Learning by exporting and innovation performance: evidence from Thai SMEs

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Abstract

This study aims to analyze the crucial mediating role of tacit knowledge acquisition from foreign markets between the effect of sub-dimensions of export activities and the innovation performance of small and medium-sized enterprises (SMEs) in Thailand. The primary purpose is to demonstrate that a Learning-by-Exporting (LBE) concept cannot always enhance SMEs' innovation performance directly, and their relationship is not always linear. Contributing to the LBE literature, the study uses the Knowledge-Based View (KBV) to emphasize a driving mechanism that explains why the LBE concept may not always lead to a firm's innovation performance directly, together with discussing current issues related to the mixed results of LBE effects on innovation performance. Involving 220 Thai Manufacturing SMEs and using structural equation model, the results indicate that tacit knowledge acquisition mediates the relationship between export intensity and process innovation, not product innovation. Besides, the study suggests that the sub-dimensions of export activities are significant factors to reconcile the inconclusive effects between export and innovation performance. Each dimension is also found to provide different significant results on the firm's tacit knowledge acquisition; for instance, while export intensity positively impacts tacit knowledge acquisition, the number of markets negatively affects it. Furthermore, whereas the results of multigroup path analysis for young and mature firms do not support the model-level, a significantly positive impact of the numbers of customers on mature firms' tacit knowledge acquisition is observed at the path-level, and the direct effect of the number of markets on young firms' product innovation is noted. The findings of this study shed new light on the LBE literature in the SMEs context by proposing a scrutiny of the ages of firms in further LBE research.

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Statement of copyright

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Chapter 1 Introduction

1.1 Introduction

Innovation is undeniably an essential tool for businesses to keep up with constantly rising competitiveness in the global market. Small and medium-sized enterprises (SMEs), in particular, need to put their effort in equipping themselves with innovation and valuable knowledge so that they can respond to increasingly unpredictable market demands in an effective manner. On the other hand, despite their attempt to obtain tacit knowledge or valuable expertise necessary for innovation development domestically, institutional voids in emerging markets have become obstacles for most of the SMEs.

Accumulating Learning-by-Exporting (LBE) literature suggests that export activities provide firms with valuable knowledge not available in their home countries (Grossman and Helpman, 1991). While evidences from the literature show that exporting promotes a firm's innovation performance (Love and Ganotakis, 2013, Salomon and Shaver, 2005, Salomon and Jin, 2010, Salomon and Jin, 2008), a report by the World Economic Forum (WEF), however, reveals that many export-led countries, especially in emerging markets, still have poor innovation performance despite the expectation that their firms will acquire more knowledge when they export. In addition, further investigation into the mixed results between export activities and innovation is needed in order to answer a question as to 'why' some firms have better innovation performance than others despite the same export activities.

Export activities are major contributors of economic growth in export-led countries. Promoting innovation in exporting SMEs will benefit such growth as this will enable the SMEs to gain better

competitiveness in the global market. However, a low level of innovation performance in export-led countries raises a key question: what is/are the missing piece(s) in the learning and innovation adoption of those exporting SMEs that prevents them from performing well regarding innovation? What is/are factor(s) contributing to firms' innovation heterogeneity that is derived from learning by exporting?

From a systematic review of LBE literature, most of the evidences have documented a direct effect of export on innovation (Love and Ganotakis, 2013, Salomon and Jin, 2008, Cassiman and Golovko, 2011, Kafouros et al., 2008). Nevertheless, an investigation of mediating mechanism remains limited in this LBE study. Few studies, for example a study by Tse et al. (2017), claim that it is too simplistic to use a direct effect between export and productivities to explain how firms learn from export. However, Tse et al. (2017) do not look at a link between export and innovation. Similar supporting evidences come from Genc et al. (2019), who, using data from SMEs in the UAE, posit that the relationship between internationalization and innovation is too complex to be explained through such a direct effect. In their study, the role of market orientation and entrepreneurial orientation is highlighted as a mediating mechanism for those links.

Given that innovation requires a new set of valuable knowledge (Carneiro, 2000, Cohen and Levinthal, 1990), the role of tacit knowledge is therefore instrumental in the value added and innovation of a firm (Grant, 1996, Nonaka and Takeuchi, 1995). Having a capability to acquire tacit knowledge will help firms overcome and cope with the difficulties arising when operating in foreign countries (e.g., institutional voids, market uncertainty, fast-changing market trends and consumer preferences). When firms face problems and then apply knowledge to solve those problems amid exposure to new environments, they are likely to develop a new set of knowledge that is needed for innovation development. However, not all exporters are able to learn equally

(Nonaka et al., 2000, Nonaka and Takeuchi, 1996) nor sense the opportunities to leverage foreign networks to acquire valuable knowledge. Hence, this study expects that tacit knowledge acquired through interactions with foreign customers and host market environments may underlie firms' innovation heterogeneity. In this connection, prior empirical evidences of LBE may fail to understand the significant role of expertise or tacit knowledge acquired from foreign markets, an area in which evidences remain limited.

To fill this LBE literature gap, the study proposes tacit knowledge acquisition (TKA) under the knowledge-based view (KBV) as a driving mechanism. Exporting enables firms to access and be exposed to essential knowledge and know-how that helps them find new ways to improve their troubleshooting process (process innovation) as well as to initiate new products (product innovation).

The first & majority objective of this study is to examine the role of tacit knowledge acquired from foreign markets as a mediating mechanism between export activities and innovation performance in the context of emerging economies.

The second objective focuses on sub-dimensions of export activities. Although there are some current LBE literature examining the relationship among export activities, such as persistence in export and export intensity (Andersson and Lööf, 2009b, Love and Máñez, 2019); export status and export intensity (Abor, 2011); export intensity and market diversification (Boehe and Jiménez, 2016), these existing LBE studies have overlooked firms' heterogeneity in learning derived from each of the different sub-dimensions of export activities. Hence, this paper can be regarded as the first study that decomposes export activities into four sub-export dimensions, namely export intensity, number of markets, number of customers and export persistence. Investigations of the effect of each sub-dimension of export activities on innovation performance through tacit

knowledge acquisition allow researchers to acknowledge that it is vital not to treat exporting as a single component. Each dimension has different aspects that affect firms' ability to acquire knowledge differently and also lead to different directions towards their innovation performance. The findings of this objective will therefore resolve the inconsistent results of LBE effects.

In this respect, the third objective is based on a lack of evidence supporting LBE in the area of export-led countries in emerging markets. A recent review of LBE researches discloses that most of them scrutinize the impact of export on innovation in the context of high-tech SMEs in developed markets. Only scant research studies look at LBE in the area of non-high-tech SMEs in export-led countries (de Oliveira et al., 2021, D'Angelo et al., 2020). Firms in export-led countries, especially those in emerging markets, are generally described as having a low level of technology and sufficient resources. After reviewing more than forty relevant LBE literature, only a few of them examine SMEs in export-led countries in emerging markets, such as studies from Taiwan and South Korea (Aw et al., 2000), Indonesia (Blalock and Gertler, 2004), Vietnam (de Oliveira et al., 2021), and Iran (Aliasghar et al., 2019). Most LBE studies investigate the learning effect under the context of Europe, particularly Spain (Monreal-Pérez et al., 2012, Salomon and Jin, 2008, Salomon and Jin, 2010, García et al., 2012, Almodovar et al., 2014, Sánchez-Marín et al., 2020). Current evidences also point out that firms being explored are in non-export-led markets and engaged in a limited number of export activities. Moreover, most of the small firms sell their products in domestic markets (Monreal-Pérez et al., 2012). Export-led countries in emerging markets are much less explored. The findings of this study, which reflects firms with high involvement in export activities, will help researchers understand the condition contexts of this under-explored area.

A significant attention has been paid to different effects of export on product and process innovation. For example, de Oliveira et al. (2021) find that export affects only process, not product, innovation. On the other hand, this study attempts to address that, for exporting firms in emerging markets, tacit knowledge acquisition is a crucial factor to enhance both product and process innovation rather than affecting only one aspect as indicated in the previous studies.

The fourth objective concerns the distinct characteristics of young and mature firms, who may have different learning patterns in their process to innovate. Whereas previous researches have examined many influential factors affecting the impact of learning by exporting, for example the influence of firm productivities (Monreal-Pérez et al., 2012), firm size (Golovko and Valentini, 2014), marketing capabilities (Ren et al., 2015), industry heterogeneity (Terjesen and Patel, 2017), institutional development (Xie and Li, 2018), level of family involvement (Sánchez-Marín et al., 2020) and technological capability (García et al., 2012), it has been found that an investigation of the LBE effect of mature and young firms through multigroup analysis is still limited. To fill this gap, the study expects that young firms with high flexibility may be more adept at innovating directly, while mature firms can take advantage of strong relationships with foreign markets and gain tacit knowledge to innovate through that channel.

In summary, this research study is worthwhile due to its several contributions to the extant literature. First, it extends an understanding of the LBE concept by highlighting tacit knowledge acquisition as a crucial mediating factor to explain innovation heterogeneity.

Second, this study resolves the inconsistence of LBE effects by addressing the sub-dimensions of export activities. The results show different directions between export intensity and the number of markets. Also, the findings reveal different aspects of different export dimensions, which matter

for innovation performance through tacit knowledge acquisition. This prompts researchers to also consider various conditions behind export activities instead of investigating only export propensity, as done in previous studies (Salomon and Jin, 2008, Bratti and Felice, 2012).

Third, while most empirical evidences focus on developed markets (Love and Ganotakis, 2013, Gkypali et al., 2015, Andersson and Lööf, 2009a), this paper provides evidences of LBE in export-led countries that belong to emerging markets. The results complement one part of an evidence from de Oliveira et al. (2021), which emphasizes that engaging in export leads to firms' process innovation, not product innovation. At the same time, this study's results illustrate that the mediating effect of tacit knowledge acquisition can help firms develop both product and process innovation.

Forth, unlike most LBE literature that uses secondary data and regression to analyse effects (Salomon and Shaver, 2005, Salomon and Jin, 2008, Salomon and Jin, 2010), this study is one of a few researches using primary data. Path analysis in SEM effectively allows an investigation of relevant latent variables so as to reflect both product and process innovation in SMEs of emerging markets, which are difficult to measure by means of the number of patents. A few LBE literature is found to use this research method to examine the relationship due to limitations of available data.

Lastly, this study also contributes to the extant literature by addressing the distinguishing moderating effects of firm age on the sub-dimensions of export activities (export intensity and number of markets) on tacit knowledge acquisition. In this regard, young and mature firms are reported to innovate differently. While young firms can leverage from export activities and are

able to innovate directly, mature firms need to innovate through tacit knowledge acquired from foreign customers.

A relevant result shows that tacit knowledge is a mechanism for export intensity and innovation performance as well as for the relationship between the number of markets and innovation performance. Significance between the number of customers and innovation performance, and the link of export persistence and innovation performance, has not been found.

In addition, this result deviates from previous studies which identify that export intensity has a non-linear relationship on process innovation, not product innovation. Even though tacit knowledge acquisition does not mediate the other two links (export persistence and tacit knowledge acquisition link; and the number of customers and tacit knowledge acquisition link), these honest, insignificant results can contribute to managerial and policy implication (Meyer et al., 2017). While previous literature posits that continuity in export supports a firm's learning (Andersson and Lööf, 2009b, Love and Máñez, 2019), an insignificant finding here provides an alternative view: export persistence may not help firms acquire tacit knowledge. The finding emphasizes that not all export activities will enhance firms' tacit knowledge acquisition. Managers and policy makers should take note of this and be careful when making a decision regarding export strategies.

However, an alternative model in which tacit knowledge acquisition is moved as a moderator between export persistence and innovation shows an interesting outcome: firms that has stopped exporting for at least one year (non- persistence in export) yields a positive impact on tacit knowledge acquisition. In addition, with high tacit knowledge acquisition, firms that experience export halt can eliminate the impact of lower process innovation. This means firms with export persistence are not likely to have process innovation. These findings constitute new evidences to

learning by exporting as they are apparently different from evidences regarding learning, which posit that firms with continuous export activities are likely to develop deep routine-based learning (Argote and Miron-Spektor, 2011). Similarly, previous evidences mention that continuous exporting is important for learning efficiency since persistence in export activities leads to a firm's accumulative learning and consequently results in productivity improvement (Andersson and Lööf, 2009a).

The remainder of this chapter is structured as follows: 1.2 describes research motivation which is extended from the introduction section; 1.3 presents research domains which mainly discusses LBE in IB and Econometrics Lane; 1.4 addresses recent literature and research gaps; 1.5 links research gaps to the objectives of this study; 1.6 highlights theoretical contributions; 1.7 outlines the conceptual model and hypotheses; and the last section provides details on how this study is structured.

1.2 Research motivation

Small and Medium Enterprises (SMEs) are nowadays seen as the backbone or lifeblood of most economies in the world due to their highly important role in economic development, innovation promotion and job creation, which consequently leads to poverty eradication and social wellbeing. For developing countries, in particular, incomes that SMEs generate through exports contribute significantly to their country's Gross domestic product (GDP), and the number of exporting SMEs constitutes a large proportion of the total number of SMEs as a whole.

There exists prior evidence that exporting is related to increased innovation performance. However, this evidence is not fully supported when considering the direct impact of exporting on innovation performance in export-led countries . The report from the Thailand National Science Technology and Innovation Policy Office shows that the percentage of Gross Expenditures on Research and Development (GERD) /GDP averages at only 0.5 per cent during 2007-2017, with the aim of 1.5 per cent of GDP in 2021. Moreover, only 24 out of 10,000 in the Thai population will be involved in the R&D sector in 2020. In addition, the Global competitiveness report from 2016- 2017 shows that Thailand is ranked 47th out of 138 countries in Innovation and sophistication factors of World Economic Forum (WEF).

Based on these facts, the primary motivation of this study focuses on why SMEs in export-led countries continue to have low innovation performance when prior evidence suggests that they should be learning more from exporting. Regarding SMEs' growth and advancement, the East Asian Miracle, referring to the rapid economic growth of eight East Asian economies -- Japan, South Korea, Taiwan, Hong Kong, Singapore, Malaysia, Indonesia and Thailand--, may help explain a stepping stone that enables manufacturers in Southeast Asia to achieve internationalization rapidly (Stiglitz, 2001). Export activities through interactions with foreign customers have been found to facilitate firms in these countries to gain new markets and technological knowledge as well as know-how beneficial in increasing their productivities, and such accumulated learning through export activities gives birth to the Learning-by-Exporting (LBE) concept (Wagner, 2007, Tse et al., 2017, Salomon and Shaver, 2005). On the other hand, a decrease in exports among emerging countries as a result of changes in production sources and the use of advanced digital technology to devalue low labour in production countries prompts SMEs to maintain and even heighten competitiveness.

Problems regarding a decrease in their export volume facing emerging countries instigate firms, especially SMEs, to realize the cruciality of innovation in a bid to sustain their businesses. Innovation requires firms' capabilities to access, integrate, and generate new ideas (Knight, 2001). Similarly, process innovation can only take place via the use of diverse and intense knowledge in developing creative solutions that help firms gain commercial benefits. However, the lack of expertise, skillful R&D, machinery and knowledge are obstacles that prevent firms in less developed countries from innovating by their own resources (Tybout, 2000, Thakur-Wernz et al., 2019). SMEs in these countries are not likely to rely on their internal knowledge to innovate (Blalock and Gertler, 2004, Katila, 2002, Abubakar et al., 2019, Rosenkopf and Nerkar, 2001). For them, acquiring knowledge from abroad could be a mechanism to drive their innovation performance, and exporting is the most feasible mean to access knowledge and information embedded in foreign countries (Salomon and Shaver, 2005, Liu and Buck, 2007, Damijan et al., 2010). Therefore, it can be stated that LBE is an important learning mechanism to foster firms' innovation (Salomon and Shaver, 2005, Love and Ganotakis, 2013).

A number of extent researches have empirically tested the relationship between exports and innovation (Salomon and Jin, 2008, Love and Ganotakis, 2013, Lööf et al., 2015, Golovko and Valentini, 2014, Bratti and Felice, 2012). However, while most exporting firms show the direct effect of the export-innovation link, not every of them learns to innovate equally.

This study hence borrows the Knowledge-Based View (KBV) theory(Grant, 1996) to explain why some exporting firms learn from exports better than others, which in turn leads them to have superior innovation performance.

The study attempts to highlight the role of tacit knowledge, which is the most valuable, yet considerably difficult to be codified and transferred, resources for firms (Grant, 1996, Nonaka and

Takeuchi, 1995). Unlike explicit knowledge, it requires more complex processes, more times, and higher costs of coordination for firms to encourage their foreign partners to share tacit knowledge through export activities. Thus, firms with capabilities to acquire tacit knowledge are likely to add value to their knowledge stocks and differentiate themselves from competitors (Grant, 1996, Fernandes et al., 2013). Profound expertise in diverse areas (e.g., marketing, technology, international practices, etc.) may also help answer the question why and how firms with similar export activities have different innovation performances.

The extent of knowledge acquisition through exports may differ following the engagement in different patterns of export activities. For example, firms that export to multiple countries may acquire different levels of skills and in-depth knowledge from those exporting to a few countries (Hitt et al., 1997, Garrido-Prada et al., 2019).

On the other hand, firms exporting to unfamiliar countries also have to deal with liabilities of foreignness (Zaheer, 1995, Eden and Miller, 2004). Even though a variety of foreign markets provide diverse knowledge sources, firms, especially small firms in emerging countries, may not have enough potentials to handle multiple networks and complex information. The level of uncertainty derived from different cultures, languages, norms, and business practices gives firms difficulties in acquiring knowledge from their export destinations (Inkpen and Beamish, 1997, Makino and Delios, 1996, Levinthal and Warglien, 1999).

In most of the previous studies, the ratio of exports to total sales is used to determine how much firms involve in export activities, i.e., export intensity(Salomon and Shaver, 2005, Love and Ganotakis, 2013, Ren et al., 2015). However, whereas several researchers scrutinize the impact of export intensity on innovation performance, the findings and results in this regard are still inconclusive. Furthermore, in LBE literature, the integration of sub-dimensions of export activities

-- export intensity, number of markets, number of customers, and export persistence – as antecedents of LBE on innovation through driving mechanisms of tacit knowledge acquisition have not been examined. Therefore, it is expected that these different sub-dimensions of export activities may exhibit different learning patterns that help explain the inconclusiveness of LBE effects on innovation performance.

The session below demonstrates each theoretical gaps in LBE areas as well as variables in the conceptual model.

1.3 Research domains

There are two main streams elaborating on the link between export and performance. One is economics literature, which suggests that firms gain benefits from exposure to new knowledge sources in international markets (Grossman & Helpman, 1991). Most current economics scholars focus on export status and a firm's productivities (Blalock & Gertler, 2004; De Loecker, 2013; Greenaway & Kneller, 2007). The underlying mechanism is derived from the economies of scale when firms expand to foreign markets. Firms learn to leverage international networks to access an important source of key information, leading to the improvement in their performance to survive in highly competitive pressure from overseas markets (Bernard, Eaton, Jensen, & Kortum, 2003).

The LBE papers in an economic domain are likely to use secondary data, which benefits them to investigate the learning effect for a certain period of time. The use of secondary data in LBE helps us to know the durations of the learning period after exporting. The effects from export activities may take time to master, especially when firms have no international experience. However, some studies show that learning occurred at the beginning of exporting and then declined. For example, Blalock and Gertler (2004) found that firms increased their productivities only in the initial period

of exporting, but the learning effect decreased in subsequent years. Therefore, the literature illustrated that the effect of LBE is not always constant over time (Martins & Yang, 2009).

Productivity is pervasively used as the indicator for investigating the learning effects of exporting. The impact of exporting on firm productivities is higher for less-develop countries than developed countries (Blalock & Gertler, 2004; Martins & Yang, 2009; Van Biesebroeck, 2005). Moreover, firms that export to more developed countries may gain more advanced technology and knowledge rather than export to less developed countries (Martins & Yang, 2009).

In contrast, productivity can induce export activities since the more productivities the firms are, the better they are able to expand their markets (Monreal-Pérez et al., 2012). Several papers attempted to examine the lack of conclusive results between the self-selection concept and LBE (Damijan & Kostevc, 2006; Golovko & Valentini, 2011). The reason why this study aims to focus on LBE, not Self-selection can be found in the next session.

Apart from the economic lane, LBE has been examined through the international business management (IB) domain, which looks into this link at a firm's level rather than from a macro perspective. The IB literature is likely to expand the scope of export behaviors from export status to export intensity (D'Angelo et al., 2020; James H Love & Ganotakis, 2013), export persistence (Andersson & Lööf, 2009b; Cruz, Newman, Rand, & Tarp, 2017), export intensity (Cos, Colom, & Cabasés, 2019).

1.4 Recent literature and research gaps

1.4.1 Missing pieces of learning by exporting (LBE) and innovation

The extent research posits that Learning by Exporting (LBE) refers to a concept indicating that firms participate in export markets and learn about new market and technological knowledge from

interactions with export intermediaries or directly from customers (Love and Ganotakis, 2013, Salomon and Jin, 2008, Salomon and Shaver, 2005, Clerides et al., 1998, Salomon and Jin, 2010, Salomon, 2006). Exposure to competitive companies or products in foreign markets also provokes exporting firms to improve their technological knowledge (Salomon, 2006). In addition, feedbacks from professionals and technical experts in their export destinations enables firms to adopt new technological knowledge that may not be accessible in their home countries (Salomon and Jin, 2010). Clerides et al. (1998) suggest that interactions with foreign buyers allow firms to obtain useful methods to improve their production processes and create new product designs. Information and knowledge exchanges among foreign markets also facilitate firms to explore competitive products and market trends as well as to share information with foreign stakeholders (Grossman and Helpman, 1991).

While the existing literature normally shows the direct effects between exports and innovation (Salomon and Jin, 2010, Salomon and Jin, 2008, Salomon and Shaver, 2005, D'Angelo et al., 2020, Love and Ganotakis, 2013), it might be too simplistic to claim that export itself will predict a firm's innovation performance. The lack of mechanism to distinguish firms with high innovation performance from those who are less likely to innovate is noted, and this issue requires further examination.

