moreover, the findings on the differential effects of both inbound and outbound OI support the conjectures that both OI activities are not mutually exclusive (Gassmann and Enkel, 2004) and can affect performance outcomes differently (Cheng and Shiu, 2015).

Third, the findings on the antecedent and outcome of DMC contribute to a recent stream of literature by establishing that inbound IO is an essential predictor of DMC. Based on a review of marketing capabilities, Morgan *et al*. (2018) argued that given the theoretical importance of marketing capabilities in explaining a firm's marketing role in influencing the firm performance, surprisingly, research on what generates different marketing capabilities is still relatively scant (Morgan *et al*., 2018). In a conceptual study, Nielson (2006) demonstrated a link between different knowledge management activities, including knowledge acquisition and DC development. This study provides lucid empirical support to Nielson (2006) by demonstrating that knowledge acquisition leads to DMC development. Moreover, past research suggests that theoretical knowledge on the mechanism by which marketing capabilities affect performance remains an understudied topic and thus merits research attention (Morgan *et al*., 2018). Since the relationship between DC and performance is complicated, having both a direct and indirect impact (Lin and Wu 2014; Wang and Ahmed 2007), researchers continue to call for more research on this topic to provide deeper insight into the mechanisms involved (Dahlander and Gann 2010; Cheng and Shiu 2015; Lin and Wu 2014). This research contributes to the literature by responding to these calls, and endorsing the paramount importance of inbound OI as an antecedent to DMC, which can affect performance.

Fourth, this study provides noble insight into the boundary conditions influencing the outbound OI and performance relationship. According to Easterby-Smith and Prieto (2008), as limited research has provided insights into the mutually reinforcing interaction between knowledge management and DC, there are important avenues for research on their combined effects on performance. Although both the resource-based view and DC theory have stressed the significance of complementary between a firm's knowledge-based resources and its 'know-how' deployment capabilities (Grant, 1996; cited in Morgan *et al*., 2009, p.911), the reinforcing effect of knowledge management related activities and DMC on firms' performance

remains largely unexplored (Easterby-Smith and Prieto, 2008). Recently, Hoque *et al*. (2022) argue that successful knowledge exploitation needs marketing capability (Hoque *et al*., 2022). This study extends these stream of literatures by establishing the reinforcing effect of DMC in the relationship between knowledge exploitation and firms' performance.

Finally, the knowledge stemming from this study is based on entrepreneurial firms in a Southeast Asian emerging economy i.e., Malaysia. There is a consensus among entrepreneurship scholars that the country context is vital in understanding entrepreneurial behaviour (Yin *et al*., 2020). Past research suggests that differences in institutional profiles (Busenitz *et al*., 2000), culture and social settings (Mitchell *et al*., 2002; Kreiser *et al*., 2010) cause entrepreneurial behaviour to vary across nations. Remarkably, emerging or developing countries' challenging institutional environments makes them critical for theory development (Ahmed and Brennan, 2019a, 2019b). Therefore, Cheng *et al*. (2014) call for future research to explore OI and performance-related research to be undertaken in non-Western settings; notably, they suggest incorporating samples from Asian countries. The findings of this study contributes to entrepreneurship literature on emerging economies.

Practical implications

This study informs Malaysian entrepreneurial firms on the implications of inbound and outbound OI (knowledge acquisition and exploitation), suggesting that the inbound OI (knowledge acquisition) has a critical role in fully realizing the performance benefits. They can develop DMC based on the knowledge resources within and outside of their boundaries. In particular, the findings suggest the mechanism through which entrepreneurs can develop DMC required to attain performance outcomes. DMC as a mediator and a moderator in the model relationships, suggests its paramount importance in fully realizing the performance benefits. To develop DMC, Malaysian firms must invest in developing routines for accumulating knowledge from various sources such as international conferences, business expos, and forums. As the findings also indicate a synergistic effect of DC and knowledge exploitation on firms' performance, consistent with Sandhawalia and Dalcher (2011, p.325), it can be argued that 'organizational