To fill this gap, this study adopts the KBV, which suggests that tacit knowledge is firms' most important resource (Grant, 1996). Firms' knowledge determines their ability and expertise to identify and integrate existing knowledge with new knowledge acquired from external resources, thus resulting in value added and then equipping them with superior performance (Kogut and Zander, 1992, Grant, 1996). Unlike tacit knowledge, explicit knowledge, such as rules and

procedures, is readily available and easily accessible to firms and also their competitors (Nonaka and Takeuchi, 1995). On this account, this study will focus on tacit knowledge only.

Being uncodified in nature and difficult to transfer, tacit knowledge becomes a valuable asset to firms (Dhanaraj et al., 2004) and might be a plausible indicator of their innovation performance. In this respect, we expect that firms that have the capabilities to obtain tacit knowledge from foreign countries are likely to have a superior innovation performance.

1.4.2 Lack of integrative review of sub-dimensions of export activities that could exhibit different learning patterns

The second limitation concerns a need to understand whether different sub-dimensions of export activities of SMEs have different impact on tacit knowledge acquisition. While most prior literature on LBE take an empirical look at export status, this study, after reviewing the prior literature, argues that different characteristics of export activities may exhibit different impact on firms' learning.

Export status has been pervasively investigated in LBE literature. A number of studies show that exporting firms enhance their innovation performance better than non-exporting firms do.(Salomon and Jin, 2008, De Loecker, 2013, Bratti and Felice, 2012, Golovko and Valentini, 2014, Damijan et al., 2010, Blalock and Gertler, 2004, Van Biesebroeck, 2005). However, there are sub-dimensions of exports that may demonstrate different learning patterns and provide different shapes of learning and different effects on innovation. Some literature opines that in the learning process, it takes time to acquire knowledge and skills that will become a process of routines for product and process development(Nelson and Winter, 1982), as well as a high level of commitment (Salomon and Shaver, 2005). Incidentally, firms need to achieve a certain level of internationalization to foster innovation (Kafouros et al., 2008).

Here below are the explanation of each sub-dimensions of export characteristics that may exhibit different leaning patterns to acquire tacit knowledge from foreign countries. First, export intensity refers to the proportion of export sales in a firm's total sales. Export firms have the different level of engagement in export markets (Baldwin and Gu, 2003). A prior research shows a positive impact of export intensity on firms' performance (Ellis et al., 2011): high export sales indicate high export activities involvement and intense interactions with foreign markets to access key information that may facilitate firms to acquire tacit knowledge and, consequently, achieve innovation. Therefore, export intensity determines firms' international capabilities: it acts as an indicator of firms' competency to learn, obtain and utilize knowledge in order to respond to market needs.

Second sub-dimension is export persistence, Export persistence refers to a firm's continuous export activities (Lööf et al., 2015, Andersson and Lööf, 2009a). In prior studies, export persistence and intensity are observed to have a contingent effect on innovation (Andersson and Lööf, 2009a), and the underlying mechanism in this regard is that consistent interactions between exporting firms and customers allow these firms to acquire sufficient skills and knowledge necessary for their innovation.

As knowledge is constantly changed and updated over time, and innovation requires up-to-date knowledge, continuous learning becomes a crucial factor affecting firm's innovation performance. Because deep, routine-based organizational learning comes from continuous process (Argote and Miron-Spektor, 2011), firms with sporadic exports are not likely to acquire and develop valuable knowledge from their export activities (Andersson and Lööf, 2009a). In order to catch up with current market trends, persistence in export activities is therefore important. In this connection, this study aims to investigate another sub-dimension of export: export persistence. On the other

hand, export persistence has different impact on learning patterns. Inconsistent interactions between exporting firms and foreign customers limit the firms' knowledge acquisition and may subsequently exacerbate their innovation performance.

Third sub-dimension of export activities is number of market; in this respect, exports enable firms to gather ideas from different markets, thus facilitating their learning and, ultimately, innovation (Hitt et al., 1997). Firms with low diversification tend to become exposed to the same set of knowledge, which leads to redundant information. The redundant information here might limit firms' enthusiasm in exploring new knowledge as well as lessening their willingness to acquire tacit knowledge (Droege and Hoobler, 2003).

Whereas exposure to different markets and cultures in foreign countries allows firms to accumulate a wide variety of ideas through their interactions with foreign partners, distributors and customers, leading to the accretion of their knowledge stocks (Kafouros et al., 2008, Hitt et al., 1997), firms have to strive to manage complex and multiple connections simultaneously (D'Angelo et al., 2020). Market expansion is usually accompanied by a high volume of information, which may exceed firms' cognitive limits and/or capacity to process information effectively (Huber, 1991). This number of foreign markets pose the challenging for SMEs in emerging countries to cope with, and may provide a contradict results from other sub-dimension of export activities on tacit knowledge acquisition.

Lastly, number of foreign customers that firms have is the factor that underexplored in LBE literature. Firms are likely to export to multiple markets but serve only one or few customers. On the other hand, they may have multiple customers in a few countries. The distinction of two scenarios is likely to make them obtain a key information differently. The way that firms have

established relationship with multiple customers and few customers seems to shape how they learn to acquire knowledge and skills, leading to their innovation development.

This study differs from current literature by illustrating different impacts of sub-dimensions of exports (export intensity, numbers of markets, persistence and number of customers) on innovation performance through tacit knowledge acquisition. Investigating various sub-dimensions of exporting on innovation might alleviate a lack of consensus in the LBE literature. As a lack of integrative review of a set of different sub-dimensions of exports might cause constraints in observing different impacts on tacit knowledge acquisition and on firms' innovation performance -- different patterns of export activities may explicitly result in different impacts --, examining the sub-dimensions of exports will therefore improve the understanding of knowledge acquisition in the area of LBE.

1.4.3 Differences between young and mature SMEs

Several previous LBE literature have examined the learning effect in many contexts, such as firms from different industries (Perri et al., 2013, Love and Ganotakis, 2013), firms with leading technology and non-technology firms (Salomon and Jin, 2008), and firms' sizes(Golovko and Valentini, 2014) However, differences in mature and young firms seem to be the area that has been overlooked.

Resources /knowledge stocks are one of key factors that distinguish young from mature firms. Based on export activities of SMEs in the past literature, it is expected that young and mature firms are different in terms of their strategic resources to pursue innovation performance. Newly-established firms are likely to face with liabilities of foreignness and liabilities of newness (Mudambi and Zahra, 2018), so they might have to accelerate themselves in building customer satisfactions by directly obtaining feedback from foreign countries .

Apart from issues pertaining to the liabilities of forgiveness, young firms with less international experiences also have problems in establishing trust with foreign customers (Baum and Silverman, 2004). As close, long-term relationship promotes knowledge exchanges and transfer, short-term relationship seems to limit young firms' capability to acquire tacit knowledge through export activities. In addition, a lack of existing knowledge stocks restrains young firms' comprehension of knowledge and information from foreign countries (Pellegrino, 2018). All the above-mentioned reasons may become obstacles for firms to acquire tacit knowledge.

While the KBV suggests that tacit knowledge is a strategic resource (Heffner and Sharif, 2008) and a source of competitive advantage(Grant, 1996, Turner and Makhija, 2006). Similarly, Senker (1995) mentions that tacit knowledge can only be transmitted through personal interactions. Several research studies also regard tacit knowledge as a critical strategy for innovation development (Senker, 1995, Seidler-de Alwis and Hartmann, 2008, Koskinen and Vanharanta, 2002, Leonard and Sensiper, 1998). As a result, firms, especially young ones, having difficulties in establishing strong connections through export activities tend to face limitation in their tacit knowledge acquisition.

Furthermore, insufficiency in existing knowledge stocks limits firms' capabilities to obtain knowledge from unfamiliar cultures or foreign markets. Under the resource-based view (RBV), which views knowledge and capabilities as intangible resources (Barney, 1995), young firms with less resources as compared to mature firms may find it difficult to acquire knowledge from foreign customers.

Even though the past empirical LBE studies examine LBE in the SMEs context (Love and Ganotakis, 2013, Love et al., 2016, Freixanet et al., 2018, Sánchez-Marín et al., 2020), the moderating role of firm ages (i.e., mature and young firms) has not been empirically addressed.

Thus, from a review of past and recent LBE literature, it is anticipated that young and mature firms exhibit different export behaviors, tacit knowledge acquisition, and innovation performance.

1.4.4 Consideration of influence of knowledge inflows from machine import on LBE literature

According to the current LBE literature, emerging countries can overcome an insufficiency in domestic knowledge by acquiring knowledge from foreign sources through such means as exporting. In relation to this, while export activities are related to outward learning, importing machine plays a crucial role in technological inflows.

Existing research shows that manufacturing SMEs in emerging markets may need to import machines to facilitate their productivity improvement (Chittoor et al., 2015) and catch up on technological knowledge to enhance their innovation performance (Wang and Tao, 2019). It is also evident in the prior literature that machine import is related to knowledge spillover and increased productivity: technology embedded in machines can serve as a channel for knowledge spillover from overseas (Coe and Helpman, 1995, Acharya and Keller, 2009). Therefore, machine import can be a crucial factor in knowledge acquisition and should be considered as an alternative knowledge source.

The term machine import has pervasively been used in diverse approaches (Zhou et al., 2020, Choquette, 2019, Wang and Tao, 2019, Fernández and Gavilanes, 2017), for example, technology licenses (Li-Ying and Wang, 2015), technology import (Wang and Tao, 2019, Chittoor et al., 2015) and importing process (Fernández and Gavilanes, 2017). Machine import is this study refers to an investment in physical machines (excluding import licenses and technology software) that facilitate a firm's potentials in productivity improvement, learning, and new product creation. As the dynamics of machine import remains a largely neglected area in the LBE literature, this study’s

integrative review of machine import's role in the effect of export activities on tacit knowledge acquisition gives several insights into the LBE literature.

First, firms that import machines with advanced technology are required to learn more in order to utilize such technology, hence acquiring technological knowledge. Supporting evidences show that importing foreign machineries allows firms to absorb foreign technology and develop new knowledge about imported products (Zhou et al., 2020). Imported machines also enhance quality upgrading, as suggested by Navaretti et al. (2004), who investigated a link between imported technology and export performance. In this study, export performance is proxied by product quality, which reflects value-added that are derived from the process of technological learning; therefore, importing machines could be considered as an alternative source of technological learning. Furthermore, prior research studies suggest that machine import benefits firms' productivity: Coe and Helpman (1995) and Acharya and Keller (2009) illustrate that machine imports are related to knowledge spillover through which firms gain new knowledge and consequently increase their productivity, which is similar to another evidence showing that importing technology or machines enhances a firm's productivity (Wang and Tao, 2019, Alvarez and López, 2005).

Second, importing machines may offer firms international experiences through interactions with foreign suppliers at a certain point. Serving as a channel for information exchanges with overseas counterparts, machine import allows firms to expose themselves to new products and processes (Filipescu et al., 2013) and stimulate the learning of new production methods and product design (Acharya and Keller, 2009),

Nevertheless, while there is no clear evidence whether machine import fosters or hampers the effect of LBE on tacit knowledge acquisition, increasing an involvement of imported machines

can hinder the crucial role of export activities in a firm's learning process. The rationale behind this is that when firms take a full advantage of imported machines' capacity, they tend to reduce their effort in learning. Whereas imported machines can enhance their productivity or innovation performance, firms may fail to acquire any tacit knowledge, achievable via a learning-by-doing process. That is to say, machine import could strengthen or weaken the effect of export activities on firms' tacit knowledge acquisition.

A lack of empirical studies to recognize machine import as having a countering effect on the relationship between a firm's export activities (export intensity and the number of markets) on tacit knowledge acquisition makes this area worth exploring. This study will therefore address this gap by investigating the impact of machine import in two scenarios: one is the effect of machine import on the relationship between export intensity and tacit knowledge acquisition, and the other concerns its impact on the relationship between the number of markets and tacit knowledge acquisition. It is speculated that if the two sub-dimensions of export activities exhibit different learning patterns, machine import is likely to affect those relationships differently. Disclosing how machine import impacts foreign knowledge acquisition might provide a worthwhile contribution to the existing knowledge stocks

1.4.5. Distinguish learning pattern of sub-dimensions of export activities on process innovation and product innovation

Even though existing literature suggests that SMEs in less-developed countries are not likely to innovate (Genc et al., 2019, Golovko and Valentini, 2011, Rosenbusch et al., 2011), some LBE evidences investigate 'how' firms enhance their innovation through participation in export

activities and ‘what’ are key factors that explain heterogenous innovation performance in terms of both product and process innovation.

The focus of this study was narrowed down under the LBE concept as well as to argue that tacit knowledge acquisition is a critical factor to answer main research questions. Besides, a small amount of LBE literature has focused on different learning effects of export on process and product innovation (Abubakar et al., 2019).

A recent study shows that an engagement in global value chain (GVC) enables firms to improve their process innovation, not product innovation (de Oliveira et al., 2021). This is because firms are obliged to maintain their production efficiency in order to retain global contracts. However, to sustain competitive advantages in the global market, firms also need to initiate not only new process but also novel products (O'dwyer et al., 2009, Rosenbusch et al., 2011). Exposure to foreign markets through exporting allows firms to develop market intelligence (Kohli and Jaworski, 1990) and establish relationships that foster their learning capabilities (Chen et al., 2009), and superior and valuable knowledge obtained through such an exposure enables them to come up with new ideas beneficial not only for process but also for product innovation. As few researches provide evidences about a mechanism that steers exporters into both product and process innovation, this study therefore aspires to substantiate that tacit knowledge acquisition is a crucial mechanism to drive both product and process innovation.

1.4.6 Lack of LBE in export-led countries in emerging markets

In this study, more than 50 papers in different condition contexts, most of which were in European countries (Salomon and Shaver, 2005, Salomon, 2006, Salomon and Jin, 2008, Salomon and Jin, 2010, Damijan and Kostevc, 2006, Crespi et al., 2008, Andersson and Lööf, 2009a, García et al.,

2012, Love and Ganotakis, 2013, Terjesen and Patel, 2017, Gkypali et al., 2015, D'Angelo et al., 2020) were reviewed. Nevertheless, only a small number of these papers provide evidences regarding the learning effects of export on innovation in SMEs (Love and Ganotakis, 2013, Golovko and Valentini, 2014). Also, there are relatively few researches that examine the learning effects of export-led markets in emerging markets conditions (Aw et al., 2000, Blalock and Gertler, 2004, de Oliveira et al., 2021).

Whereas a recent supporting evidence, using data from 63 countries, shows that firms from less developed home markets are likely to benefit from export in terms of productivities (Vendrell-Herrero et al., 2022), learning-by-exporting effects of SMEs in export-led countries in emerging market has been overlooked. Since Thailand is regarded as an emerging market and export-led country which can provide a distinct condition for LBE study, this study therefore selected Thailand to represent export-led countries in emerging markets, and data were collected from SME exporters there.

1.5 Research objectives

To address the aforementioned gaps, this study, therefore, proposes the following objectives:

1. To empirically examine the mediating mechanism of tacit knowledge acquisition in the relationship between sub-dimensions of export activities and innovation performance, and to explain how tacit knowledge acquisition can distinguish firms with innovation performance from those with no or less innovation performance;

2. To assess more closely whether the sub-dimensions of exports, apart from export status, may exhibit different impacts on tacit knowledge acquisition and innovation performance;

3.1 To empirically test the moderation effect of machine import on the relationship between export intensity and tacit knowledge acquisition;

3.2. To empirically test the moderation effect of machine import on the relationship between the number of markets and tacit knowledge acquisition; and

4. To investigate the moderation effect of firm ages on the relationship among learning effects of sub-dimensions of export on innovation performance through tacit knowledge acquisition across young and mature firms.

1.6 Theoretical contributions

Theoretical Contributions

This study aspires to make considerable contributions to the LBE and KBV literature. First, the study contributes to LBE by emphasizing that tacit knowledge acquired from foreign countries as a key knowledge resource identifies firms' innovation performance. An indirect effect of LBE and innovation provides prior LBE literature with a fruitful and more profound understanding (Salomon and Jin, 2008, Clerides et al., 1998, D'Angelo et al., 2020, Love and Ganotakis, 2013, Salomon and Shaver, 2005, Lööf et al., 2015, Andersson and Lööf, 2009a). Without tacit knowledge acquired from foreign markets, firms are not likely to have sufficient capabilities and resources to achieve superior innovation. Furthermore, tacit knowledge acquisition as a mediating mechanism answers the research question as to why exporting firms perform differently on innovation. The distinction between firms with high innovation performance and those with no or

less innovation performance varies following their expertise on market knowledge, technology knowledge, and other knowledge acquired from foreign countries.

The findings of this study advance existing LBE literature by providing empirical evidences on the effects of tacit knowledge acquisition on a link between export intensity and innovation performance as well as that between the number of markets and innovation performance. Even though the results show an insignificant impact of the other two relationships, namely mediation effects for export persistence-innovation performance and the number of markets and innovation performance, it is plausible to take note of these results and claim that in some export strategies, tacit knowledge acquisition functions as a mechanism to innovate. Also, these insignificant results provide controversial evidences for the current export persistence, which states that persistence in export activities is essential for firms' learning (Love and Máñez, 2019).

The second contribution is that this study provides an integrative explanation on the relationship between the sub-dimensions of export activities and innovation performance through tacit knowledge acquisition. Prior research studies have portrayed mixed results regarding the relationship between export activity and innovation: several studies show a positive impact (Castellani, 2002, Love and Ganotakis, 2013, Salomon and Shaver, 2005, Salomon and Jin, 2008, Salomon and Jin, 2010), yet other evidences indicate a negative impact (Monreal-Pérez et al., 2012). In addition, only a few empirical studies specify which sub-dimension of exports is a good determinant of tacit knowledge acquisition and what does the relationship between each sub-dimension and tacit knowledge acquisition look like. Concerning this issue, the study addresses an explanation of the inconclusive results by specifying each of the sub-dimensions of export activities, thus contributing to the extent LBE literature by illustrating that each different sub-dimension of export activities could exhibit firms' knowledge and learning differently.

Similarly, while prior literature shows inconclusive results on a link between exports and learning to innovate, this study provides more supportive views by elaborating that each different sub-dimension of export activities has different influence on tacit knowledge acquisition, which subsequently leads to innovation. The results related to learning effects here will extend the LBE literature as they point out that looking at export activities alone may not be sufficient when drawing a conclusion on the learning effects that are derived from exports.

In this study, the insignificant effect of export persistence on tacit knowledge acquisition is reported. This insignificant result also provides the implication for the literature in a sense that not reporting this kind of result may cause bias for the study (Meyer et al., 2017). While a recent research indicates that firms' learning abilities can be impaired when they experience continuous changes within certain activities (D'Angelo et al., 2020), this study argues that continuous engagement in export activities does not pose significant impact on tacit knowledge acquisition. This insignificant effect further contributes to the existing LBE literature by noting that tacit knowledge acquisition may work as a mediating learning mechanism to innovate for some dimensions of export activities (e.g., export intensity and number of markets) but not for others. Additionally, a study by Pisu (2008) proposes that firms' learning process takes some time to take effect: LBE effects could never occur at once. Hence, it is not conceivable to detect the exact time a firm starts and stops exporting. Similarly, Damijan and Kosteve (2005) state that the timing of entering into export activities matters as their findings show that firms in Slovenia learn to improve their productivities only during the entry year of exporting. On the contrary, Fernandes and Isgut (2005), using data from Colombian firms, indicate that firms that are poorly involved in export activities have more room for learning.

The result also reveals the negative impact of the number of markets on tacit knowledge acquisition, while there is no direct impact of the number of markets on both process and product innovation. This finding contradicts a recent paper (D'Angelo et al., 2020) suggesting that an increase in the number of export markets, not export intensity, poses a positive impact on product innovation.

Moreover, this study discovers the positive impact of export intensity on tacit knowledge acquisition, as well as a non-linear effect on process innovation, not product innovation.

The third contribution is associated with an alternative source of knowledge, hereby referring to machine import, that 1) intensify the negative relationship between the number of markets and tacit knowledge acquisition; and 2) hamper the positive impact of export intensity on tacit knowledge acquisition. This study demonstrates that machine import is one factor affecting LBE and tacit knowledge acquisition, amplifying past literature that has acknowledged the importance of imports on innovation and firm performance (Fernández and Gavilanes, 2017, Lööf and Andersson, 2010). The underlying mechanism is that firms that import advanced machineries may adapt themselves to up-to-date technology rapidly.

The fourth contribution concerns the multigroup analysis applied to investigate whether young and mature firms have similar/different learning from export activities during their pursuit of innovation. Whereas the LBE literature has examined firms' innovation performance in the context of SMEs as a whole (Love and Ganotakis, 2013, Gkypali et al., 2021), this study argues that the characteristics of mature versus young firms enable them to learn from export activities uniquely and differently. The results of the study, which demonstrate that mature and young firms deploy

different mechanisms to pursue innovation performance, will provide more insights into LBE literature.

Implications for export managers and owners

This study has essential managerial implications for exporters by prompting them to realize that export activities may not always lead to an improvement in innovation performance. To achieve innovation development, firms need to pay attention to acquiring tacit knowledge from their foreign customers. Also, they may need to commit to resource development? and more engagement in export activities to reach a certain export intensity point that can result in an improvement in their innovation process. On the other hand, exporting to multiple countries may be detrimental to firms' tacit knowledge acquisition since they cannot cope with complexity arising from diverse requirements.

A result of the contingency effect of machine import may offer alternative strategies to managers or export owners when considering to put significant investment in importing machines that match their sub-dimensions of export activities. For example, if firms have high export intensity, having imported machines may hamper them from paying attention to reaping tacit knowledge from foreign markets.

Policy implication

Innovation development in emerging economies mainly relies on government policies, which can either support or undermine the learning process of SMEs. The government may motivate SMEs to collaborate with research universities or R&D institutes, yet this may not be the most effective way for SMEs exporters to foster value creation and initiate innovation. Instead, policymakers can

encourage firms to build strong relationships with foreign customers to subsequently acquire tacit knowledge that might be instrumental in enhancing their innovation performance.

Furthermore, the results indicate that young and mature firms require different mechanisms to boost their innovation. Thus, policymakers should have a sound understanding of unique conditions of young and mature SMEs exporters in emerging economies, recognizing that they rely on different mechanisms to innovate. The findings suggest that young firms acquire tacit knowledge through their export intensity, whereas mature firms acquire tacit knowledge through the number of customers and the number of markets. In this regard, policymakers may facilitate mature firms to cultivate relationships with foreign customers by granting them certifications to showcase their government-endorsed credibility.

1.7 Research hypotheses and conceptual model

Building on these theoretical constructs and the abovementioned gaps, the session below summarizes all hypotheses examined in this study and presents the conceptual model.

First of all, this study examines how the effect of each sub-dimension of export activities (export intensity, number of markets, number of customers and export persistence) on tacit knowledge acquisition differs by reflecting a different learning pattern. In this connection, these links are proposed in *hypotheses 1, 2, 3 and 4*, respectively. Next, the study investigates the effect of tacit knowledge acquisition on both product and process innovation. Hence, *hypotheses 5 and 6* are proposed respectively.

It is apparent that an understanding of the direct effect of export on innovation in the previous LBE literature has not been extended. Past research findings mainly examine the linear relationship

between export and innovation (Love et al., 2014, Salomon and Jin, 2008, Salomon and Jin, 2010). This study therefore attempts to argue that examining the curvilinear aspect of the LBE effects on innovation may broaden the understanding in a sense that export intensity may not necessarily exhibit only a linear perspective on firms' process innovation. The level of engagement and commitment in export activities, which signals export intensity, does matter; that is, a small level of export intensity will result in diminishing process innovation until firms reach a certain level of export intensity. As a result, this study examines a non-linear U-shaped relationship between export intensity and process innovation, as proposed in *hypothesis 7.*

A theoretical relationship shows how tacit knowledge acquisition intervenes the relationship between the sub-dimensions of export activities (export intensity, number of markets, number of customers and export persistence) and innovation performance (process and product innovation). With an aim to examine tacit knowledge acquisition in terms of a crucial mechanism to explain 'how' and 'why' export leads to innovation, this study tests the mediating role of tacit knowledge acquisition in the relationship between export activities and innovation performance. In this respect, the focus is drawn on export intensity and process innovation since export intensity, in general, obviously reflects the highest level of engagement in export activities as compared with other sub-dimensions. Therefore, the study presents tacit knowledge acquisition as a mediator in *hypothesis 8.*

Next, this study divides data set into young and mature firms, using multigroup path analysis and robust with a Chow test to examine the moderating roles of firm ages. The purpose in this regard is to observe learning patterns that young versus mature firms have developed through export activities as well as impacts on their innovation performance. Understanding the similarities and differences in the relationship among the sub-dimensions of export activities, tacit knowledge

acquisition and innovation performance of firms under these two age categories will reveal the two age groups' distinctive learning mechanisms. Therefore, this study examines this aspect in *hypothesis 9.*

Besides, the moderating role of machine import in a link between the number of markets and tacit knowledge acquisition is tested. While most prior researches in LBE neglect to consider an alternative knowledge source that may facilitate a firm's learning, this study, on the contrary, regards machine import as another source of knowledge for firms and proposes that machine import intensifies the negative effect of the number of markets on tacit knowledge acquisition. Additionally, the study aspires to examine the moderating role of machine import in the relationship between export intensity and tacit knowledge acquisition. Therefore, *hypotheses 10 and 11* are proposed.

In summary, this research proposes eleven hypotheses, as demonstrated below:

H1: Export intensity has a positive effect on tacit knowledge acquisition.

H2: Number of foreign markets has a positive effect on tacit knowledge acquisition.

H3: Number of foreign customers has a positive effect on tacit knowledge acquisition.

H4: Export persistence has a positive effect on tacit knowledge acquisition.

H5: Tacit knowledge acquisition has a positive effect on process innovation.

H6: Tacit knowledge acquisition has a positive effect on product innovation.

H7: There is a non-linear relationship between export intensity and process innovation.

H8a: Tacit knowledge acquisition mediates the relationship between export intensity and product innovation

H8b: Tacit knowledge acquisition mediates the relationship between export intensity and process innovation

H8c: Tacit knowledge acquisition mediates the relationship between number of foreign markets and product innovation

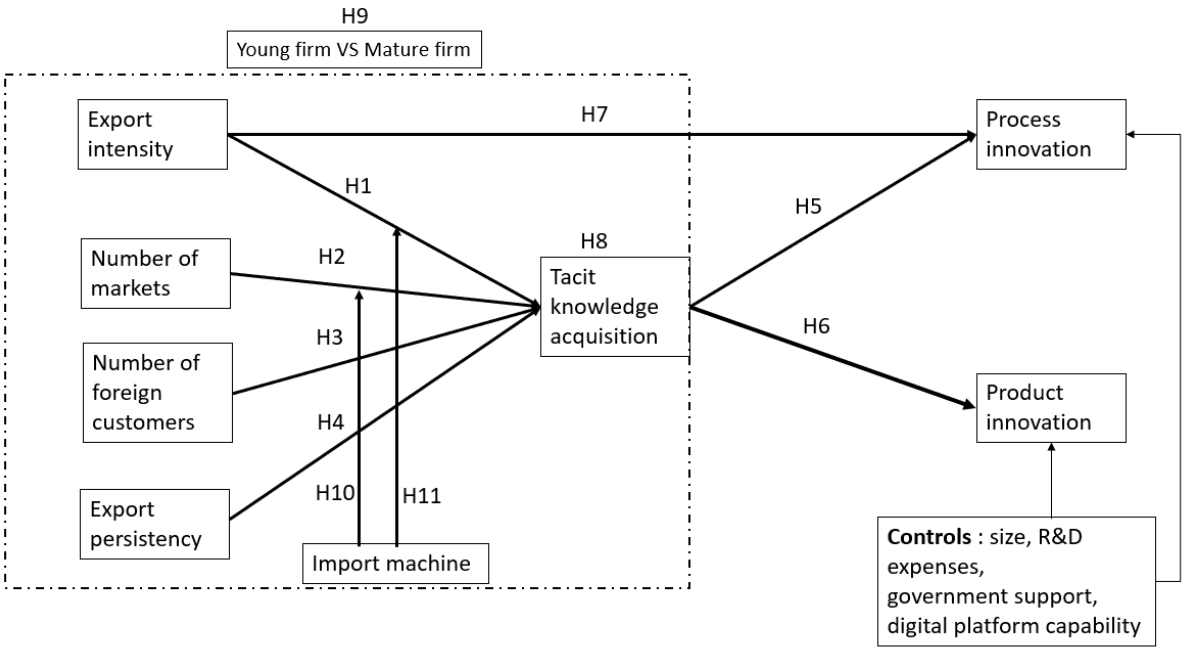
H8d: Tacit knowledge acquisition mediates the relationship between number of foreign markets and process innovation

H9: The relationships amongst export intensity, number of markets, number of customers, and tacit knowledge acquisition are different in young and mature firms. There is no mediation effect of tacit knowledge acquisition between export activities and innovation performance for young firms. In contrast, tacit knowledge acquisition is the mediator mechanism of export activities (export intensity, number of markets, number of customers) and innovation performance.

H10 Machine import intensifies the negative impact of number of markets and tacit knowledge acquisition.

H11. Machine import negatively moderates the relationship between export intensity and tacit knowledge acquisition.

Figure 1. Conceptual framework



1.8 Organization of dissertation

This dissertation is comprised of seven chapters.

Chapter One introduces the overall research motivation, research domain, current research studies as well as introducing theoretical gaps, research objectives, conceptual framework and details of each construct.

Chapter Two addresses the review of LBE literature and theories applied in this study. This chapter also demonstrates the relationship between each construct.

Chapter Three includes interdiction, research model, and the rationale for the hypothesized links, and summary. The details of the relationship between each sub-dimension of export activities and

innovation performance through tacit knowledge acquisition are explained. In addition, this study explores firm ages (mature and young firms) and machine import as moderators for the conceptual model.

Chapter Four describes research methodology illustrating the scope of the study and explaining as to why Thailand' exporting manufacturing sector is chosen as a sample to represent SMEs in emerging economies. The study shows the process of data sampling and collection, including pilot study, and how a questionnaire survey is conducted. Next, how each construct measures in this study, including how to manage non-response bias and common method bias (CMB), is described in detail.

Chapter Five is the findings of descriptive Statistics

Chapter Six addresses validity and Reliability analysis

Chapter Seven reports the results of hypotheses tests. It describes the empirical results of the 11 hypotheses purposed in Chapter Three. Here, SPSS is utilized to describe sample profiles and show a robustness test. The relationships among all constructs are analyzed through structural equation modeling (SEM) with AMOS v. 27. In addition, the additional analysis tests and results has been added.

Chapter Eight discusses the study's theoretical contributions, managerial implications to the LBE literature, and the implications for public policy makers. This chapter explains how the study findings provide significantly to the body of existing LBE theoretical knowledge.

Chapter Nine summarizes the whole dissertation, takes notes of study limitations, and proposes further recommendations.

Chapter 2. Literature review

In this chapter, we point out the reason why LBE, not self-selection to support the endogeneity issues. Then we discuss the background literature on relevant theories, LBE literature, antecedent of tacit knowledge acquisition, innovation performance, and machine import.

2.1 Introduction

This chapter scrutinizes the different aspects of Learning by Exporting (LBE) that acts as a crucial mechanism for SMEs to acquire tacit knowledge, as well as discussing the review of relevant literature, empirical studies, theories, and theoretical frameworks. Differing contexts between developed and developing countries and the links (negative, positive, U-shaped, direct and indirect links) are also examined. Furthermore, this study will point out which aspects have been overlooked from the current literature and why it is important to investigate these research studies.

LBE is regarded as a crucial learning mechanism for exporting firms to acquire tacit knowledge and, ultimately, achieve innovation. Nevertheless, while previous studies have shown the direct effect of export on innovation performance (Salomon and Jin, 2008, Love and Ganotakis, 2013, De Loecker, 2013), this study would like to argue that LBE does not always affect firms' innovation performance directly. There is a need to unveil some mediating mechanisms in order to find out as to why many exporting firms still have low innovation performance despite the fact that they have been exporting for quite a period of time.

In addition, although some studies identify multiple mediators to reveal the learning effect, their aim is to investigate a link between export and firm productivity, not innovation (Tse et al., 2017). Tse et al. (2017) emphasize that export behavior itself cannot lead to intensive productivity enhancement. Accumulated experiences and knowledge from export activities are essential ingredients that help define LBE. However, a lack of mediating mechanism to explain the relationship between export and innovation is still noted. Therefore, there might be some other mechanisms to elucidate LBE and innovation performance. This study aims that tacit knowledge acquisition that serves as a crucial driving mechanism in answering the first research question: why do some exporting firms may not innovate when others do?

Furthermore, this study would like to reflect on the recent literature through multiple sub-dimensions of export activities that support the impact of LBE, and also highlight the lack of clarification why the relationship between LBE and innovation is still uncleared. We expect that this study will answer the next research question; what are different patterns of the relationship between the sub-dimensions of exports and tacit knowledge acquisition, leading to innovation performance?

Definition of LBE

Learning by exporting (LBE) broadly refers to activities and processes in which firms acquire new technology and market knowledge through their participation in export markets (Salomon and Shaver, 2005, Love and Ganotakis, 2013). Export activities facilitate information sharing and information flow between exporting firms and foreign agents, referring to foreign customers, competitors and intermediaries from the host markets. Market and technological knowledge that does not exist in their home countries may benefit firms to improve their productivity and performance(Evenson and Westphal, 1995).

Blalock and Gertler (2004), using Indonesian firms as their case study, suggest that "firms can receive technical assistance from foreign buyers or professional services. For example, German customers send their engineers to review production processes and advise Indonesian firms to invest in machineries". In addition, engaging in export markets allows firms to establish global connections that bring to them global business practices. However, foreign knowledge and general information may not provide them with sufficient essential information or knowledge that will bring about anticipated innovation performance.

2.2 Why LBE, not self–selection?

The concept of **Self-Selection** is found to be in contradiction to that of the LBE. Unlike LBE, self-selection posits that innovation is a significant component of firms' export strategy that enables them to gain competitive advantage (Pla-Barber and Alegre, 2007, Gunday et al., 2011). Innovation serves as firms' primary strategy to expand markets in Self-selection perspective.

Notwithstanding that several studies clarify the conflict between LBE and self-selection, this study proposes to refer to LBE for many reasons. First, SMEs in emerging countries cannot rely too heavily on their insufficient resources, knowledge and domestic skills. A lack of internal resources and capabilities, such as absorptive capacity, is the main obstacle for their innovation development (Cohen and Levinthal, 1990). Firms with insufficient resources need to seek knowledge from external sources to create value-added products or initiate new process innovation. Prior evidence supports that young firms have a greater effect from LBE more than old firms (Delgado et al., 2002, Baldwin and Gu, 2003, Fernandes et al., 2013). As a result, LBE is more pertaining to this context.

Secondly, self-selection is more likely to pertain to firms in developed countries equipped with readily available valuable resources for innovation (Becker and Egger, 2013, Bernard et al., 2003)than to those in developing countries with scarce or limited resources (Blalock and Gertler, 2004, Van Biesebroeck, 2005) Past evidence, on the contrary, suggests that firms from less developed countries (LDC) have gained knowledge from export better that those from developed countries (Siba and Gebreeyesus, 2016, Van Biesebroeck, 2005). For example, Grossman and Helpman (1991) emphasize that trade openness gives developing countries an access to advanced technological knowledge that they lack through interact with foreign customers. Salomon and Jin (2008) examine the differential LBE effects across industries and find that firms in technologically lagging industries benefit from knowledge spillovers through export activities better than firms in technologically leading industries. Apparently, developed countries stand at the global technological frontier, so firms in these countries can utilize their internal resources to innovate easily. Furthermore, a study by Abubakar et al. (2019) highlight that SMEs in Sub-Saharan Africa's less developed countries (LDCs) are more inclined to respond to foreign market demands. For these reasons, firms from less developed countries tend to utilize knowledge acquired from foreign markets through export activities to achieve innovation.

The scope of this study is therefore focused on SMEs in export-led, emerging countries due to the circumstance that their resource constraints force them to exercise LBE in order to acquire sufficient knowledge through exports to boost innovation performance.

2.3 Relevant theories

Prior research studies have borrowed different theories to explain the underlying mechanism of the LBE effect. Organizational Learning Theory (OLT), for instance, has frequently been cited and

applied in several common theoretical approaches in LBE literature e.g.,(Love and Ganotakis, 2013, Ren et al., 2015).

2.3.1 Organizational Learning Theory (OLT)

Organizational Learning Theory (OLT) refers to a process in which firms learn by interacting with the environment surrounding them. Such learning will become a collective memory, which is vital for firms in sustaining their competitive advantage (Cyert and March, 1963). Similarly, questing for knowledge from foreign customers and foreign members in supply chain is recognized as part of the organizational learning process (Katila, 2002).

Entering into export markets acts as a process in which firms obtain a chance to interact with foreign customers and agents, thus providing them with valuable critical knowledge. In addition, this learning process allows firms to add new knowledge to their existing knowledge stocks and utilize new marketing and technological knowledge obtained from foreign markets, hence innovation development (Yeoh, 2004, Clerides et al., 1998, Salomon and Shaver, 2005).

Although OLT can explain how firms learn from interactions with foreign customers, it still cannot answer the question as to why some exporting firms have better innovation performance than others despite the fact that they also have interactions with foreign customers. From this perspective, the study argues that further investigation on potential mechanism contributing to different innovation performance among firms is therefore needed so as to explain this gap.

2.3.2 The Resource-Based View (RBV)

The Resource-Based View (RBV) emphasizes that, in order to make them stand out from others, firms need to possess resources that are valuable, rare, inimitable, and non-sustainable (Barney,

1991, Wernerfelt, 1984). The capabilities to acquire key knowledge can be categorized as firms' superior resources that are conducive to enhanced innovation performance.

2.3.3 Knowledge-Based View (KBV)

Knowledge-Based View (KBV) views knowledge as a valuable strategic resource that gives value to a firm and leads to competitive advantage (Kogut and Zander, 1992, Grant, 1996). Such knowledge can be categorized into two dimensions: explicit and tacit knowledge (Kogut and Zander, 1992), both of which complement each other. However, tacit knowledge is more efficient in predicting firms' innovation performance since it is complex, uncodified, and difficult to transfer (Dhanaraj et al., 2004, Tsang et al., 2004), therefore enabling firms who succeed in tacit knowledge acquisition to gain a superior performance.

With regards to the KBV, several research studies under this discipline have mentioned mechanisms to obtain knowledge, and relationship with foreign customers, intermediaries and institutions that has been established and maintained through export activities is noted as a mechanism in this regard. That is, a strong connection with foreign partners promotes knowledge spillovers, including expertise in operation, management, production, marketing and technology. As these types of knowledges pertain to tacit knowledge, not explicit knowledge, it is feasible to suggest that tacit knowledge is a mediating mechanism that helps advance a firm's heterogeneity and, consequently, innovation performance.

This study attempts to argue that tacit knowledge under the KBV deserves to be regarded as a critical mechanism to better explain the learning process under the OLT. Hence, this study aspires

to extend the current LBE literature by exploring the role of tacit knowledge as the mediating effect on learning by exporting and innovation performance.

2.3.4 Why is KBV applicable for this study?

The main research objective of this study is; why do some exporting firms have a heterogenous innovation performance when they should learn from exporting? While the organizational learning theory (OLT) becomes the main theory for explaining the LBE phenomena, as observed in many previous studies, (Love and Ganotakis, 2013, Salomon and Shaver, 2005), the KBV suggests that knowledge resources are the most crucial resources to enhance firms' competitiveness in the extensive marketplace (e.g., Arthur, 196; Nonaka & Takeuchi, 1995).

Prior literature suggests that innovation requires a set of firms' resources and learning capabilities. According to the RBV, firms need to possess valuable resources, both tangible and intangible, so as to gain competitive advantages (Barney, 1991; 1995). However, SMEs in emerging markets are found to have insufficient intangible resources (Grant, 1991), and this is a major constraint especially when they enter into new markets and have to face with liability of foreignness (Zaheer, 1995). In this connection, knowledge, which is perceived as an intangible resource, will help firms overcome the liability of foreignness and also enable them to gain competitive advantages.

Comparing to small firms, large firms can innovate through their own internal resources. Empirical evidences show that their international experience, R&D, and existing relative knowledge can enhance knowledge flow and consequently leads to innovation performance (Kotabe et al., 2007). Additionally, large firms can reap benefits from international collaboration and use them to improve their innovation quality (Fu et al., 2022). While large firms' innovation is derived from internal factors, SMEs, however, may need to rely mainly on external sources.

Searching strategy is also an antecedent for innovation development that has pervasively been examined in IB and innovation linkage (Terjesen and Patel, 2017). Existing literature illustrates that innovation is all about knowledge, and knowledge acquisition promotes product development (Cross and Baird, 2000). Similarly, evidences show that knowledge is the most important resource that can determine heterogenous performance (DeCarolis and Deeds, 1999). Taghizadeh et al. (2018), using data from Bangladesh, elaborate that knowledge from customers is tacit, and this knowledge is the most substantial factor to drive innovation. Koskinen and Vanharanta (2002) indicate that tacit knowledge plays an essential role in small technology companies' innovation processes. Therefore, it can be inferred that tacit knowledge acquired from overseas markets will drive firms' innovation performance. This study focuses on seeking knowledge from exporting under the scope of LBE, proposing that the KBV is likely to best suit this model framework, which looks into links between export and innovation in order to answer this main research question.

This study differs from other LBE literature in several aspects. **First**, while previous studies mainly explain the LBE phenomena through the OLT, this research borrows the KBV to explain a mechanism of tacit knowledge acquisition in the LBE process. In LBE literature, the KBV has not received nearly as much attention as the OLT. Prior LBE literature perceives innovation performance as the outcome of a learning process, most of which is explained through the OLT (Salomon and Shaver, 2005, Salomon and Jin, 2008, Salomon and Jin, 2010). However, since firms' heterogeneity in capabilities and resources may not have a direct impact on innovation, focusing on tacit knowledge as an 'output' instead of 'process' of knowledge acquisition may yield a better understanding of firms' innovation performance.

Tacit knowledge in this study refers to different categories of new knowledge and skills acquired from foreign customers, such as new technological knowledge, new marketing knowledge, new

managerial skills, etc. (Tsang et al., 2004). While a few LBE literature pays attention to a crucial role of tacit knowledge, this study draws a clearer picture by linking LBE with the KBV.

Second, literature reviews that integrate export, knowledge, and innovation are still limited. Most of the available literature explains a linkage of knowledge and innovation and demonstrates the main theme of antecedent, which includes knowledge sources (Aliasghar et al., 2019) and search strategies (Li et al., 2010a). A seminal work finds that exploring new knowledge from external sources required firms' internal process and absorptive capacity as this enables firms to recognize the value of novel ideas and information (Cohen and Levinthal, 1990; Zahra and George, 2002).

The antecedent of tacit knowledge acquisition has been explained mainly from relative resources. To facilitate knowledge transfer and reduce information asymmetry, firms need intense interactions, trust and strong relationships (Dhanaraj et al., 2004). Some literature also focuses on the obstacle of knowledge transfer, especially in terms of exporting mode, which poses big challenges for firms as they have to overcome cultural and institutional distances to acquire valuable knowledge embedded in the exporting markets (Zander, 1991). Besides, SMEs with liabilities of smallness tend to face great challenges in extracting knowledge under different or changing environmental contexts. However, no research or paper highlighting the role of tacit knowledge acquisition as a mediating mechanism between export and innovation performance has been found.

2.4 Relevant Learning -by-Exporting empirical reviews

Many empirical research studies have investigated whether firms learn from exporting. There are mixed evidence related to productivity and export, and the results of these studies are inconclusive

and unclear (Wagner, 2007). Whereas some studies show a positive effect of learning by exporting on productivities (Aw et al., 2000, Blalock and Gertler, 2004, Greenaway and Kneller, 2007, Damijan et al., 2010), others find no relationship between the two (Bernard et al., 2003, Clerides et al., 1998, A. Giles and Williams, 2000, Delgado et al., 2002). Still, a number of studies reveal that export and productivities actually complement each other(Golovko and Valentini, 2011).