vision and value statements need to reflect the commitment towards a knowledge culture, and be effectively communicated throughout the entire organization'. Therefore, regarding DMC, given the limited resources in an emerging economy context such as Malaysia (Mostafiz et al., 2021), entrepreneurial firms must invest in building formal and informal relationships with internal and external stakeholders to facilitate know-how and outweigh the risk of losing markets for their products/services. Moreover, entrepreneurs must note that the beneficial role of knowledge acquisition is not only confined to DMC development, but also it helps to the accomplishment of an important entrepreneurial/managerial task, i.e., exploitation of acquired knowledge. For instance, entrepreneurs can seek valuable feedback from the distributor's network of their positioned markets in order to build a strong relationship with customers and engage them in strategic decision-making to better commercialize products/services developed from OI.

Overall, the findings assist the Malaysian entrepreneurial firms in determining which OI practices are most beneficial to firms' performance, how DMC influence the relationship between inbound OI and performance, and how DMC moderates the outbound OI and performance relationships. For example, suppose a firm wishes to internationalize through licencing or co-develop products/services (i.e. outbound OI) with potential global partners; in those cases, firms can achieve their internationalization objectives by manifesting rich marketing strategies informed by DMC in collaboration with potential stakeholders to satisfy customer demands. Similar strategies were adopted by firms in 1990s; when LEGO faced hard times regarding profitability, the company embraced the OI model to bounce back and introduce LEGO's 'Shared Vision' to co-create new products with its customers (Elmansy, 2016). The process enables LEGO to put the customer in the heart of the innovation process; therefore, it assists them in complementing the OI practices and facilitates the firm to understand their customers closely to redesign the marketing strategies efficaciously. The findings of this study and this example illustrate the importance of nurturing OI and DMC and reducing the apparent tensions in a challenging market like Malaysia.

For policymakers, transitioning from an upper-middle country status to a developed nation involves ensuring a conducive environment for entrepreneurship. A vital precondition to nurturing entrepreneurship is the existence of enabling environment facilitated by political and economic stability, market-based

incentives, and access to those resources required to grow (Ahmad and Xavier, 2012). The findings of this research inform policymakers in Malaysia on the inevitable role of knowledge-based resources in building their entrepreneurial firms' capability and ensuring their performance. The Malaysian government can offer a platform to entrepreneurs to share their experiences on the barriers to knowledge acquisition and exploitation activities. This can be done through establishing an active association and organizing workshops with the representative of entrepreneurs on a regular interval. The governmental initiatives also can include policy reformation. For example, under the National Automotive Policy 2020, the Malaysian government highly incentivizes foreign collaboration to facilitate innovation in the automotive sector (Razak, 2020), which not only engages existing firms in fostering innovation but also offers an opportunity for new entrepreneurial venturing as a result of a new collaboration. In particular, with an aspiration to become a high-income country (e.g., Hodgkinson et al., 2016) by welcoming entrepreneurial venturing (Jones et al., 2021), the Malaysian government and these firms should work together and energize the focus on innovative business models in building value-adding organizational capabilities. Firms like Proton in Malaysia's automotive industry are already embracing OI business models (Murugiah, 2022); however, the notion of OI should be applied among firms regardless of a single industry.