It is postulated that the mixed results of learning effects have resulted from the sub-dimensions of export behaviors (e.g., export sales, numbers of markets, number of customers and export persistency). Thus, this study would like to hypothesize that the heterogeneity of LBE results can be explained by the sub-dimensions of export activities that exhibit different aspects.

The section below will clarify the questions on 'how' the learning process occurs through each sub-dimension of export and 'why' each sub-dimension of export offers heterogeneous results on tacit knowledge acquisition.

Sub-Dimensions of Export Activities on Tacit Knowledge Acquisition

The number of markets refers to the number of export markets that firms enter into. Prior studies pervasively term it as export diversification and regard it as one of the international market expansion strategies (Hitt et al., 1997, Kafouros et al., 2008). The underlying mechanism of the number of markets is that each market has its own institutional contexts, and the diverse cultures, norms and cognitive knowledge embedded in these contexts enable firms to acquire new market and technological knowledge they cannot find in their own country.

A firm with increasing export activities through engagements in many markets can achieve greater returns on innovation (Hitt et al., 1997, Kafouros et al., 2008). The increasing knowledge stocks acquired from new markets will be beneficial for their learning, knowledge sharing and knowledge

transfer, therefore adding value to the firms themselves (Goh, 1998, Garvin, 1993). In other words, when firms serve various customers in a greater number of markets, they are exposed to a broader variety of different sets of new knowledge (Dierkes et al., 2003).

Although entering into a greater number of markets allows firms to access diverse knowledge sources (Zahra et al., 2000, Yeoh, 2004), some firms, on the other hand, may devote their efforts to one or a few markets before entering multiple markets. This approach allows firms to gradually acquire knowledge from foreign customers at low costs (Anderson and Gatignon, 1986). Once firms develop a substantial degree of experiential knowledge, which is materialized accumulatively through the learning-by-doing process, they will expand to other markets, using their previous lessons as a guidance. Such an incremental introduction to different new markets allows firms to develop tacit knowledge, which is difficult to codify and imitate by others (Eriksson et al., 2000). The real experience of operating in one or a few markets while simultaneously accumulating knowledge and expertise may foster firms' learning process (Leonidou and Katsikeas, 1996) and, consequently, tacit knowledge acquisition.

Furthermore, exporting to a few markets allows firms to concentrate on building expertise and networks. Concentrating on a few overseas markets gives firms more time and effort to spend on existing customers, therefore enabling them to better understand foreign cultures, consumer preferences and business practices in those markets (Kogut and Zander, 1992). Thus, it appears that concentrating on a few markets also gives rise to tacit knowledge.

Conversely, exporting to a greater number of markets may primarily result in the acquisition of explicit or objective knowledge, which refers to knowledge in the form of published documents such as information through data sources, reports and market researches (Nonaka and Takeuchi, 1995, Polanyi and Sen, 2009). The rationale behind this notion is that tacit knowledge is time-

consuming, and firms exposed to many different cultural contexts may not have enough time for experiential knowledge acquisition. Therefore, firms exporting to multiple countries may acquire explicit information instead of by observing what other competitors do in each foreign country (Fletcher and Harris, 2012).

Besides, even though some evidence suggests that firms exposed to multiple market environments have greater opportunities to acquire valuable marketing know-how from customers, a rapid increase in the number of markets can create difficulties for them. For example, firms may face inefficiency problems that arise from changes in their current organizational routines in a bid to digest diverse knowledge from diverse countries at the same time as well as integrating them (Birkinshaw, 2002, Lahiri, 2010). More supporting evidence can be found in a study by D'Angelo et al. (2020) using Italian manufacturing firms, which shows that a rapid increase in the number of markets poses difficulties to firms as they need to deal with an influx of information and knowledge that exceeds their capabilities to process information effectively.

Multiple export destinations imply sophisticated customer demands and multiple transactions from different networks. These require firms' high experiences and managerial skills. In this case, young firms with less experience as compared to their mature counterparts may not be able to effectively apply knowledge to create new value-added products when they enter into multiple markets (Love et al., 2014, Rothaermel and Deeds, 2006).

Another export activity mentioned and assessed in the existing LBE literature is **export intensity.** Several previous studies have comprehensively investigated the positive effect of export intensity on learning (Chung, 1998, Hitt et al., 1997, Haahti et al., 2005). In these studies, export sales over total sales have been proxied for export intensity. The volume of export sales can determine firms' commitments to foreign customers, and export intensity also reflects the amount of time firms

spend on interacting with foreign markets, namely foreign customers, competitors, and intermediaries. This high involvement and commitment firms have towards their foreign customers brings about trust between the two sides. As a consequence, foreign customers might be willing to share their crucial information so as to help boost exporting firm's performance.

Social interactions arisen from market commitment leads to informal relationships and knowledge exchanges. Likewise, the number and volume of transactions occurred through export activities allows firms to assimilate essential market information, technical knowledge, new product designs, etc. A study by Haahti et al. (2005) that investigates the export performance of SMEs in Norway and Finland suggests that foreign interactions can increase knowledge intensity in exporting SMEs, while building domestic connections does not offer significant benefits because of their poor choice of domestic partners. Similarly, a study by Ellis et al. (2011)using data from China shows that the export intensity of transition economy firms positively relates to new product development. Firms can acquire valuable marketing knowledge to catch up with market trends and improve their current technology through export intensity.

The next sub-dimension of export activities is the **number of foreign customers**, which differs from other sub-dimensions of export activities in a sense that many customers can locate in one particular country. These multiple customers in the same country facilitate firms to sense common customer behaviors and market needs in that country in multitudes. The deep understanding of customer behaviors and markets in similar culture hence reduces the liabilities of foreignness and liability of newness. As a result, firms may obtain critical information from those markets and acquire tacit knowledge from those customers. However, if firms have multiple customers from diverse countries, institutional diversity (e.g., languages, norms, cultures, etc.) that follows suit may hamper the knowledge acquisition process.

Having a higher number of customers will help firms avoid locked-in issues as firms have more knowledge sources to explore. The diverse knowledge sources from several customers may also assist firms in acquiring tacit knowledge. However, this may be obstructed by knowledge leakage issues: customers may be reluctant to share new ideas and knowledge because they are concerned about knowledge leakage.

On another note, newly-established firms who have just had short-term involvement in the market, such as a large number of SMEs in developing countries, may not be able to obtain knowledge and crucial information from foreign customers as their mutual relationship is not long enough to gain the latter's trust. In this connection, long-established firms with a good and enduring relationship with foreign customers are more likely to obtain knowledge from their customers. However, some literature posits that a strong relationship may hinder firms from making radical changes in their market offering (Christensen and Raynor, 2003, Danneels, 2003). These opposite ideas argue that novel innovation may derive from weak relationships instead (Fredberg and Piller, 2011).

Export persistence refers to continuous export activities. The perspective of learning by exporting is that firms enter into export markets, acquire knowledge from foreign customers, and become more innovative (Liu and Buck, 2007, Hanley and Pérez, 2012, Aghion et al., 2018). Export scholars illustrate that export activities enable firms to enhance their innovation capabilities through knowledge spillovers in foreign markets ((Blalock and Gertler, 2004, Salomon and Shaver, 2005). In addition, export activities help firms to improve their manufacturing process, product design, and the quality of the products (Westphal et al., 1984, Grossman and Helpman, 1991). Similarly, Crespi et al. (2008) report that UK firms that exported in the past and used their overseas customers as an information source for innovation experience faster productivity growth.

Andersson and Lööf (2009a) also suggest that persistent Swedish exporters exhibit learning by exporting effect in their productivity gains.

Table 1. Summary of sub-dimensions of export literature

No.	Variable	References	Theory	Key findings	Types of relationship
1	Export status	Bratti and Felice, 2012; Salomon and Shaver, 2005(Spain); Aw et al., 2000(Korean and Taiwan); Salomon and Jin, 2008; 2010(Spain), Love and Ganotakis, 2013 (UK), Xie and Li, 2017(China)	OLT, Institutional based-view	Export firms learn to innovate more than non-export firms	Positve linear
2	Export diversity (no.of contries)	Yeoh, 2004(), Wu, Chen, and Jiao, 2016(China), Mudambi & Swift, 2011; Capar and Kotabe, 2003 (Germany U-shaped); Laursen and Salter, 2006 (inverted U-shape); Gomes & Ramaswamy, 1999; Hitt, Hoskisson, & Kim, 1997; Kotabe, Srinivasan, & Aulakh, 2002; Tallman & Li, 1996	RBV, TCA, Social capital theory, KBV	Divese knowledge and multiple networks from a variety of knowledge sources bring firms knowledge stocks, which are value input resources.	Mixed (non-linear: inverted U-shaped, S-curved, and linear)
3	Export sales	Gkypali et al., 2015; Love and Ganotakis, 2013; Chuang, 1998	N/A	Export sale reflects a firm potential to continuosly respond to market demands.	Positve linear
4	Export intensity (number of volume)	Tse et al., 2017;Girma, Gorg, and Henley, 2008 (UK and Ireland);Kafouros et al., 2008; Monreal-Perez et al., 2012;Hult, Ketchen, and Nichols, 2002; Lages, Jap, and Griffith, 2008;Brouthers et al., 2009.	ACAP, OLT	Firms need to reach a minimum volume of exports in order to increase innovation performance. A small portion of the output have not developed sufficient knowledge of export markets to be competitive.	Positve linear
5	Export persistence	Love and Manez, 2018; Andersson and Loof, 2009 (Sweden); Alvarez, 2004.	N/A	Permanent exporters can remain their export sales. While sporadic firms may exist from overseas markets and unable to learn much from interactions with a reduced number of foreign markets.	Positve linear
6	Export experiences (no.of years)	Crespi, Criscuolo, and Haskel, 2008(UK); Timoshenko, 2015 (Colombia); Shimizu and Hitt, 2004	Learning theory	Export experience will positively related to innovation performance to the certainpoint. However, if firms depend too much on their past success, their experience may impede explorative behaviours that limit a firm's innovation performance.	Mixed results (positive and negative linear and non-linear)

In conclusion, the aspects mentioned above of sub-dimensions of export activities may explain the inconclusive results of LBE and innovation performance.

Table 2. Summary of relevant empirical findings of LBE study

	Author	Year	Theory	IV	Mediator	Moderator	DV	Control Variables	Country	method	Sample
1	Aw, Chung, and Robert	2000		Export status	/	1. Types of industries 2. Government intervention	Productivities		Taiwan and South Korea		
2	Delgado, Fafrinas, and Ruano	2002	/	Export intensity	/	firm size; Large firm -> process innovation, SMEs -> product innovation	Productivities	/	Spain	nonparametric method	secondary
3	Van Biesebroeck's	2005	/	Export status	/	/	Productivities	firm ownership, size	Sub-Saharan Africa	GMM	secondary data (20018)
4	Charles Dhanaraj, Lyles, Steensma, and Tihanyi	2004	KBV	Relational embeddedness (Parent-IJV strength, trust, and shared systems)	explicit knowledge and tacit knowledge	young and mature IJV	IJV performance	log sales, foreign equity, brand strategy, state-owned enterprise	Hungary	Survey-SEM, multigroup analysis	137
5	Blalock and Gertler	2004	/	export status	/	export experience: one-time export (+)	Firm productivities	Age, ownership, capital, labour and wages,	Indonesia	OLS Regression	Secondary data
6	Alverez and Robertson	2004	/	1. Exporting (+) 2. FDI (+) 3. Imported intermediate input (n/s)	/	Export destination (developed countries +)	Innovation products and processes	size, age, machine investment, foreign licenses, labour costs	Chile and Mexico	Regression	Secondary

7	Salomon and Shaver	2005	/	Export volume and export status	/	/	Product innovation (product innovation counts and patent applications)	Size, R&D intensity, advertising intensity,	Spain	non-linear GMM	2188
8	Fernandes, and Isgut, 2005	2005	/	export experience	/	firm ages (-) and firms that are exporting to high-income countries (+)	Productivities	Labour quality, capital	Colombia	OLS Regression	1986
9	Damijan and Kostevec,	2006	/	Exporting firm, non-exporting firms, and OFDI (outward FDI)	/	level of foreign market competitiveness	Productivity improvement	share of the revenue from exports, the share of material costs in import, changes in relative market conditions	Slovenia	Difference-in-difference	Secondary data
10	Liu and Buck	2007	idea-driven growth theory	1. Local R&D activities of foreign MNEs 2. Level of imports of advanced technology 3. R&D activities 4.Level of export activities	/	sources of spillover	Innovation performance	Capital intensity, firms' size, expenditure on imported technology,	China	OLS and GMM	Secondary

11	Greenaway and Kneller	2007	/	Export status	/	Industrial differences	Productivities	/	UK	Regression	Secondary (12, 875 firms)
12	Salomon R and Jin,	2008	LBE	Export status	/	Industry at the home country (technology lagging industry vs technology frontier industry	Patent application	firm size, R&D intensity, advertising intensity, foreign capital participation,	Spain	a negative binomial regression	
13	Crespi, Criscuolo, and Haskel, 2008	2008	/	Export status	/	/	Labor Productivity growth	firm size, location, industry, ownership status	UK	Regression	Secondary
14	Kafouros, Buckley, Sharp, and Wang	2008	/	1. Tangible asset 2. Labor input 3. Innovation (R&D intensity)	/	Degree of internationalization (foreign sales to total sales)	Firm's performance	high- and low-tech firms, firm size, year and the industry to which each firm belongs.	UK	Regression	Secondary
15	Andersson and Loof	2009		1. Non-exporter 2. Temporary exporters (-) 3. Persistent exporters with low exp intensity (+) 4. Persistent exporters with	/	exp intensity (+) and exp persistence (+)	Productivities	Physical capital, Import activities, R&D efforts,	Sweden		

				high export intensity (++)							
16	Salomon R and Jin	2010	LBE	Export status and Export volume	/	Firm heterogeneity (Tech lag firms vs tech leading firms (+))	Patent application	firm age, group of membership, capital intensity and unit labour costs, Absorptive capacity	Spain	a negative binomial regression	2137
17	Damijan, Kostevec, and Polanec	2010	/	Export status (+ for the process)	/	/	Product and process innovation	value-added per employee, capital per employee, R&D expenditure, size	Slovenia		Secondary
18	Garcia, Avella, and Fernandez	2012		Export status(+)	/	Technological capabilities (+)	Productivities	Firm size, advertisement investments, inward FDI, industry	Spain	OLS Regression	Secondary
19	Monreal-Perez, Aragon-Sanchez A., and	2012		Export activities (ns)	/	Productivity	Innovation		Spain		14, 142

	Sanchez-Marin G.										
20	Bratti and Felice	2012	OLT	Export Status (+)	/	/	Product innovation introducing	graduate ratio, average labour cost, international mode	Italy		
21	De Loecker	2013	/	export status	/	/	Firm productivities	/	Slovenia	econometric	secondary
22	Love and Ganotakis	2013	OLT	Export intensity	/	1. Persistence in exporting 2. Manufacturing versus services 3. level of innovation intensity	Innovation product performance	Size, R&D intensity, advertising intensity,	UK	Probit and truncated regression model	secondary
23	Almodovar, Saiz-Briones, and Silverman	2014	/	1. Exporting (+) 2. FDI (+) 3. Importing (n/a)	/	no	Patent application and product innovation	firm size, R&D intensity, advertising intensity	Spain		secondary
24	Golovko and Valentini	2014	/	Export status	/	firm size; Large firm -> process innovation, SMEs -> product innovation	Product and process innovation	R&D intensity, size, foreign capital, growing market	Spain	Regression	Secondary (19, 737)

25	Wu Jie, Uw Zefu and Zhuo Shuaihe	2015	Institutional theory	Institutional quality in foreign markets and diversity of foreign markets	/	foreign markets Institutional diversity (-)	Radical and incremental innovation performance	R&D intensity, firm size, firm age, state ownership, foreign ownership	China	Regression	Secondary (1,509)
26	Fernandes, and Isgut, 2005	2015	/	Export status (+)	/	Experienced firms and born exports	Total factor productivity	/	Columbia	Regression	Secondary
27	Araujo, Selerno,	2015	/	Export status (+) Technological strategies (+)	/	/	Productivities	Firm size, Firm international patenting activities	Brazil	Regression	Secondary
28	Ren, Eisingerish, Tsai	2015	OLT	R&D capabilities (+) Export intensity (+)	/	Marketing capabilities,	Innovation performance (Patent applications)	Firm size, Firm international patenting activities	China	Regression	Secondary
29	Un Annique	2016	KBV	Subsidiaries firms and Domestic firms	/	1. Training; language, marketing, IT and engineer 2. Export level	Product innovation	The level of education of employees, R&D intensity, Size, Age, business groups, standardized products, Diversified, competition intensity, industry, year	Spain	Regression	Secondary (3,926)

30	Terjesen and Patel	2017	Attention-based view	Search Breadth (-) and Search depth (+)	No	1. Industry process heterogeneity (+) 2. Industry productivity growth (+)	Process innovation	firm age, R&D, the geographic distribution of sales, product innovation	Europe	2SLS	secondary
31	Tse, Yu, and Zhu	2017		Export intensity	1. innovativeness 2. production capabilities 3. human capital	1. Ownership structure 2. Industry characteristics	Productivities	capital stock, number of employees, age, government subsidies	China	GMM estimation	Secondary (250,000)
32	Cruz, Newman, and Rand	2017	/	Export status	/	Export persistence	Productivities	firm size, capital intensity,	Mozambique	Regression	Secondary (714)
33	Xie and Li	2018	Institutional theory	Export intensity	/	1. level of institutional development (+) 2. better-developed market intermediaries (+) 3. market openness (-)	Innovation	firm size, age, organizational slack, foreign ownership	China	GLS	Secondary
34	Aliasghar, Rose, and Chetty	2019	ACAP	External sources (Value chain partners, and University (ns))	Absorptive capacity	/	Process innovation	ages, sized, govern own (private or public), R&D staffs	Iran	Survey-Smart PLS	Survey (171)

35	Genc, Dayan, and Faruk Genc	2019	/	Degree of internationalization	Market orientation and Entrepreneurial orientation	/	Innovation	ages, sized, goods, industry	UAE	Survey-Smart PLS	Survey (235)
36	Abubakar, Hand, Smallbone, and Saridakis	2019	Institutional theory	1. Foreign tech licensing (+) 2. Import of intermediate production input (n/s) 3. Exporting (n/s)	/	/	Innovation (new product and new processes)	age, sized, R&D, inadequately educated workforce, access to financial	Sub-Sharan	Regression	Secondary (1058)
37	D'Angelo et al. (2020),	2020	OLT	1. Export status (+) 2. Export intensity (+) 3. Numbers of markets (-)	/	R&D intensity (-)and foreign (-) collaborative agreements (-)	Radical new products	Governmental supports, foreign patents, foreign technical services, foreign ownerships,	Italy	Probit model	Secondary (880)
38	Sanchez-Marin and Pemartin	2020	/	Export intensity	/	Level of family involvement in management (inverted U-shaped); the generational stage first-gen(+)	Product innovation	size, age, gross operating margin, industry	Spain	Tobit regression	Secondary (770)
39	Gkypali, Love, and Roper	2021	/	1) Export capable (+) 2) Export status (+)	/	/	Productivities	Profitability, size, age, family ownership,	UK	Regression	Secondary (12,495)

								capital investment			
40	This study	2021	OLT and KBV	1. Export intensity (+) 2. Number of markets (-) 3. Number of customers (ns) 4. Export persistence (ns)	Tacit knowledge acquisition	1. firm ages 2. Imported machine	Product innovation and process innovation	firm size, government support, industry, R&D intensity	Thailand	SEM	Survey (220)

The summary empirical findings table reveals important points that can be explored more in this study. First, the current LBE literature shows the lack of comprehensive views of sub-dimensions of export activities; most of the current LBE literature focuses on export status and export intensity. The number of customers has been overlooked. Most LBE scholars use secondary data instead of the survey. The advantage of using the survey is that it supports us to investigate other sub-dimensions of exports such as a number of foreign customers. The secondary has a limitation to provide this kind of data, especially manufacturing SMEs in emerging countries.

Second, the mediating mechanism between export and innovation is overlooked. In addition, we have not found any LBE studies that mentioned machine import as the moderators which we will examine in this study. Third, the dependent variable of the LBE effect is likely to be a firm's productivities e.g., (Delgado et al., 2002, Van Biesebroeck, 2005, Blalock and Gertler, 2004, Damijan and Kostevc, 2006, Tse et al., 2017, García et al., 2012), the number of LBE articles that focus on the impact of export on innovation performance by separating between product and process innovation is rare.

Lastly, the summary of the literature review shows the scope of the LBE study. Even though the current LBE literature uses data worldwide, prior LBE literature has mainly focused on high-tech industries and used data in developed countries (Love and Ganotakis, 2013, Salomon and Jin, 2008, Salomon and Jin, 2010). In addition, most research studies have investigated this phenomenon using data from Europe, especially from Spain e.g. (Sánchez-Marín et al., 2020, Golovko and Valentini, 2014, Almodovar et al., 2014, Salomon and Jin, 2008, Salomon and Jin, 2010), and UK (Love and Ganotakis, 2013, Crespi et al., 2008, Salomon and Shaver, 2005, Kafouros et al., 2008). However, the context of these countries differs from this study for several reasons. For example, Spain is not an export-led country; SMEs in Spain are not likely to export

and prefer to sell their products domestically. Additionally, even though China is another area in the LBE study of emerging economies(Xie and Li, 2018, Ren et al., 2015), China may not be an appropriate representation of small export-led countries in Asia due to the market sizes, resources, and institutional systems.

Few research focuses on SMEs in export-led countries. For example, Blalock and Gertler (2004) examined the impact of export on firm productivity in Indonesia. However, they have not focused on innovation performance. Similarly, Boermans (2010), using SMEs data in Africa, found that firms that export positively impact a firm's productivity. Firms that export outside Africa are more likely to become more capital incentives than those firms that export in African markets. In Addition, Aw et al. (2000), using data from Taiwan and South Korea, investigate the LBE effect on a firm's productivities, not innovation performance. Few empirical LBE studies provide evidence for the LBE of SMEs in emerging markets. In a recent study, de Oliveira et al. (2021) used data from Vietnam manufacturing and found that becoming a supplier in the global value chain will foster a firm's process innovation, not product innovation.

Similarly, the study of Aliasghar et al. (2019) shows that value chain partners are an external source for firms to increase their absorptive capacity, which results in the pursuance of process innovation in Iran. This study uses data from SMEs exporter in Thailand, which represents an export-led country with low innovation performance, and it is expected that firms should learn more from exporting. This will add a meaningful contribution to the LBE literature in terms of SMEs in export-led markets of emerging economies. We argue that involving in export activities enhances firms' innovation performance, both product and process innovation, through tacit knowledge acquisition.

2.5 Tacit knowledge acquisition as a mediating mechanism

A lack of capabilities to acquire tacit knowledge from foreign customers seems a primary threat to innovation development (Howell, 2016). Several researchers posit that the nature of tacit knowledge is that it is derived from personal experiences (Nonaka and Takeuchi, 1995, Nonaka and Takeuchi, 1996, Nonaka et al., 2000), and acquiring tacit knowledge requires a high level of close relationships and social interactions (Cavusgil et al., 2003, Zhou et al., 2007).

Rosenberg and Nathan (1982) elaborate that "tacit knowledge could be techniques, methods, and designs that work in certain ways and with certain consequences, even when one cannot explain exactly why". Even though tacit knowledge is difficult to transfer, as Polanyi (1966) posits: "We know more than we can tell", acquiring it can be feasible through internalization and socialization. This is also in accordance with Nonaka's SECI model that emphasizes a social process through participation in action learning and personal interactions (Nonaka and Takeuchi, 1995, Nonaka et al., 2000).

Furthermore, tacit knowledge is generally part of a long-term process (Senker, 1995) and needs a firm's existing knowledge and resources to obtain it. Under the KBV literature, the nature of tacit knowledge acquisition, which includes 1) the difficulties to codify and transfer it from foreign markets to exporting firms; and 2) the process through which it is transferred from foreign customers to exporting firms, makes tacit knowledge become a strategic value asset for firms. These aspects of tacit knowledge, therefore, make firms stand out from their competitors and steer them towards a superior innovation performance.

Several previous studies show that knowledge is a key to a firm's innovation (Cavusgil et al., 2003, Du Plessis, 2007, Grant, 1996, Seidler-de Alwis and Hartmann, 2008). Apart from this, Koskinen and Vanharanta (2002) indicate that tacit knowledge plays an essential role in the innovation processes of small technology companies. The underlying mechanism is that people or firms learn to solve problems from past experiences or lessons learned from previous similar problems, and they also acquire related knowledge throughout this troubleshooting process. The accumulated knowledge and know-how based on their problem-solving experiences consequently becomes their capability. Firms' existing knowledge will also promote their ability to acquire new readily available external knowledge. The depth of knowledge and know-how that firms acquire from outside resources is essential in extending and strengthening their problem-solving skills and will be beneficial to them in tackling more complicated problems. In summary, troubleshooting experiences encourage firms to develop necessary expertise that yields innovation development. However, this study by Koskinen and Vanharanta (2002) investigates only process innovation, not product innovation.

Another supporting evidence is mentioned by Howells (1996), who notes that "intuition based on tacit qualities play an important role in the innovation process, which shows that a great deal of the knowledge that is important to the operation or improvement of a given process or product technology is tacit."

López-Cabarcos et al. (2019), using data from 153 medium and large firms in the industrial sector, show the mediating role of product innovation on tacit knowledge and firm performance. Nevertheless, their study focuses on tacit knowledge available within the firms instead of tacit knowledge acquired from foreign sources. Similarly, several pieces of evidence show the role of knowledge integration on innovation performance: Wang et al. (2018) illustrate that knowledge

networks improve firms' innovation performance through knowledge integration capabilities. This is in line with a study by Guan and Liu (2016) investigating the technological field of nano-energy, which suggests that integrating knowledge and networking with other firms can lead to a firm's innovation activities. However, those researches do not focus on tacit knowledge in terms of the output of knowledge acquired from export activities.

Debates regarding the heterogeneous results of tacit knowledge on innovation performance are still ongoing. Although several research studies mostly explore the positive impact of tacit knowledge on innovation and come up with supporting evidence (Cavusgil et al., 2003, Du Plessis, 2007, Seidler-de Alwis and Hartmann, 2008), some studies show the opposite views instead.

For example, Sheng and Hartmann (2019) argue that tacit knowledge harms the innovation capability of MNCs. The rationale behind this notion is that transferring advanced tacit knowledge is difficult, expensive, and time-consuming (Gupta and Govindarajan, 2000, Szulanski, 1996). In addition, the institutional and cultural distance between exporting firms and foreign markets limits the effectiveness of communication (Ambos et al., 2016, Cummings and Kiesler, 2005, Gibson and Gibbs, 2006, Håkanson et al., 2016).

Such inefficient communication in new foreign markets may limit firms' comprehension on knowledge and complex information and also hinder their ability to build trust with customers, which is one of the key components that promote tacit knowledge sharing (Katsikeas et al., 2009, Li et al., 2010b).

Moreover, it is costly to establish relationships with foreign markets and handle uncertainties (Bindroo et al., 2012, Hilmersson and Jansson, 2012). These are the reasons why the way firms

accumulate knowledge to build their capabilities is unique and inimitable, and firms with resource constraint may be reluctant to stive to acquire tacit knowledge.

From the review presented above, it is found that the inconclusive results of tacit knowledge's impact on innovation have yet to be clarified, particularly in the LBE literature that considers tacit knowledge acquisition and innovation in terms of both product and process. Thus, there is an opportunity to investigate this unexplored area to fill the gap.

2.6 Innovation performance

Innovation is the key competitive advantage for SMEs in emerging economies, which distinguish firms from their competitors. Innovation can be defined as the knowledge which is converted into new products and new processes. In this study, the relationship between export activities and innovation has been investigated. Even though a number of studies show a positive relationship between export and innovation (e.g., Cassiman and Golovko, 2010; Kafouros et al., 2008). Few of them that investigate innovation product and innovation process separately (Golovko and Valentini, 2014, Abubakar et al., 2019, de Oliveira et al., 2021, Alvarez and Robertson, 2004).

The session reviews the characteristics of innovation performance primarily used in LBE literature and investigates which criteria is the most appropriate one for the context of emerging economies that aligns with this study. Prior study shows that Innovation has been identified in multiple dimensions. The criteria could range from the level of innovativeness, which can be classified as radical and incremental innovation.

On the one hand, SMEs in emerging countries have to deal with many barriers, such as lacking government support, restrictive local culture, inappropriate infrastructure, and insufficient resources, including financial and knowledgeable working capital(Pellegrino, 2018). Therefore,

these barriers limit the innovation of SMEs in emerging countries to pursue radical innovation (Sandberg and Aarikka-Stenroos, 2014). In addition, unlike firms in developed countries with high potential to absorb advanced knowledge to create breakthrough ideas, small firms in emerging countries tend to modify and improve gradually. Instead of focusing solely on the level of newness (incremental vs radical innovation), this study investigates innovation performance from other perspectives by dividing it into process and product innovation. SMEs innovation is more related to incremental innovation (Pullen et al., 2009).

2.6.1 Process Innovation and Product Innovation

Process innovation refers to the introduction new ways of producing products or delivering products to customers (Damanpour and Gopalakrishnan, 2001), as well as an improvement in production methods, techniques, or the use of alternative or new materials in order to increase production flexibility and capability, reduce labour costs, and lessen the use of materials and energy per produced unit (Breschi et al., 2000, Aliasghar et al., 2019, Hervas-Oliver et al., 2014).

Process innovation is more complex and required a set of tacit knowledge (Gopalakrishnan et al., 1999). Terjesen and Patel (2017) investigate that search breadth is positively related to process innovation. Exploration few knowledge sources (search depth) allows firms to develop strong relationship, leading to knowledge acquisition. However, search breadth is negatively related to process innovation since firms may not be able to focus and absorb valuable knowledge from a variety of sources. Align with the prior study showing that over-search can lead to the negative results of new product outcome (Katila, 2002).

Firms in emerging countries initially innovate from the process in production. They, especially those in non-tech and low-tech industries, are likely to relate innovation processes with production processes.

Firms in emerging countries also need to develop and maintain a breadth of internal operational routines and utilize this depth and breadth of knowledge to make a move towards process innovation (Ettlie and Reza, 1992, Gopalakrishnan et al., 1999) since process innovation takes time to develop and requires the learning by doing process (Macher and Mowery, 2003, Pisano, 1997). The evidence shows that firms in emerging markets can engage expot activities as the suppliers of global supply chain. The recent research study of de Oliveira et al. (2021) using data from Vietnamese new venture firms provide evidence that involving in exporting activities as international suppliers in to global value chain can enhance their process innovation, but not product innovation. In addition, the study suggested that export destination matters to the effect of export on innovation performance. Firms that export to developed countries are likely to have positive impact on process innovation, but not product. While exporting to emerging markets are not likely to impact on a firm' s product and process innovation.

Firms are likely to learn from customer feedback to enhance the quality of their products and production process. They may obtain new methods by finding substitute materials, deploying machines that improve production efficiency and product quality (Terziovski and Guerrero-Cusumano, 2009), implementing cost reduction measures (Bernstein and Kök, 2009), increasing process flexibility by adapting new technology and machinery in the production process (Reichstein and Salter, 2006), and heightening responsiveness (Craighead et al., 2009). By revamping their production processes, firms, therefore, achieve process innovation and ultimately sustain their competitive advantages (Gopalakrishnan et al., 1999).

Prior studies emphasize that to acquire process innovation, a more complex process is required to compile tacit knowledge embedded in firms' knowledge base (Gopalakrishnan et al., 1999). Getting process innovation also involves a considerable amount of time, the learning by doing

process (Pisano, 1997) and firms' ability to extract knowledge from their internal operation routines and use it to improve their production processes (Ettlie and Reza, 1992, Gopalakrishnan et al., 1999).

Product innovation

Most current LBE research studies focus on product innovation in SMEs (Bratti and Felice, 2012, Sánchez-Marín et al., 2020, Love and Ganotakis, 2013). Prior LBE research pervasively used the number of patents and the number of new product innovations to measure product innovation performance (Salomon and Jin, 2010, Salomon and Jin, 2008, Salomon and Shaver, 2005). However, the measurement related to patents may not fully represent the overall innovation performance of SMEs in this context since those SMEs are not likely to develop their own R&D and lack knowledge resources to apply and maintain the patent.

Furthermore, prior scholar uses sales of a new product a commercialized innovative capacity, and reflect market acceptance (Atuahene-Gima and Li, 2004). However, we found that owners and managers of local cultures, particularly emerging markets, treat sales data as confidential data.

Product innovation in this study refers to the introduction of new or significant improvements to existing products, which involves improvements or changes in the shape, size, texture and design of a product and the addition of value and uniqueness to it.

Based on the extant innovation in LBE studies can be classified into different categories. The first dimension of innovation is related to new product ideas generation, such as product design, processes, and product quality. This dimension also concerns with the level of novelty of the firm's new product.

Furthermore, innovation is also related to adopting technology that facilitates a firm's productivities, including increase the speed of new product development, given that the interactions between exporters and foreign customers allow the exchange of technology and market knowledge. The extant LBE literature pervasively examines the effect of export on innovation in terms of technological aspects. For example, a previous study using Indonesian textile firms showing that new product designs have been launched by adopting advanced technological knowledge from foreign customers (Blalock and Gertler, 2004).

Furthermore, Golovko and Valentini (2011), using the data of SMEs from Spain, emphasize technology knowledge, which produces novel products. Similarly, Liu and Buck (2007), using data from Chinese high-tech industries, show that LBE is one of the other factors for technological knowledge spillover. In addition, Salomon and Shaver (2005) posit that R&D investments are the innovative input fostering technological innovation and reflecting knowledge spillover and learning effects (Damijan and Kostevc, 2006, De Loecker, 2013).

2.6.2 Innovation Performance of SMEs in Thailand

The extant LBE literature suggests the scope of innovation performance which can be applied in the context of this study; each country has a unique pattern to innovate. For example, Alvarez Alvarez and Robertson (2004), using the data from Chile and Mexico, suggest that exposure to foreign markets improves a firm's innovation, both product and process innovation. The result shows that firms in Chile are more likely to innovate from their R&D onsite, while firms in Mexico are more likely to import technology.

It has been found that innovation in SMEs differs from that in large firms because these small firms have more flexibilities and customization, which are achievable through knowledge-based resources, internal capabilities, and networks(Baldwin and Gellatly, 2003). Unlike large firms, SMEs need unique, dynamic capabilities to sustain their businesses (Sapienza et al., 2006).

Several comprehensive studies disclose that SMEs seek to explore sources of innovation. For example, March and Simon (1958)posit that most SMEs learn through borrowing know-how from others rather than initiating new products on their own. Because of they do not have sufficient capabilities and knowledge to generate innovation development (Zahra and Filatotchev, 2004), together with usually having financial and human resource constraints that bar them from doing so (Verhees et al., 2004, Liao et al., 2009).

A firm's internal capabilities that contribute to the way they innovate vary due to many factors. One of the crucial factors is their absorptive capacity, which is mostly proxied by R&D capabilities. However, SMEs may not be able to establish their own R&D: only long-established firms or mature firms with experience are likely to develop R&D capabilities to initiate product innovation. Unlike mature firms, young firms still need to rely heavily on external knowledge sources, such as foreign customers, government support, or foreign suppliers whose knowledge is transferred when firms import their machines.

Therefore, in line with the LBE mentioned earlier, firms may need to explore new knowledge from external sources when attempting to enhance their existing knowledge stocks.

2.7 Machine import

This section explores the role of machine import in moderating the relationship between export intensity and tacit knowledge acquisition, and that between the number of markets and tacit knowledge acquisition. Whereas the machine itself may not directly influence firms' tacit knowledge acquisition, it could facilitate or hamper their knowledge acquisition from export activities.

Learning by importing is an area that has extensively been investigated in international business. Extended RBV research indicates that learning by importing can influence how firms acquire international knowledge from foreign suppliers. For example, firms use importing as an external knowledge source along the supply chain as this enables them to share knowledge and engage in information regularly (Lasagni, 2012). Under the RBV, firms' import activities are regarded as capabilities-based resources that are likely to influence their knowledge acquisition.

Extent studies define import sourcing as "the acquisition of raw materials, components and subassemblies from international sources for use in fabrication" (Kotabe and Omura, 1989). However, this study will narrow down the scope to machine import, which refers to an investment in advanced physical machines that will facilitate firms to improve their productivity or launch a new product. Technology software and technology licenses are excluded from this investigation. After reviewing the literature, *it is found that there is a lack of studies to recognize machine import as countering the effects of export activities on knowledge acquisition.*

This study contends that machine import may support or hamper firms' knowledge acquisition from foreign markets in two aspects. The first aspect is that it is the process of import itself that gives firms the opportunities to develop international and technological knowledge (Wang and

Tao, 2019), and the other aspect is that the machine that firms import promotes their productivities (Amiti and Konings, 2007, Lööf and Andersson, 2010, Kasahara and Rodrigue, 2008, Paul and Yasar, 2009, Topalova and Khandelwal, 2011, Halpern et al., 2015). As a consequence, machine import enables firms to explore new methods to increase productivity in manufacturing (Bas and Strauss-Kahn, 2014). Also, experiences gained from import help firms reduce export market entry costs incurred as it increases their familiarity with a particular foreign market (Bas and Strauss-Kahn, 2014, Choquette and Meinen, 2015). Furthermore, these experiences can help firms identify and evaluate business opportunities because, before entering into these markets, firms are better at evaluating the fit between their capabilities/resources and the foreign market environment. As a result, the liability of foreignness in the new market and firms' uncertainty will be reduced when they determine whether to enter into a new export market.

Previous researches examine the relationship between import and innovation (Chittoor et al., 2015). Past research studies mention a positive impact of learning by importing on Chinese manufacturers' productivity: importing foreign machinery and technology plays a vital role in allowing firms to absorb foreign technology and develop new knowledge related to imported products (Zhou, Wang, and Yang, 2020). Similarly, a study by Stirbat et al. (2015) and Welch and Luostarinen (1993) posits that experiences from importing lead firms to develop the capabilities to understand business practices and deal with foreign environments more effectively.

Encountering foreign markets through import facilitates firms to develop market knowledge and network connections (Welch and Luostarinen, 1993). Also, machine import gives firms alternative knowledge sources and access to advanced technology from foreign countries. Choquette (2019) explains that import-based market experience is a significant source of market-specific knowledge before firms decide to export. Thus, firms with import experiences are not likely to exit from export

markets. It is also indicated that different types of international experience (import and export) trigger different outcomes.

Furthermore, import allows firms to become familiar with foreign markets in a more effective way. Therefore, firms investing in machine import are likely to acquire a higher level of tacit knowledge from their export intensity than those with no investment in technology.

Apart from the benefit of allowing firms to become familiar with the foreign market environment, several researchers view import as the alternative knowledge sourcing strategy. Knowledge has been exchanged and transferred through interactions. It is thus expected that firms who work with export customers can acquire knowledge through their interactions, and firms working closely with suppliers through import activities can also obtain new international insights. Import activities provide firms with an international network, and foreign suppliers, who are parts of the international network, can accommodate them to learn new technological knowledge through constant interactions. For example, suppliers in foreign countries may send their engineers to train how to utilize imported machines more effectively. Hence, knowledge exchanges occur through the training process.

However, imports can pose a danger to the learning process as well. In distinguishing between assimilative and cumulative learning, Wang and Tao (2019) view importing technology as assimilative learning (or learning by buying) that may result in firms' reluctance to acquire tacit knowledge from export customers if machines perform well in increasing their productivities. A shortcut solution resulting from the machines' efficiency can then hinder firms' time-consuming learning process, such as trial-and-errors.

Furthermore, machine import is likely to be a one-time process, as compared to export activities. The negative effect of machine import in this connection can be explained by learning myopia (Levinthal and March, 1993), referring to a circumstance when firms are likely to ignore time-consuming tacit knowledge acquisition. That is, firms may learn to utilize imported machines and initially benefit from them in the short-term, and then they tend to become accustomed to what the machines can do, thus neglecting to look for new ways to improve productivity further.

On the other hand, the main reason for firms' reluctance to acquire new knowledge from foreign countries is that they have resource constraints and need to focus on output in terms of profitability rather than on such an intangible asset as knowledge. The imported machines may eliminate this constraint and encourage firms to focus on exploring new ideas from foreign customers as well as exploring global market demands. In this case, machine import will strengthen firms' learning from exporting rather than weakening it.

Discussion

An incomplete understanding of the role of machine import on firms' tacit knowledge acquisition allows for further examination by integrating machine import with the LBE concept. Therefore, this study complements the existing LBE literature by answering the question: what effect does machine import have on each sub-dimension of export activities and tacit knowledge acquisition from foreign markets?

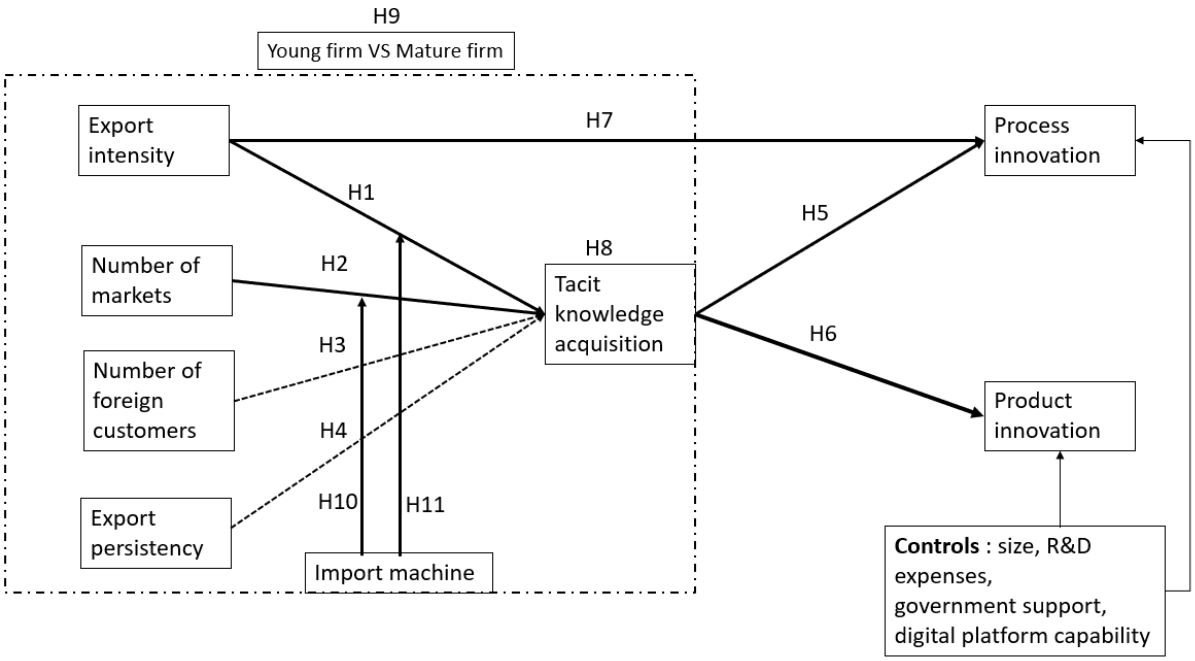
Chapter 3: Hypotheses

3.1 Introduction

In this section we will discuss the impact of sub-dimensions of export activities on innovation performance both product and process innovation through tacit knowledge acquisition. Finding from the previous LBE studies have not considered the mediating mechanism to explain the different between firms that have perform in innovation and vice versa. To address the void in current and existing LBE literature, as noted above, this study has developed a conceptual model considering mainly in : 1)The role of each sub-dimension of export activities on product and process innovation through tacit knowledge acquisition. 2) The mediating role of tacit knowledge acquisition 3) The moderation of machine import and firm ages, and, 4) The non-linear relationship between export intensity and process innovation.