Limitations and future research

Although this research offers insights into the subtle effects of OI dimensions and their distinct mechanism to complement performance, the current study is not free from limitations that lead to several future research avenues. First, although past research hypothesized that both inbound and outbound OI activities would be associated with organizational capability development (see Cheng and Shiu, 2015), examining the impact of outbound OI on DMC remains beyond the scope of the current study. Second, OI can be operationalized as a unidimensional construct and be associated with the performance outcome, as evident in past research (see Cheng and Huizingh, 2014; Oltra *et al*., 2018). The combination of the respective mechanisms for knowledge inflows and outflows (known as coupled practices) is argued to improve performance because through this; the firm can efficiently accelerate internal innovation (Cheng and Huizingh, 2014; Oltra *et al*., 2018). This possibility is not considered in the current study because the

nature and purpose of each dimension and types of OI are distinct, and the underemotional operationalisation of OI suffers noise (Hung and Chou, 2013). Future research can merit additional insight and further investigate how DMC mediates the relationship between explorative and exploitative innovation and firm performance. Third, knowledge acquisition in this study is shown to result in only DMC. Knowledge is seen as a critical resource that serves as a basis for building higher-order DCs (which incorporates three DCs: adaptive, absorptive and innovative capabilities, for example, Kaur and Mehta (2016)). This provides another fruitful avenue for future researchers to explore, and can provide greater generalizability on the utility of OI in generating various types of higher-order DCs. Finally, by mentioning generalizability, the findings of the study can be applied to similar economies such as India, Indonesia, and Thailand. However, replication of the study in advanced economies requires caution and the incorporation of context sensitivities.

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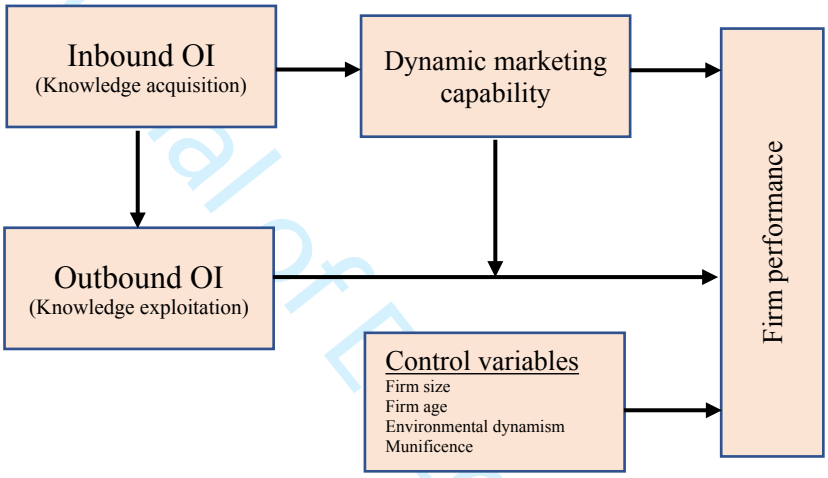

Figure 1. Conceptual framework of the determinants of entrepreneurial firms' performance

List of tables

Table 1 Constructs and standard loadings of the items

Constructs/items	Standard loadings (n=251)
Open Innovation	
Knowledge acquisition	
We often acquire valuable/unique/diverse knowledge from outside for our use	0.711
We regularly search for external ideas that may create value for us	0.734
We have a sound system to search for and acquire valuable/unique/diverse knowledge and intellectual property	0.719
We proactively reach out to external parties for valuable/unique/diverse knowledge on products/services	0.703
We tend to build greater ties with external parties and recognise their innovation	0.746
Knowledge exploitation	
We are proactive in managing outward knowledge flow	0.743
We make it a formal practice to sell/trade intellectual property in the market	0.797
We have a dedicated unit to commercialize knowledge assets (e.g., selling, cross-licensing patents, or spin-off)	0.755
We welcome others to purchase and use our knowledge or intellectual property	0.826
We seldom co-exploit our intellectual property with external organizations (R)	0.703
Dynamic Marketing Capability	
Compared with your major competitors, how do you rate your firm's capabilities in the following areas? The cross-functional process across areas of …	
ascertaining customer needs, designing tentative new product solutions and prototypes, manufacturing, and coordinating departmental relationships, with the objective of developing and producing products that enable the customers to experience maximum value and benefits.	0.713
acquiring and leveraging customer information, establishing and maintaining relationships with customers and channel members, and providing after-sales service and support of managing relationships with customers, with the objective of learning about their needs and how to best satisfy them	0.735
selecting and qualifying desired suppliers, establishing and managing inbound and outbound logistics, and designing work flows in product/solution assembly, with the objective of designing, managing, and integrating own supply chain with that of suppliers and customers	0.785
Firm performance	
Profitability	
1. Company overall profitability.	0.853
2. Company return on investment.	0.748
3. Company return on asset.	0.724
Sales performance	
1. Overall market share relative to target market objective.	0.764
2. Sales volumes relative to target market objective.	0.753
3. Sales growth relative to target market objective.	0.765