3.2 Research model

Figure 1. Conceptual Model



3.3 Hypotheses

3.3.1 Export intensity and tacit knowledge acquisition

Export intensity has been pervasively used to represent a firm's export activities (D'Angelo et al., 2020, Sánchez-Marín et al., 2020, Tse et al., 2017) export sales to total sales ratio identify how much it commits to foreign markets. Alongside this, export intensity can explain a firm's learning process through export activities. Whereas SMEs might not be able to fully gain an advantage over the Learning by Exporting practice when they export to only a few markets, the volume of export sales signals that those markets have enough potentials to generate an income for them and also enough information or knowledge for their learning process (Chuang, 1998).

The volume of export sales also indicates the degree of foreign market engagements. Intense interactions with foreign markets consequently enable firms to be exposed to new knowledge from different markets and a large diversity of cultural perspectives, thus facilitating innovation (Hitt et al., 1997). Likewise, the relationships generated through intense interactions with foreign customers and foreign market intermediaries enable a key market information exchange(Salomon and Shaver, 2005, Blalock and Gertler, 2004). Therefore, a close relationship is one of the valuable intangible assets that lead firms to gain a superior performance (Morgan-Thomas and Bridgewater, 2004). A study by Haahti et al. (2005), which used data from SMEs in Norway and Finland, notes that for exporting SMEs, foreign interactions can increase their knowledge intensity while domestic connections are not significantly beneficial to them due to their poor choices of domestic partners.

Previous studies claim that export intensity is a good factor in determining a firm's learning approach in LBE literature (Pla-Barber and Alegre, 2007, Salomon and Jin, 2010, Salomon and

Jin, 2008, Greenaway and Kneller, 2007). Even though many studies use export status in determining export activities (Greenaway and Kneller, 2007, Crespi et al., 2008, Salomon and Jin, 2010, Salomon and Jin, 2008), engaging in export alone is not enough to determine the effectiveness of learning (Kafouros et al., 2008, Monreal-Pérez et al., 2012). To develop sufficient knowledge of export markets so as to enhance competitiveness, firms ought to export a large volume of their products (Lages et al., 2008).

In addition, supporting evidence from a study performed with data from Canadian manufacturers suggests that increasing export intensity provides a firm with a chance to encounter new stimulus environments that require quick learning to solve ensuing problems (Baldwin and Gu, 2003). Nevertheless, as new knowledge embedded in foreign markets is probably difficult to be transferred and codified automatically, exporting firms need to be engaged in a certain export volume and acquainted with these foreign markets in order to be able to sense opportunities and extract critical knowledge from them.

Firms with high export intensity are often capable of building new connections in foreign markets, thus giving them better opportunities to absorb knowledge and learn about customer preferences (Love and Ganotakis, 2013). Experiences with high export volume also enable them to know how to access knowledge sources and then obtain knowledge from these pools. Moreover, high export intensity, which implies the level of trust foreign customers have in firms, can enhance their knowledge acquisition since customers with high trust usually share novel ideas, which subsequently establish crucial skills required in tacit knowledge acquisition. For example, Indonesian textile exporters have received large export orders from Japan, and these substantial export volumes over time help foster and strengthen their relationship. The Indonesian firms then have a chance to learn about a new production process from the Japanese customers when the latter

send their engineer team to review their manufacturers' production process. As a result, the Indonesian firms acquire new technical knowledge to improve on cost reduction (Blalock and Gertler, 2004). Similarly, (Westphal et al., 1984) point out that the Korean manufacturing sector also gains new production techniques and skills through feedback from foreign buyers.

Apart from foreign connections as a contributing factor in a firm's tacit knowledge acquisition, high export intensity can associate with tacit knowledge acquisition in terms of exposure to another knowledge. Through frequent interactions with foreign markets, firms learn how to sense opportunities and catch up with market trends and familiarize themselves with customer perspectives, preferences, and languages. A deep understanding of customer demands accumulated through these interactions successively strengthens their capabilities to acquire essential information. As SMEs have more limitations and are more susceptible to external environments than large firms, SMEs with high export intensity will continually export their goods (Alvarez and Robertson, 2004). From time to time, or even regularly to some, frequent exporters are obliged to tackle new challenges, problems and opportunities by seeking help and advice from their trusted customers, and this serves to exercise their knowledge acquisition skills. Therefore, it can be stated that troubleshooting ability and expertise in different dimensions (e.g., market, production, technology) are derived from the export intensity.

On the other hand, firms with low export intensity are not likely to acquire crucial knowledge from foreign markets. Low interactions with foreign markets may not provide enough incentives for firms, especially SMEs in emerging countries, to acquire tacit knowledge. It takes time and a reasonable extent of existing knowledge and skills to obtain tacit knowledge (Polanyi, 1966, Martin and Salomon, 2003). As a result, firms with low export intensity tend to face challenges in

sensing market opportunities and lack networks through which they can gain tacit knowledge. In other words, low export volume cannot give a firm a sufficient opportunity to learn.

Resource constraints, including limited financial and managerial skills, can hinder a firm's capabilities to adjust to new working approaches and satisfy customers. Upon seeking foreign customers' advice to resolve these issues, it is probable that foreign customers who do not have enough trust in firms due to low interactions might be concerned about knowledge leakage and is unwilling to share or exchange knowledge with them. In this sense, firms with low export volume may not gain much tacit knowledge from foreign markets.

Hypothesis 1: Export intensity has a positive impact on tacit knowledge acquisition.

3.3.2 Number of markets and tacit knowledge acquisition

From the knowledge-based perspective, it is posited that knowledge from geographically dispersed locations enhances a firm's potentials to develop its own unique and valuable insights (Doz et al., 2001). However, acquiring tacit knowledge from multiple foreign countries can be a challenge for exporting firms. In order to acquire new knowledge embedded in host countries, they need to leverage multiple foreign networks and build their capabilities to obtain such diverse information.

The mixed results regarding directions for the relationship between multiple knowledge sources in multiple export destinations and tacit knowledge acquisition need a further explanation. The number of markets in this study then refers to the number of countries firms export to. Meanwhile, to some extent, previous research indicates that the number of diverse markets enables a firm to access different networks, which are channels to acquire a considerable amount of knowledge (Cos et al., 2019, Hitt et al., 1997, Lu and Beamish, 2004, Myles Shaver, 2011, Wu et al., 2016).

While young firms cannot take full advantage of potential learning when they export to too few markets even when their export volume to a particular country is high (Lages et al., 2008), geographic diversification, on the other hand, may enable them to access diverse knowledge from multiple and cultural perspectives (Zahra et al., 2000, Boehe and Jiménez, 2016, Mudambi and Swift, 2012).

In this way, entering into a more significant number of markets allows firms to access new ideas, new technologies and new networks that they can utilize to support the learning process within their organization (Johanson and Vahlne, 1977, Katila, 2002). That is to say; diversification brings firms different knowledge and international networks, which are essential ingredients for their learning process (Cirera et al., 2015, Hitt et al., 1997).

On the other hand, some literature shows the negative effect of diverse sources of knowledge on learning. Prior studies mention that geographic diversity is negatively related to technological learning (Yeoh, 2004). In this regard, enhancing tacit knowledge acquisition requires a firm's capabilities and resources beyond simply tapping into diverse knowledge sources from different countries.

The tacit form of knowledge, which is difficult to transfer (Hansen, 1999, Song et al., 2003, Szulanski, 1996), can provide firms with heterogeneity and potential value (Kogut and Zander, 1992). However, there are several challenges for exporting firms in acquiring tacit knowledge from foreign countries, which could be harmful for tacit knowledge acquisition.

First, firms need to have a certain level of capabilities to manage multiple relationships with multiple networks. Whereas diversity escalates the number of new knowledge and resources, which consequently fosters organizational learning (Cohen and Levinthal, 1990), only firms that

can leverage multiple networks from different institutional environments simultaneously are inclined to deal with cultural distances, different business practices, and communications with unfamiliar languages (Sousa and Bradley, 2006). The more countries a firm export to, the more complex channels and networks it has to manage. In addition, it takes a lot of time and costs to manage networks(Roth, 1992). Firms, therefore, have to establish a relationship in each country (Kogut and Kulatilaka, 2001, Hitt et al., 1994). Usually, SMEs in emerging countries who export to multiple countries may not have enough international experience to leverage various networks from different institutional environments and quickly respond to market demands.

Secondly, acquiring tacit knowledge from multiple markets demands firms' capabilities to manage overloaded information and multiple tasks from various operational requirements since multiple knowledge sources unavoidably increase management and operational complexities (Levinthal and Warglien, 1999). Apart from concerns regarding multiple knowledge sources, not every firm that exports to multiple countries knows how to justify a crucial knowledge, especially a geographically dispersed one, and apply it (Cantwell and Piscitello, 2005, Joshi et al., 2009, Kostova and Roth, 2002). In dealing with a myriad of different information, there needs to be highly proficient staff who are well equipped with appropriate managerial and communication skills and language capabilities to understand requirements from customers in each country (Sousa and Bradley, 2006). Firms speaking only their home language may also face language barriers that hamper their understanding of foreign market demands, thus leading to difficulties in acquiring tacit knowledge.

With different requirements generating the complexity of managing diverse cultures, customers and institutional regulations (D'Angelo et al., 2020), the high volume of information firms need to manage may also exceed their cognitive limits and capacity to process information effectively

(Huber, 1991). Therefore, SMEs in developing countries are not likely to integrate and synthesize information effectively due to these resource constraints, and they may find it challenging to develop problem-solving skills to cope with an influx of information.

Thirdly, it has been found that the inability to apply diverse knowledge through exporting to a greater number of countries may decrease firms' tacit knowledge acquisition. That is, the lack of ability to identify crucial information bars them from acquiring quality knowledge. Another study shows that international diversification allows firms to exploit superior core competencies and then apply such competencies in other markets (Lei et al., 1996). However, the competency to apply diverse knowledge is based on the existing experience of learning from one place and applying it to the others.

Prior literature proposes that firms are likely to find and acquire relevant knowledge similar to the one they already have (Morris et al., 2015). The narrow scope of knowledge that firms reach is more associated with codified knowledge because it is easier to obtain and does not take much time to comprehend. Morris Morris et al. (2015) also investigate the global knowledge reach and discover that an expanded reach encourages a firm to access explicit knowledge rather than tacit knowledge, hence decreasing its performance. Therefore, firms may become reluctant to put more effort into acquiring knowledge far beyond their knowledge scope and tend to search for knowledge that proximate to their existing one instead. From the above points of view,

*Hypothesis 2: The number of markets has a **negative** impact on tacit knowledge acquisition.*

3.3.3 Number of foreign customers and tacit knowledge acquisition

The number of foreign customers refers to the business-to-business customers that firms have. Some exporting firms may concentrate on only a few markets but expand their customer-based lines to multiple customer accounts, while some may export to various countries but receive export orders from a few customers. For example, a manufacturer exports its products to IKEA stores in multiple countries, yet IKEA is counted as one customer. This sub-dimension of export activities (number of foreign customers) is overlooked in international business literature, and no evidence supporting this notion is found in LBE literature.

Many research studies argue that focusing too much on customer requirements may limit a firm's to explore novel ideas because customers generally might not provide firms with novel ideas. Their product ideas come from their past experiences of using the product, and they do not need to concentrate beyond current market trends (Enkel et al., 2005, Hippel, 2005).

However, one study emphasizes how having a number of customers foster tacit knowledge acquisition. A greater number of customers may bring a diversity of ideas and know-how to firms, and interactions with foreign customers enable information exchanges and knowledge spillovers through export activities. Besides, Firms capable of utilizing and applying customer feedback are likely to generate quality improvement ideas (Linderman et al., 2004, Wirtz et al., 2010), and enhance learning (Caemmerer and Wilson, 2010).

From the organizational learning perspective (Cyert and March, 1963), it is mentioned that firms learn when they experience problems since they will search for a new way to solve such problems. As SMEs in less developed countries do not have their own current knowledge stocks, looking for new knowledge from foreign customers is a vital learning strategy. When firms have more customers, a knowledge gap related to unique requirements might be wider, so they have to exert

to get know-how and insights to diminish this gap. Therefore, the more problems from customers firms face with, the more they can learn and gain knowledge.

*Hypothesis 3: The number of foreign customers has a **positive** impact on tacit knowledge acquisition.*

3.3.4 Export persistence and tacit knowledge acquisition

One of the sub-dimensions of export activities is persistence in exporting. Export persistence refers to a period of continuous exports by a firm (Love and Máñez, 2019). The consistency of export activities relies on a firm's capacity to stay abreast of and effectively respond to, changes in export and domestic demands.

Persistence in exporting induces a firm's learning process. However, not all exporting firms can maintain their export activities. Young firms that have just started exporting for a few years are not likely to survive (Besedeš and Prusa, 2006), especially if they cannot manage their operation in a fast-changing, uncertain environment. Dealing with the liabilities of foreignness when entering into new markets also impairs a firm's survival.

For firms, not having enough essential information about foreign markets and business practices are the greatest obstacles to exporting (Artopoulos et al., 2013). Increasing competition in global markets and dynamic market demands that change rapidly also impede firms' ability to survive. As a result, firms, especially those with resource constraints, resort to reduce their foreign investment and focus on domestic markets instead since both domestic and export markets always compete for resource allocation. The growth rate of the domestic market, which implies devotion to domestic sales, is then likely to hamper export persistence (Love and Máñez, 2019). A study by

Alvarez and Robertson (2004) that investigates differences in the export performance of the sporadic and permanent exporters shows that permanent exporters can maintain their export sales.

Using Columbian data, Timoshenko (2015) suggests that the duration of export increases the chance of persistence in exporting. Learning and experiences gained from exporting might not only reduce firms' chance to exit export markets but will also encourage them to maintain their export activities in foreign markets, thus increasing their opportunities to acquire new knowledge. Similarly, Love and Máñez (2019)find that learning by recent exporting induces persistence in exporting, implying that experiences from firms' past operations could mitigate risk of their international market exit.

Even though the internationalization process model (Johanson and Vahlne, 1977) indicates that firms learn how to modify their products and production process through export activities so as to maintain their competitiveness in the international market, not every firm can benefit from short involvement in export activities.

The scope of knowledge covers not only market knowledge and technology knowledge but also international operation knowledge, managerial knowledge, and many more. Therefore, firms need to continually engage in export activities to absorb those types of knowledge.

Why do firms need to continually commit to exports in order to acquire tacit knowledge? First, continual learning promotes their ability to absorb and acquire tacit knowledge: a short involvement in exports does not benefit their learning. In a study conducted on Swedish firms, Andersson and Lööf (2009a) emphasize the significant role of the persistence and intensity of exporters, revealing that persistent export gives small firms sufficient time and chance to acquire knowledge from foreign countries. However, sporadic exporters are not likely to develop sizable

export sales, which would have an impact on how they commit to international market involvement and build their managerial capabilities (Cieslik et al., 2010, Katsikeas, 1996, Samiee and Walters, 1991).

According to organizational learning researches, if small firms lack potentials to develop their own knowledge, they should consistently learn from external sources (Sinkula et al., 1997). Collaboration with external sources, for example, could promote knowledge transfer and become a more efficient way to acquire knowledge than developing their own knowledge (Simonin, 1997, Poppo and Zenger, 1998). As learning occurs over time, the persistence of export activities helps encourage firms to never stop learning about new skills and new knowledge in order to continuously improve their products and manage international operation so that they can keep up with business environment more effectively. Therefore, firms' commitment to continual involvement in exporting plays a key role in their tacit knowledge acquisition.

Secondly, apart from foreign market commitment that stimulates their quest for learning, firms need to invest in resources to cultivate a substantial level of foreign relationships (Zhao and Islam, 2017). This is because a close relationship with foreign customers enables them to acquire more implicit knowledge. Besides, the underlying mechanism is that good coordination between exporting firms and foreign customers contributes to an improvement in service level performance and customer satisfactions (Blomstermo et al., 2006) and thus leads to the foreign customers' willingness to share crucial information with the firms. Through such a close relationship, firms can increase their knowledge stocks. Hence, without a good relationship that is derived from persistence in exporting, firms are unlikely to acquire tacit knowledge.

*Hypothesis 4: Export persistency has a **positive** impact on tacit knowledge acquisition.*

3.3.5 Tacit knowledge acquisition and innovation performance

Although a number of prior research studies have examined the impact of knowledge on innovation performance (Leonard and Sensiper, 1998, Koskinen and Vanharanta, 2002, Cavusgil et al., 2003, López-Cabarcos et al., 2019, Seidler-de Alwis and Hartmann, 2008), only a few put an emphasis on specific types of knowledge despite the argument that general knowledge does not provide sufficient elements in predicting a firm's innovation performance. Past researches have categorized knowledge into two dimensions; one is explicit and the other is tacit knowledge (Kogut and Zander, 1992).

The knowledge-based view of the firm (KBV) suggests that knowledge is a strategic asset that adds value to a firm. Tacit knowledge, which is complex, uncodified, and abstract in its nature (Dhanaraj et al., 2004, Tsang et al., 2004), can be one of the resources that steer a firm towards superior performance (Grant, 1996).

Following the characteristics of tacit knowledge, as noted above, this study argues that not all firms with export activities have the ability to acquire tacit knowledge so as to pursue their innovation performance. Nevertheless, it is presumed that firms with tacit knowledge acquired from foreign markets are likely to have better innovation than those without any.

The process used by a firm to obtain knowledge from foreign customers is also crucial in its effort to acquire new important information, skills and competencies (Tsai and Ghoshal, 1998, Kale et al., 2000, Yli-Renko et al., 2001). Previous studies point out that tacit and explicit knowledge are complementary (Nonaka et al., 2000)e, yet tacit knowledge is acquired through experience sharing (Kikoski and Kikoski, 2004, Hall and Andriani, 2002). This study emphasizes tacit knowledge because explicit knowledge can be obtained and imitated easily by competitors (Seidler-de Alwis

and Hartmann, 2008), thus it is not a critical source of a firm's competitive advantage (Grant, 1996).

The importance of tacit knowledge on a firm's innovation performance can be explained by a number of reasons. First, novel ideas to change and modify a firm's routines require a quality set of knowledge and expertise. A lack of deep understanding of a set of knowledge (e.g., managerial knowledge, operational knowledge and technology knowledge) is a major obstacle to the change process.

Several past evidences support the association between tacit knowledge and innovation performance. Almeida Almeida et al. (2002) suggests that the transfer and application of tacit knowledge can foster innovation. Koskinen Koskinen and Vanharanta (2002) indicate that tacit knowledge plays an essential role in the innovation processes of small technology companies. Similarly, Howells (1996) notes that "intuition based on tacit qualities plays an important role in the innovation process, which shows that a great deal of the knowledge that is important to the operation or improvement of a given process or product technology is tacit."

Given that tacit knowledge is acquired through relationships, firms need to build close connections with foreign customers to absorb knowledge and learn from related experiences (Polanyi, 1962). Prior literature also stresses that collaboration with external sources could promote knowledge transfer and is more efficient than developing one's own knowledge (Simonin, 1997, Poppo and Zenger, 1998). The close relationship with foreign customers facilitates firms to observe customer preferences, market insights and new technology used in foreign countries, therefore enhancing their learning capabilities and ability to initiate ideas for innovative products (Fernandes et al., 2013).

Secondly, tacit knowledge acquired from foreign markets indicates a firm's capabilities to acquire and assimilate new knowledge. The different dimensions of tacit knowledge that are examined in this study are the output of process acquisition, which include new technology, new product development, a new technique of production, marketing, and managerial knowledge (Kafouros et al., 2018).

Considering that it is relatively difficult to extract tacit knowledge from individuals or companies in foreign counties, the expertise that firms have accumulated through export activities and interactions will alternatively provide them with a deep understanding and how to adapt and use acquired knowledge (Liu et al., 2010, Tsang et al., 2004).

Furthermore, acquired tacit knowledge reflects a firm's ability to overcome knowledge ambiguity from different environmental contexts (Ho et al., 2019). This is especially significant due to the fact that not all firms can succeed in managing knowledge ambiguity. New capabilities a firm has developed through international knowledge acquisition consequently provides the basis for innovation (Inkpen and Beamish, 1997, Yli-Renko et al., 2001). In addition, firms that utilize knowledge rapidly and effectively can innovate faster and more successfully (Lynn et al., 1999). As a result, it can be inferred that tacit knowledge acquisition will enhance firms' innovation performance in terms of both innovation product and innovation process. Therefore,

Hypothesis 5: Tacit knowledge acquisition has a positive impact on process innovation.

Hypothesis 6: Tacit knowledge acquisition has a positive impact on product innovation.

3.3.6 Non-linear relationship between export intensity and process Innovation

The LBE offers opportunities to investigate the relationship between export intensity and innovation performance (Fernández-Mesa and Alegre, 2015, Pla-Barber and Alegre, 2007). In addition, export in itself serves as a learning process: firms learn through interactions with foreign customers, foreign markets, and foreign competitors when they export their products (Love and Ganotakis, 2013). This study principally focuses on export intensity because it reflects a high level of export involvement. Export intensity here is proxied by export sales, which is sufficient to justify a firm's commitment on resource investments and interactions with foreign customers. A strong relationship derived from intense export sales facilitates firms to learn to improve their process in a novel way. Unlike export intensity, the numbers of markets and customers can be interpreted into different aspects of export dimensions. For example, the number of markets may be dependable on other factors such as export strategy: while some firms adopt concentration strategy, others might employ diversification strategy. It can therefore be posited that a firm's innovation performance may heavily depend on export strategy yet cannot be solely based on the number of markets or customers. These constructs can become potentially conflicting factors when explaining LBE approaches.

Process innovation in this study refers to "the implementation of new or significantly improved production or delivery methods. This includes significant changes in techniques, equipment and/or software" (OECD, 2005). However, process innovation here emphasizes on production-oriented improvements or changes that result in a significant increase in productivity (Breschi et al., 2000, Hervas-Oliver et al., 2014).

It takes time and requires a firm's capability to assimilate and acquire knowledge from external sources to develop process innovation (Zahra and George, 2002, Damanpour and Gopalakrishnan, 2001). The nature of process innovation is tacit and complex. Through experiences, firms will

enhance their understanding of external sources and expand, as well as refine, their absorptive capacity to reach process innovation. At the same time, a critical issue in transferring highly complicated tacit knowledge is that there might be a reduction in knowledge quality (Kotabe et al., 2007).

Prior literature illustrates the inverted U-shaped relationship between international knowledge transfer and innovation performance (Kotabe et al., 2007). However, past research findings have been mixed: while some find a non-linear relationship in this regard (Kotabe et al., 2007), others suggest no relationship, or a linear one (Thakur-Wernz et al., 2019).

A distinct explanation has been found from the above-mentioned viewpoints. This study thus argues that export intensity will enhance a firm's innovation process up to a certain point, then the performance will start to decline. The learning process occurs when firms encounter and resolve foreign problems and overcome obstacles by modifying and improving their operation process. Meanwhile, a high level of export intensity allows them to face a myriad of international issues and then utilize their experiences to resolve them as well as assimilating knowledge from them.

On the contrary, a low level of export intensity may limit firms' opportunity to enhance their process innovation for a number of reasons. First, they do not have enough international commitments, which in turn poses a constraint on the acquisition of enough knowledge and know-how to change their production processes. In the international process model, firms learn gradually through market commitment (Eriksson et al., 2015), which leads to a reduction of the liabilities of foreignness (Zaheer, 1995).

Secondly, firms with a low level of export intensity find it challenging to leverage foreign networks. Strong connections require intense interactions and socialization with foreign customers

(Nonaka and Takeuchi, 1996). Thus, they need to reach a certain point of export sales to establish foreign networks that yield desirable consequences. As a result, firms with low export intensity are not likely to have the power to acquire knowledge through their foreign networks.

Lastly, firms with low export intensity may concentrate on sustaining their export markets by pushing sales rather than paying attention to any improvement in the process. There might not be enough incentives for them to change their process as well. Furthermore, process changes are costly and difficult. Therefore, a low level of export intensity limits firms' capacity and willingness to change their process.

A trigger point that transforms the direction of the relationship between export intensity and process innovation from a negative into a positive one is when firms possess sufficient experiential knowledge, which is instrumental in their decisions and actions towards the new way of working. Likewise, experiential learning occurs when firms acquire essential information and valuable insights from foreign customers through time.

By learning and acquiring knowledge through high and prolonged involvement in export activities, firms become more efficient in dealing with market and technological uncertainty and are more adaptable to the cultures and norms of the countries they export to. As a result, firms with a set of necessary tacit knowledge are more likely to enhance their innovation process.

It is an undeniable fact that a high level of commitment in export allows firms to establish relationships with foreign customers (Yeoh, 2004, Zhao and Islam, 2017), and the coordination between foreign buyers and exporting firms helps the latter improve their customer satisfaction (Blomstermo et al., 2006). However, Schwens et al. (2018) argue that knowledge from past

experiences accumulated from one location may not be enough for firms to reduce the liabilities of foreignness when exporting to a new location. Therefore,

Hypothesis 7: The relationship between export intensity and process innovation is non-linear, with process innovation decreasing at the lower levels of export intensity and increasing at the higher levels of export intensity.

3.3.7 Firm's tacit knowledge acquisition mediates relationship between export intensity and process innovation

Tacit knowledge acquisition works as a predictor dictating firms' innovation process. At the same time, LBE posits that export activities enable them to learn to innovate. This study argues that a lack of capability to acquire tacit knowledge raises a difficulty for innovation performance. Besides, not all export activities have a direct impact on innovation performance.

Different sub-export activities serve different purposes and provide different direction on a firm's learning. The study would like to clarify that, on the innovation front, LBE using only export status may not be a good explanation for why innovation occurs after exporting.

International process literature suggests that firms gain knowledge from entering into new markets. However, such knowledge may comprise a general internationalization knowledge (Eriksson et al., 2000) that are not superior enough to allow firms to achieve competitive advantages. In this connection, specific types of knowledge which have been accumulated through each market-specific experience may create more advanced learning.

Tacit Knowledge as Mediating Mechanism

Although learning by exporting is usually considered to have a direct impact on innovation (Lööf et al., 2015, Love and Ganotakis, 2013, Salomon and Jin, 2010, Salomon and Jin, 2008), this relationship requires a broader analysis of the learning process between export and innovation performance. Understanding the mediating role of tacit knowledge acquisition in the relationship between export activities and innovation performance will give a clearer picture of how firms innovate through exporting.

Improving process innovation is related to establishing or promoting production capabilities, cost reduction (Bernstein and Kök, 2009) and flexibilities (Reichstein and Salter, 2006). Firms' incapability to achieve process innovation is mainly attributable to them not knowing how to improve the process and not having sufficient valuable knowledge to proceed with it.

Improving process innovation requires knowledge at the deeper levels. Process innovation is likely to be complex, and firms cannot develop it quickly in line with product innovation (Damanpour and Gopalakrishnan, 2001, Gopalakrishnan et al., 1999). While product innovation is more about customer demands, process innovation concerns internal management, which is less tangible and less apparent to customers than product innovation. Some studies posit that process innovation is more associated with a firm's value chain (James et al., 2013).

The knowledge-based view explains how tacit knowledge creates value added to firms and plays a critical role in developing sustainable competitive advantages (Nonaka and Takeuchi, 1995, Grant, 1996, Spender, 1993). However, some study argues that tacit knowledge may limit firms' aspiration to change, which is detrimental to their innovation development (Ambrosini and Bowman, 2001). This study attempts to propose that tacit knowledge acquisition is a crucial strategic value asset that justifies a firm's capability to absorb and apply knowledge acquired from foreign markets. Firms who are able to integrate acquired knowledge with their existing one and

assimilate it into their expertise are likely to have superior innovation performance. Therefore, it is anticipated that tacit knowledge acquired from export activities is a critical mechanism to drive a firm's process innovation.

Tacit knowledge acquisition benefits firms' innovation process in three ways: 1) knowledge related to operation and management assists firms in enhancing their operation and production process; 2) marketing knowledge enables firms to improve product and service quality so as to satisfy customer preferences; and 3) tacit knowledge obtained through internationalization promotes firms' capabilities to deal with uncertainty, leading to better flexibility and cost reduction.

In conclusion, the key advantage of tacit knowledge acquisition is that it helps firms overcome a lack of knowledge which usually constrains their innovation process. This study emphasizes that export activities alone are not a sufficient factor for innovation process performance in the context of SMEs.

When firms have a high degree of interactions with foreign customers, they are inclined to develop an ability to leverage foreign networks. In other terms, social interactions are likely to promote greater tacit knowledge acquisition (Leonard and Sensiper, 1998). Advices from international partners (e. g. customers, market intermediaries, etc.), for example, can be an important source of tacit knowledge: foreign customers may provide firms with implementable knowledge about a new production process. However, it takes time, export intensity and intense interaction to instil trust in foreign customers to the extent that they are willing to share invaluable knowledge with firms. That is to say, a high degree of involvement in export activities (which indicates export sales) helps firms establish a relationship with foreign customers, progressively resulting in knowledge

exchanges at the deeper level and, ultimately, establishment of innovation (Terjesen and Patel, 2017).

Cumulative knowledge embedded in a foreign context is acquired through learning by doing (Polanyi, 1966): firms cannot just absorb knowledge by observing but through ongoing activities. While exposure to foreign markets allows them to obtain more ideas and develop a better understanding of markets, repeated export orders enable firms to recognize opportunities and identify the key tacit knowledge embedded in the foreign context. On the other hand, advanced technology and production process may force firms to accelerate process improvement to catch up with novel ideas in the markets they enter into. Furthermore, export intensity helps firms understand foreign markets more comprehensively and encourages them to boost their capabilities to acquire tacit knowledge from their foreign markets. In this way, firms may find new solutions to their businesses that pertains to process innovation.

The mediation of knowledge acquisition on export intensity and innovation performance

In this study, the enhancement of innovation in SMEs exporters focuses on the knowledge acquired from overseas markets derived from export activities. The study argues that sub-dimensions of export activities exhibit differing export characteristics that lead them to respond differently in foreign context conditions. Knowledge, especially tacit knowledge, is a source of competitive advantage (Day and Wensley, 1988, Barney, 1991)D; embedded in this context creates a challenge for firms to obtain. However, by being able to acquire this tacit knowledge, firms are characterized with high innovation performance.

Literature of foreign knowledge acquisition posits that relational mechanism is the main driver for firms to obtain knowledge (Zhou et al., 2007, Li et al., 2010b, Bembom and Schwens, 2018, Lu et

al., 2010). Haahti et al. (2005) show that an informal cooperative strategy fosters a firm to obtain relevant foreign market knowledge and increase knowledge intensity about the export market. Networking has become a critical strategy for SMEs to overcome resource constraints (Brass et al., 2004, Coviello and Cox, 2006). It helps firms to access the knowledge of the overseas context (Lu et al., 2010); to extract a set of valuable knowledge requires strong networks that possess the value of market knowledge and technology knowledge that are difficult to access and hard to transfer automatically.

The study integrates export behaviors, knowledge, and innovation and examines each particular type of sub-dimensions of export that foster innovation through knowledge acquisition.

Export intensity is related to the relational establishment for several reasons. The intensity of export sales determines how much firms have commitments on their resources to meet foreign customer satisfaction. We argue that export intensity is more associated with a relative mechanism.

Export intensity is the indicator to determine a firm's dependence on foreign markets (Ling-Yee, 2004, Verwaal and Donkers, 2002). Ellis et al. (2011) find that routines of export involvement stimulate marketing know-how among foreign markets. The intensity of interactions allows firms to exchange information about market demands, product designs, and acquired manufacturing and packaging skills. Prior research shows that cohesive interactions are critical to knowledge transfer, and trust can help firms receive tacit knowledge (Levin and Cross, 2004). Dhanaraj et al. (2004) showed that strong relational networks facilitate tacit knowledge transfer.

Having a strong relationship with foreign customers through export intensity allows firms to obtain more important information about market needs and learn about consumers' demands in terms of product quality (Chandy and Tellis, 1998, Ellis et al., 2011). The study shows the positive

relationship between export intensity and new product development by investigating how firms acquire marketing knowledge via foreign markets (Ellis et al., 2011). This deeper understanding of customers' demands and markets in foreign countries enables firms' efforts to initiate new ideas that meet oversea markets' demands, which leads to product innovation. In addition, the strong ties derived from high export intensity motivate firms to devote their resources to improving process. As a result, firms are likely to improve their process innovation with high export intensity.

The number of markets is perceived as the knowledge sources to assist knowledge acquisition. Prior studies show different knowledge sources' positive impact on knowledge acquisition(Hemmert, 2004). The rationale is derived from the different sources and refers to diverse knowledge crucial for innovation development. In contrast, some studies posit that geographic proximity facilitates firms to acquire knowledge (Andretsch, 1998). The common practice and knowledge sharing among firms facilitate exporters to develop products or change some processes to better suit their customers needs, especially for small firms that can tailor their products to meet customer requirements.

Therefore, we propose that

8a: Tacit knowledge acquisition mediates the relationship between export intensity and product innovation

8b: Tacit knowledge acquisition mediates the relationship between export intensity and process innovation

8c: Tacit knowledge acquisition mediates the relationship between number of foreign markets and product innovation

8d: Tacit knowledge acquisition mediates the relationship between number of foreign markets and process innovation

3.3.8 The moderating role of firm age

The age of a firm plays a significant role in explaining the relationship between export intensity and tacit knowledge acquisition: the firm's age is associated with learning process, resources, and dynamic capabilities, all of which contribute to its innovation performance (Huergo and Jaumandreu, 2004, Coad et al., 2013, Gkypali et al., 2015). Young and Mature firms do not share core characteristics. That is, young firms would exhibit export behaviors similar to those among themselves and different from those of mature firms.

According to previous research studies, SMEs share some common characteristics but are categorizable by their sizes. This study, on the other hand, aspires to investigate the other points of view by using their ages instead of sizes in revealing some differing aspects regarding knowledge acquisition from foreign markets, a factor that helps boost their innovation performance.

A mechanism that drives innovation performance in young and mature firms is different. This study would like to point out that while mature firms need tacit knowledge acquisition to drive innovation performance, young firms are better off leveraging export activities to innovate directly.

Existing studies using data from innovative Greek companies show that young and mature innovative firms influence the relationship between export and innovation performance differently. The reason is that different firms face different market environments with different existing knowledge capital and different resource constraints. For young firms, export activities seem to be

a primary knowledge source for their innovation performance since they have unseasoned knowledge-based view, hence forcing them to rely on knowledge from abroad. The results show that young firms exhibit the LBE effects, while mature firms pertains to the self-selection (Gkypali et al., 2015).

In connection with innovation performance, Pellegrino (2018)'s study using data from Spanish firms examines barriers that hamper innovation, and the findings indicate that young and mature firms perceive obstacles differently. Young firms have higher tendency to innovate as compared to longer-established firms, while mature firms concentrate more on their market structure and demands.

Several empirical studies on innovation focus on a crucial role of a firm's age in innovation performance, using qualifications of employees as key consideration factors. It is noted that highly qualified employees serve as drivers that helps firms absorb knowledge from export activities, which consequently enables the firms to develop absorptive capacity (Cohen and Levinthal, 1990). In this connection, mature firms with absorptive capacity are likely to innovate better than young firms. However, some studies argue that young firms have more flexibility and better access to highly skilled employees (Baron et al., 2001). Besides, they are more likely to have an entrepreneurial mindset, are more willing to take risks, and have more flexibility than mature firms (Zahra and Filatotchev, 2004). A prior research study also mentions that young firms have a higher probability of initiating innovation activities and success in innovation output than mature firms (Audretsch et al., 2020).

However, a lack of critical information and essential know-how are obstacles facing young firms in acquiring tacit knowledge from foreign countries (Katila and Shane, 2005, Gort and Klepper, 1982). In addition, small firms are more prone to have financial constraints (Katila and Shane,

2005). Thus, young firms with less experiences need to accelerate themselves vigorously in changing and modifying their products so as to meet foreign customer preferences.

Without a long-established relationship, it will be difficult for young firms to obtain tacit knowledge from foreign customers. Meanwhile, the liabilities of newness and liabilities of foreignness force them to focus on survival and sustainability in their markets. Therefore, young firms are likely to experience a direct effect of export activities on innovation performance.

In contrast to young firms, with their long experiences, mature firms are likely to leverage foreign networks more effectively than young firms, and leveraging foreign social ties with customers or partners subsequently allows them to acquire the tacit knowledge embedded in their counterparts. However, there are some obstacles facing mature firms in their move to innovate despite the fact that they have more available resources and skills.

First, they have to deal with their legitimate and complicated structure, which makes them reluctant to change. Mature firms with high rigidity and long experiences may find it difficult to change rapidly or move quickly enough to meet market demand conditions (Nelson and Winter, 1982, Hannan and Freeman, 1984, Dougherty, 1992). Existing researches show that the complex structures of mature firms limit their capabilities to change because they have well-established organizational routines and business practices that impede innovation engagement (Nelson and Winter, 1982, Baron et al., 2001). In addition, when mature firms decide to pursue innovation, they may need to restructure and invest in new expertise.

Secondly, according to several previous studies, mature firms may rely too much on their past successful strategies (Ferriani et al., 2008). This results in their resistance to adjustment. On a different note, their export capabilities enable them to sense a market opportunity in foreign

markets more adroitly as well as helping them acquire critical market and technology knowledge better than young firms do.

Regarding innovation performance, mature firms are more likely to rely on their experiential knowledge rather than using export activities as a primary knowledge source to initiate innovation. While innovating through acquired tacit knowledge, sub-dimensions of export activities (number of customers, number of markets, and export intensity) facilitate them to extract key market and technology-related information through close and long-term relationships with foreign customers and market intermediaries. Consequently, bundles of new knowledge that is integrated with their existing experiences will foster their product innovation and process innovation.

In sum, while the IB literature has discussed the differences between young and mature firms, this study deviates from previous findings in some points. First, tacit knowledge acquisition as the mediating mechanism may not be a driver for young firms due to their lack of absorptive capacity. Secondly, under LBE literature, no study has been found to distinguish between the export behaviors of young firms and those of mature firms in the model using sub-dimensions of export to examine innovation through tacit knowledge acquisition. Therefore,

Hypothesis 9: There is a difference in the relationship among export activities, tacit knowledge acquisition, and innovation performance between young and mature firms at model level.

Sub-hypotheses (path level analysis)

H9.1: There is a difference in the relationship between export intensity and tacit knowledge acquisition varying across firm age.

H9.2: There is a difference in the relationship between number of markets and tacit knowledge acquisition varying across firm age.

H9.3: There is a difference in the relationship between number of foreign customers and tacit knowledge acquisition varying across firm age.

H9.4: There is a direct impact between number of markets and product innovation varying across firm age.

H9.5: Tacit knowledge acquisition mediates the relationship between export intensity and process innovation varying across firm age.

3.3.9 Machine import positively moderates relationship between number of markets and tacit knowledge acquisition

Machine import is one of the knowledge-seeking strategies that firms utilize. Knowledge from importing machines is in an explicit form, and firms acquire this ready-to-use knowledge through studying technical specifications and manuals (Polanyi, 1966). In this way, learning-by-machine import may alleviate the negative impact of diverse and overloaded information from multiple countries on tacit knowledge acquisition (Wang and Tao, 2019).

Although the relationship among importing, exporting, and firms' innovation have been explored, the role of machine imports that influences LBE on their tacit knowledge acquisition is still much overlooked in the LBE literature. An example of this is a study by (Almodovar et al., 2014) that investigates the import and export relationships on a firms' innovation. The result shows that import activities can enhance their new product development but does not promote their patenting activities. The reason behind this statement is that import helps firms obtain more advanced technology (Blalock and Veloso, 2007) and reduces the need for developing their own R&D. In

contrast, export generates greater learning for them than FDI does and also leads to an increase in both innovation and patents since participating in foreign activities enables firms to access more advanced technological knowledge (Kogut and Chang, 1991, Myles Shaver and Flyer, 2000).

This study investigates the negative effect of the number of markets on tacit knowledge acquisition -- from insufficient capacities to multiple requirements from diverse countries. In this connection, SMEs in emerging markets may not have enough potentials to leverage foreign networks (Love and Ganotakis, 2013). With the fact that knowledge is more complex and difficult to absorb, firms may shift their focus to tasks that are crucial for generating sales rather than obtaining tacit knowledge from foreign countries. The asymmetric information from diverse cultures also creates difficulty for them to catch up with new tacit information. Moreover, firms may mainly utilize their resources to fulfil production capacity in order to minimize costs; thus, they may not have enough capabilities to acquire new tacit knowledge. From this view, machine import may mitigate the negative impact of dealing with these issues in some aspects.

First, learning by importing could be an alternative source of international knowledge, which in turn lessens the crucial role of LBE. Explicit knowledge firms have acquired through import gives them international experiences since they have to interact with multiple foreign customers: at least firms become familiar with foreign suppliers and global practices. For example, firms may recognize the usefulness of acquiring new technology-related knowledge from machinery suppliers in foreign countries, and experiences obtained via interactions with these suppliers will probably complement their learning from exporting to a greater number of countries. This is in line with a prior literature in knowledge-based theory evidencing that explicit and tacit knowledge is intended to complement the learning process. Therefore, the experiences gained through machine import allays difficulties in dealing with various requirements from different countries.

Secondly, machine import primarily pertains to facilitating productivities and cost minimization in manufacturing (Kotabe and Omura, 1989). SMEs in emerging countries tend to focus more on cost reduction than on seeking new knowledge, yet the import of foreign technology allows them to absorb foreign technology and develop new imported products(Zhou et al., 2020). Consequently, firms can achieve a rapid improvement in production capacity. When imported machinery promotes an improvement in their production, firms may shift their limited attention to seeking novel knowledge and establishing their relationship with foreign customers. In this regard, firms will possibly pay more attention to acquiring various knowledge from various markets to satisfy market needs. This process then leads to better tacit knowledge acquisition.

It is hypothesized that exporting to a greater number of markets does not necessarily lead firms to acquire tacit knowledge from foreign countries. However, machine import is capable of lessening the negative effect of a number of markets on tacit knowledge acquisition. Therefore,

Hypothesis10 Machine import intensifies moderates the relationship between a number of markets and tacit knowledge acquisition.

3.3.10 Machine import negatively moderates the relationship between export intensity and tacit knowledge acquisition

In this hypothesis, the role of machine import on the relationship between the positive effect of export intensity and tacit knowledge acquisition is examined. It is hypothesized that machine import is likely to hamper a firm's tacit knowledge acquisition through export intensity.

The study borrows the learning organization theory to explain changes in an organization's knowledge that occur as a function of experience (Fiol and Lyles, 1985). Firms can accumulate knowledge from learning by exporting and investing in technology imports (Chittoor et al., 2015). Accumulation here refers to an investment in technology import, while the assimilation approach refers to the idea of 'learning-by-doing, which is LBE.

Machine import is considered an essential source of international knowledge acquisition. Importing machines help firms leverage international knowledge from interactions with their foreign suppliers. Instead of relying heavily on export intensity to acquire tacit knowledge, firms have accumulated international experience through importing processes. Nevertheless, while most prior researches find the positive impact of technology import on innovation performance (Li-Ying and Wang, 2015), some studies argue that importing technology reduces firms' investment in R&D, which therefore leads to decreased innovation performance (Blalock and Gertler, 2009).

In addition, some previous researches have discussed whether export and import are complementary or substitute for each other (Wang and Tao, 2019). Several studies that examine the relationship between international outwards and international inwards mention that both learning mechanisms allow knowledge spillovers among international markets, and an integration of both inwards and outwards activities is needed to enhance a firm's productivities (Alvarez and López, 2005).

However, links between the role of machine import on export intensity and tacit knowledge acquisition have not been investigated. Therefore, while it is hypothesized in the previous section that machine import intensifies the negative effect of the number of markets on tacit knowledge acquisition, the study suspects that machine import is likely to weaken the positive effect of export intensity on tacit knowledge acquisition.

How machine import reduces the effect of export intensity on tacit knowledge acquisition can be explained as follows: first, firms learn through the trial-and-error process until they can integrate new knowledge into the existing knowledge and then develop tacit knowledge. However, when firms decide to import machines that come with manuals, they can follow instructions in the manuals, thus eliminating the trial-and-error process. As a result, firms are not likely to acquire a good extent of tacit knowledge when they import machines, as compared to those who do not import machines.