Table 2 Descriptive statistics (n=251)

Constructs	1	2	3	4
Knowledge acquisition	0.738			
Knowledge exploitation	0.225	0.711		
Dynamic marketing capability	0.224	0.369	0.757	
Firm performance	0.212	0.226	0.305	0.709
Control variables				
Firm age	0.376	0.232	0.725	0.954
Firm size	0.277	0.370	0.497	0.907
Environmental dynamism	0.636	0.458	0.471	0.628
Munificence	0.555	0.626	0.412	0.002
Mean score	22.33	21.08	13.24	26.48
Standard deviation	2.21	1.64	1.89	1.91
Skewness	1.205	1.167	1.080	1.731
Kurtosis	0.669	0.095	0.318	0.597
VIF	1.21	1.27	1.53	2.86

Note: Diagonal is the square root of the AVE.
*Correlations significant at the 0.05 level
**Correlations significant at the 0.01 level

Table 3 Reliability and validity

Constructs	Cronbach alpha	Composite reliability	AVE	MSV
Knowledge acquisition	0.711	0.727	0.544	0.279
Knowledge exploitation	0.763	0.753	0.505	0.251
Dynamic marketing capability	0.738	0.782	0.573	0.262
Firm performance	0.724	0.762	0.503	0.271

Table 4 Results of hypothesized relationships

Path relationships	Model 1			Model 2		
	Coefficient	Critical ratio	p-Value	Coefficient	Critical ratio	p-Value
Knowledge acquisition - > Dynamic marketing capability	0.271***	2.924	0.001	0.276**	2.729	0.004
Knowledge acquisition - > Knowledge exploitation	0.219**	2.685	0.002	0.221**	2.436	0.003
Dynamic marketing capability -> Firm performance	0.208**	2.819	0.002	0.209***	2.126	0.001
Knowledge exploitation -> Firm performance	0.266***	2.935	0.001	0.267**	2.338	0.005
Knowledge exploitation * Dynamic marketing capability -> Firm performance				0.055**	2.516	0.002
Model fit indices	Measurement model	Structural model		Measurement model	Structural model	
x^2	916.637	781.548		983.529	809.148	
df	520	491		510	489	
CMIN/df	1.76	1.59		1.92	1.65	
RMSEA	0.049	0.049		0.049	0.049	
CFI	0.912	0.911		0.914	0.911	
GFI	0.907	0.904		0.919	0.903	
TLI	0.911	0.902		0.907	0.901	
PClose	0.999	1.00		0.998	1.00	
SRMR	0.039	0.035		0.044	0.038	

Note: Critical ratio greater than 1.96 is significant at $^{**}p < 0.05$, $^{***}p = 0.001$

Appendices

Appendix 1

Legends	Frequency
Number of employees	
10 - 30	79
31 - 50	85
51 - 70	68
71 - 90	19
Firm age	
1- 4	31
5 - 8	107
9 - 12	102
13 - above	11
Industry	
Manufacturing	
Aero components	2
Automotive components	37
Chemicals, minerals & alloys	28
Computer components	39
Machinery & equipment	28
Pharmaceuticals	11
Services	
Business consultancy	28
Constructions	12
Engineering services	21
Financial	17
IT and software services	15
Data processing	13