For example, bakery manufacturing firms take time to accumulate knowledge about how to produce higher quality bakeries through foreign customers' feedback. They have to learn about appropriate baking temperatures and the right amount of ingredients, which have to be adjusted many times along the trial-and-error process until they achieve the best results, justified via collective feedback from their foreign customers. This cumulative learning therefore brings them tacit knowledge. However, when these manufacturing firms decide to import machines, they do not necessarily develop a 'cumulative learning process' since all tasks of making bakeries are accomplished by the imported machines. As a result, machine import is likely to diminish the impact of export intensity on tacit knowledge acquisition.

Secondly, investing in machine import can serve as inward international activities by generating knowledge spillovers and then decreasing firms’ propensity to acquire tacit knowledge from abroad. Li et al. (2012) find that inward international activities in emerging countries negatively affect firms' participation in outward international activities.

Similar to export intensity, import enables firms to establish relationships with foreign suppliers, leading to the acquisition of critical technological knowledge. Normally, firms exposed to foreign markets face intense market competitiveness that stimulates an improvement in product designs

and quality (Tokatli and Kızılgün, 2009); hence, they need to, and seek to, acquire substantial knowledge to fulfil this mission. However, when these firms import machines, they may neglect to acquire other dimensions of tacit knowledge, such as marketing knowledge. The learning capacity which should be built through a learning by doing process would then be reduced. Therefore, the above-mentioned rationales lead to this hypothesis:

Hypothesis 11: Machine import weakens the relationship between export intensity and tacit knowledge acquisition.

3.4 summary

The hypotheses are developed regarding the effect of export activities on innovation performance. We focus on the sub-dimensions of export activities instead of using export status as the single component. The ideas of learning heterogeneity of each sub-export dimensions lead to the different of knowledge acquisition. Hence, we propose that not all export activities have the same direction on tacit knowledge acquisition. While export intensity, number of customers, and export persistence enhance firms to acquire tacit knowledge acquisition. However, number of markets is likely to be harmful for tacit knowledge acquisition.

In addition, the study highlights the mediating role of tacit knowledge acquisition on the relationship between export activities on both product and process innovation innovation. The hypotheses were developed based on the existing LBE literature gaps. The underlying mechanism of each hypothesis based on KBV, which emphasizes the important role of tacit knowledge acquired from foreign markets.

Furthermore, the study attempts to investigate the distinguish learning pattern to innovate between young and mature firms. Moreover, the study also points out the alternative knowledge sources by investigate the moderating effects of imported machine on the export intensity-tacit knowledge acquisition link; and number of markets – tacit knowledge acquisition link.

Chapter 4 Research methodology

4.1 Introduction

This section includes eleven sections that explain the research design, research scope, research method, etc. The main methodology for this research is a quantitative approach utilizing questionnaire surveys. Furthermore, in-depth interview has also been conducted in order to deeply understand the overall problems and nature of SMEs exporters in emerging countries. The focus of the scope is SMEs exporters in Thailand, which represents emerging economies. Further details are reported in section 4.3.

LBE literature commonly uses secondary data to investigate research problems but very few empirical papers use surveys (Genc et al., 2019, Aliasghar et al., 2019, Dhanaraj et al., 2004). Even though there is usefulness in using available data to support LBE research problems, there exist limitations to secondary data. For example, the innovation performance in emerging countries cannot be explicitly measured from the number of patents, or patent application since exporter SMEs in Thailand are not likely to apply for patents. In addition, the available patent information is mainly from large companies or corporations. Therefore, the definitions of innovation product

and innovation process that have been used in this research cannot be addressed explicitly. The study will show how the data was obtained and the rationale for using the research method that may be distinct from current LBE literature.

Even though there are many methods that may be used to investigate research problems in the LBE literature, such as multiple regression, GMM, 2OLS, etc., this research mainly uses path-analysis in SEM for testing the main hypotheses. Additionally, other techniques (e.g., chow-test, multigroup analysis, SUR) has been utilized for robustness testing. Utilizing path-analysis in testing the hypotheses may be outside the convention of testing methodologies that has been used in the current LBE literature. However, the construct such as tacit knowledge acquisition, product innovation, and process innovation include unobserved variables and a regression may not be the most appropriate method for investigating.

4.2 Research design

The study starts from the formulation of the research problem: why do exporter SMEs in emerging markets have low innovation performance even when the LBE literature shows evidence that they should innovate more as a result of exporting? From the primary research problem, we did the systematic review in LBE literature, tacit knowledge acquisition, and innovation performance. The main findings from the literature review shows that most of the empirical evidence is based on secondary data. The available data about export activities is limited to export status (Salomon and Jin, 2008, Bratti and Felice, 2012), which may not be the most appropriate factor in explaining how firms acquire knowledge, and thus may create additional heterogeneity in innovation performance. In order to reconcile the mixed results related to export activities and innovation, we

conducted a survey which allows this study to investigate the sub-dimensions of export activities, and also investigate the aspect of innovation performance of SMEs in emerging economies.

4.3 Research scope

Empirical setting: SMEs in the Thai manufacturing sector

The Fiscal Policy office of Thailand reported that SMEs play a very important role in Asian economics: they cover 90 per cent of all businesses in Southeast Asia and contribute significantly to the region's GDP. In Thailand, existing 2,000,000 SMEs account for 85 per cent of the country's total employment and thus contribute to 43 per cent of its 2018 GDP. The majority of Thai SMEs (70 per cent) generate sales domestically, and the rest (30 per cent) from exporting. being the 19th largest export economy with such key export destinations as the US, China, Japan, Australia and Hong Kong, Thailand is considered one of the world's major players in this sector.

The definition of SMEs varies from one country to another, and the interpretation depends on sizes and has changed from time to time (Peres and Stumpo, 2000), yet, by reviewing literature in International Business, a number of similarities are identified. As the Thai Ministry of Commerce categorizes manufacturing SMEs as those with fewer than 500 permanent employees or an annual turnover of less than 400 million Baht, the definition of SMEs in this study is based on these criteria and therefore different from that of other countries.

This study selected Thai manufacturing SMEs to test hypotheses for several reasons. Firstly, according to the LBE concept, small firms are deficient in skills, human resources and financial support; hence, contrary to large firms with R&D capability(Delgado et al., 2002), they need to rely greatly on external knowledge in order to implement innovation. Secondly, there is only less

than 10 per cent of overall patents developed by small- and medium-sized companies in the manufacturing sector of Thailand. Understanding driving mechanisms, such as tacit knowledge acquisition, will potentially accelerate innovation growth among these SMEs, thus benefiting the sector in particular and the country's economy as a whole. Thirdly, collecting data in single country helps us to control the effect of exogenous factors.

4.4 Research method

The study employs a questionnaire survey for testing the validity of the model and research hypotheses. The questionnaire was developed based on the literature review and in-depth interview with SMEs owners and managers.

The main purpose of the in-depth interview is for a deeper understanding of the nature of export behaviors, innovation performance, knowledge acquisition, and potentially other factors that may help explain why firms are not likely to pursue their innovation performance. Based on the feedback obtained from the interview, firms have only one or two new products and collections each year. In addition, the definitions of product and process innovation have been perceived differently. To mitigate these issues, we will not use the number of new products or the number of new processes to justify a firm's innovation performance like in previous studies(Abubakar et al., 2019). The same can be said about using the number of patent or patent applications that pervasively proxy for innovation performance (Salomon and Jin, 2008, Salomon and Jin, 2010). Therefore, measuring a product and process innovation in this context requires them to be treated as unobserved variables. Therefore, we obtained the scales of process innovation from previous studies that focus on innovation process of SMEs (Hervas-Oliver et al., 2014, Aliasghar et al.,

2019), and product innovation were adapted from previous studies (Dai et al., 2019, Prajogo et al., 2007)

The method tool for testing hypotheses

Unlike multiple regression, path analysis has been used for testing the hypotheses in this model since this method can deal with the direct effect and indirect effect simultaneously, i.e. the effect of independent variables on the dependent variable through a mediating variable. In addition, the model includes moderators (such as ages, and machine import) and more than one dependent variables (product and process innovation).

Furthermore, the conditions of path analysis allow the relationship between independent variables to be integrated in explaining the dependent variables. As a result, path analysis seems to reflect the real phenomenon more so than simply using a multiple regression. Consequently, path analysis is likely to be the most appropriate tools for dealing with this study which has multiple dynamic relationships.

The LBE literature pervasively use regression (e.g., OLS, GMM, Probit regression, etc.), however, the previous studies that need to investigate indirect effect by introducing mediating variable are likely to apply

4.5 Operationalization of construct

The concept of innovation performance both innovation product and innovation process were undertaken through the feedback obtained from in-depth interview and the literature review. We found that one indicator may be not appropriate to capture the overall concept of tacit knowledge acquisition and innovation performance in emerging market contexts. Thus, we chose to explain

the concept of innovation performance and tacit knowledge acquisition through the set of multiple indicators to measure each concept.

Measures and scale assessment

This study used multiple items to measure each construct of the conceptual model: number of markets, number of foreign customers, export intensity, export persistency, tacit knowledge acquisition from foreign markets, and innovation performance--both product innovation and process innovation. The survey was scrutinized from the previous literature and refined to reflect the specific context of the study.

4.5.1 Dependent variable

Product Innovation

Product innovation was assessed using a four-item scale ($\alpha = 0.894$). In this process, the respondents were asked to evaluate their firm's innovation performance against a major competitor in the industry. The five-points Likert Scale (worst in the industry [1] to best in the industry [5]) was used to measure: 1) the level of newness (novelty) of the firm's new product; 2) the use of latest technological innovations in our new products; 3) the speed of our new product development; 4) the number of new products our firm has introduce to the market; and, 5) the number of our new products that is first-to-market (early market entrants). These items were adapted from previous studies (Dai et al., 2019, Prajogo et al., 2007)

Process Innovation

Process innovation involves the processes that enhance a firm's performance by reducing costs(Bernstein and Kök, 2009) as well as increasing quality(Terziovski and Guerrero-Cusumano,

2009), flexibilities (Reichstein and Salter, 2006), and responsiveness (Craighead et al., 2009). This article will capture all these aspects that have been used in prior innovation literature of SMEs (Hervas-Oliver et al., 2014).

The innovation process questions were adapted from the extant literature (Hervas-Oliver et al., 2014, Aliasghar et al., 2019). In this study, the construct was operationalized using the 5 Likert scales (5=Strongly agree and 1= Strongly disagree) ($\alpha = 0.865$). The questions referred to activities related to the productivities and efficiency of production process: 1) labor cost reduction; 2) production flexibility; 3) improved capacity; and, 4) reduction of materials.

4.5.2 Mediator variable: tacit knowledge acquisition

Measure from the previous literature (Gupta and Govindarajan, 2000, Shenkar and Li, 1999) were drawn and adjusted to fit this research. There were five items to measure knowledge acquisition through export activities. The respondents were asked whether, through export activities and interaction with foreign customers, they have acquired: 1) new technical skills from foreign customers; 2) knowledge and skills of international market development from foreign customers; 3) knowledge and skills of new products and service development from foreign customers; (4) knowledge and skills of management from foreign customers; and, 5) knowledge and skills of operations and production from foreign customers.

4.5.3 Export Activities

Export intensity is assessed by the share of exports in total sales. This variable is pervasively used in LBE literature (Tse et al., 2017, Sánchez-Marín et al., 2020). Nevertheless, as SMEs in Thailand

are not inclined to reveal their exact number of sales, they were requested to provide the percentage of export sales over their total sales instead of the exact number of their export sales.

Number of markets refers to the number of export countries that firms export to. It addresses the export scope that may impact on how firms learning and acquire knowledge (Yeoh, 2004, Hitt et al., 1997, Zahra et al., 2000) The respondents were asked to count the number of countries that a firm export.

Number of customers refers to the overall number of foreign B2B customers in oversea markets. Some firms may have one customer but have many branches in different countries. Thus, we counted one customer in this case.

Export persistence refers to continuous export activities. The continuously interaction with international markets allows firms to accumulate knowledge from foreign countries, which may foster firms' capabilities to innovate. The respondents were asked to indicate '1' if their firms have been stopped exporting for more than one year, and '0' for never.

4.5.4 Moderating variable; machine import

In this study, machines import refers to an investment in advanced technology machines or equipment that support a firm's productivities and facilitate R&D to launch new products. Prior research studies generally used foreign technology licensing (Wang and Tao, 2019) to proxy technology import since technology spillovers may occur through interactions with foreign importers and learning new working processes. However, as SMEs, especially those in developing countries, are not capable of affording costly licenses, this study utilized *machine import* instead of technology import. to In this connection, the respondents were asked to rate 1 if their firm has

imported physical machines (exclude any digital software or digital infrastructure) and 0 if otherwise.

4.5.5 Control variables

Innovation performance of a firm may be conditioned by size, government support, R&D intensity, platform capability and the type of industry. At the same time, **R&D intensity** is a source of knowledge input that directly impacts innovation (Leiponen, 2005, Love and Ganotakis, 2013, Roper and Love, 2002). Naturally, firms with high R&D spending are expected to have higher capability regarding innovation performance(Cohen and Levinthal, 1990). In the survey, the respondents were asked about their company's R&D spending as a percentage of net sales. **Government support**: For SMEs to acquire and increase innovation, institutional support from their government is indispensable. Such support might come in a form of government programs encouraging SMEs to access knowledge sources or financial support which will enhance SMEs' capabilities to innovate. In the questionnaire, the participants were asked to rate 1 if their firm was involved in any government support program and 0 if otherwise. **Digital capabilities:** a firm's competency in accessing information and market knowledge through online channels enables it to explore new ideas and process, eventually enhancing its innovation performance. (Sedera et al., 2016, Nylén and Holmström, 2015). According to the extant researches from which this study drew upon, digital platform capability refers to the extent of a firm's ability to apply various functions and services regarding exporting that platforms offer (Jean and Kim, 2020). At this stage, a seven-points Likert Scale (1= minimal usage; 7= maximal usage) was employed in answering five questions on the degree in which the respondents' firm 1) communicate and coordinate on product/price/delivery/payment information with foreign customers; 2) disseminate product/service information; 3) understand product and market preference; 4) use a platform's

matching service to match with foreign customers; and, 5) get more foreign customers. The firm size here was also controlled by means of the number of employees. Since large firms have more resources, they are more likely to have the capabilities to pursue their innovation performance than smaller ones.

Table 3. Summary of scale measurements

No	Constructs	Constructs	Measures	Questions	References
1	TACIT KKOWLEDGE ACQUISITION	M_TACIT	Used a 5-item Likert scale: technological, marketing, product development, managerial, and manufacturing techniques or expertise.	To what extent does your firm acquire the following knowledge from foreign customers? 1) New technological expertise 2) New product development expertise 3) New manufacturing expertise 4) New marketing expertise 5) New Managerial expertise	Ho et al. (2019), Tsang Tsang et al. (2004), and Liu et al. (2010)
2	PROCESS INNOVATION	M_PROC	Used a 5-item Likert scale, where 1 indicated the value strong disagreement and 5 strong agreements.	To what extend do you agree that your firm has improve in process innovation on: 1. Higher production flexibility (product or service) 2. Higher production capacity 3. Lower labor cost per unit 4. Fewer materials and energy per produced unit	Breschi et al. (2000), Hervas-Oliver et al. (2014)

3	PRODUCT INNOVATION	M_PRD 2	Used a 5-item Likert scale, where worst in industry (1) to best in industry (5)	The respondents were asked to evaluate the firm's innovation performance against the major competitor in the industry. 1. The level of newness (novelty) of our firm's new product. 2. The use of latest technological innovations in our new products. 3. The speed of our new product development. 4. The number of new products our firm has introduced to the market. 5. The number of our new products that is first-to-market (early market entrants)	Prajogo et al. (2007), Dai et al. (2019), and Prajogo and Ahmed (2006)
4	EXPORT INTENSITY	EX_INT	The percent of firms sales derived from export revenues (export sales/total sales) 1) less than 20% 2) 21-40% 3)41-60% 4)61-80% 5) more than 80%	What is your export intensity? (the overall percentage of your export sales over total sales) in 2016-2019?	Lu and Beamish, 2006, Pla-Barber and Alegre (2007)
5	THE NUMBER OF MARKETS	NO_MKT	A number of markets (countries)	How many countries that you export to within in each year (2010-2019)?	Boehe and Jiménez (2016)
6	THE NUMBER OF CUSTOMERS	NO_CUST	A number of foreign customers	How many foreign customers does your firm have?	
7	EXPORT PERSISTENCY	EX_PERS	Dummy: Yes =1, No=0	Have you ever stopped exporting for more than one year?	Andersson and Lööf (2009a)
8	MATURE FIRM VS YOUNG FIRM	AGE	Dummy: Young firms have been established less than 15 years (dummy =0), and Mature firms have been established at least 15 years (dummy= 1)	How many years has your firm been in business?	Gkypali et al. (2015), Coad et al. (2013),Sapienza et al. (2006)
9	MACHINE IMPORT	MINVT	Dummy: Yes =1, No=0	Did you import technologically advanced equipment and machinery during 2016-2019?	Wang and Tao (2019)

10	SIZE	SIZE	Number of permanent employees	How many total full-time employees do your firm have?	Acs and Audretsch (1987)
11	DIGITAL CAPABILITIES	M_PLAT	Used a 7-item Likert scale: Please indicate the extent to which your use of platform to: (1=Minimal use; 7 Greater use)	Please indicate the extent to which you use of platform to: 1. Communicate and coordinate product/price/delivery/payment information with foreign customers. 2. Disseminate product/service information 3. Understand product and market preference. 4. Use platform's match service to match with foreign customers. 5. Aggregate more foreign customers.	Jean et al. (2020)
12	GOVERNMENT SUPPORT	GOVN	Dummy: Yes =1, No=0	Does firm have involved any government support program?	Xie and Li (2015)
13	R&D EXPENDITURE	RD2	The average percentage of R&D spending in each year.	Please inform us about your estimated percentage of R&D expenditure.	Lane and Lubatkin (1998),Cohen and Levinthal (1990)

Sample size and questionnaire contribution

To ensure the accuracy of data, it is essential to identify the right target participants. This study set the scope of data collection at the firm level, and data of exporting manufacturing SMEs in Thailand from multiple sources were duly gathered. One of the sources was the list from the Department of International Trade Promotion, Ministry of Commerce Thailand, which provides contact details of manufacturers and their industries.

A number of 1,000 SMEs were randomly chosen from the list. To ensure the validity and reliability of responses, only owners or top managers who understand their businesses' overall activities and

have sufficient knowledge about their firm's innovation performance and knowledge acquisition were entitled to complete the questionnaire. As a result, there is no concerning issue related to the Degree of knowledge.

A random sample was drawn from exporting SMEs located in different provinces of Thailand. The sampling firms' geographical locations covered every region. The sample represented a wide range of industries, such as textile, hand-crafts, ceramics, foods, furniture, leathers, etc.,

4.6 Questionnaire design process

The survey has been used for testing the model and the hypotheses. The survey was developed from the existing literature and interview results. The component of the survey focused on 1) a firm’s background information 2) export activities (export sales, number of markets, number of customers, export persistence) 3) tacit knowledge acquisition 4) innovation performance.

Prior to the actual research, a pilot study was conducted to determine its accuracy as well as to detect possible errors. The preliminary study was conducted with three academic experts in International Business and Marketing. They were asked to validate the survey instrument in order to ensure that the scales are understandable and align with theories for the study context.

Furthermore, we did a face-to-face interview, engaging top executives or company owners as primary contacts and targeting professionals at both managerial and operational levels as respondents. The target respondents could be senior R&D managers, CEOs and international project leaders, who are most knowledgeable in cross-border knowledge acquisition (Ho et al., 2018). It is because these personnel are likely to understand their company’s main strategies to

achieve innovation and abreast with its export activities. The pilot study was then conducted using semi-structured interviews with 15-20 participants and about 45 minutes to 1 hour per person.

The interview put an emphasis on eliciting the participants' perspectives and experiences regarding export activities, such as their experiences with interactions with foreign customers, the key information or knowledge from entering to several markets, and the motivation to decide exit or continue exporting. Additionally, they were asked to identify the characteristics of their export activities, innovation performance, knowledge acquisition and machine import investment. Before the interview, the interviewer gave details about the specific objectives and privacy policy of this study to ensure the confidentiality of the survey.

In this connection, a well-produced questionnaire capable of generating adequate data was developed. The scales of constructs were mostly adopted and adjusted during an in-depth interview process. The questionnaire was originally written in English and was translated into Thai language by using back-translation method.

Interview Results

Below are samples of direct quotes from exporting SME owners;

Firm A: “Our manufacturers gain new knowledge from importers and distributors from foreign countries. Those foreign customers always tell us about their local customers’ demands and tastes as well as updates on a market trend. We then use the market knowledge we have obtained to improve our products.”

Firm B: “We love to visit physical stores at local markets to discuss and ask for feedback from salespersons and directly from customers. A good connection with foreign distributors that we get through export activities enables us to identify any customer dissatisfaction, and we use this information to initiate innovative products accordingly.”

Firm C: “After exporting to many countries, customers suggest that we adopt new technology and import machines to help with production processes. Taking the advice of our foreign customers into account, we can therefore reduce waste and increase productivities.”

From the interview, it can be seen that innovation involving these SMEs are likely to be incremental rather than radical innovation, with only 1-2 new products having been introduced per year. Most firms have co-developed their designs with foreign customers and developed incremental production processes.

The depth interviews are likely to explain that firms have interactions with foreign customers in a different level, and acquire some useful information from foreign markets. However, there is a small number of their innovation performance.

4.7 Fieldwork procedures

Following this, a data collection team was set with the responsibilities of contacting SME owners and following up with them on answering the questionnaire. In order to cover every area, we have five members come from different parts of Thailand, which comprises six regions: the North, the East, the West, the Northeast, the Central region and the South. All of the team members were well-trained before making a contact with manufacturers or the management who understand their firm’s overall international strategy and innovation performance.

Phase 1

Regarding the pandemic, it was more plausible for the participants to complete the questionnaire online than via a hardcopy sent by post. In addition to saving distribution costs, sending an electronic version could eliminate a possibility that the recipients might miss the postal parcel as most manufacturers were required to abide by the Thai Government's work-from-home policy. For this reason, the survey was therefore conducted online.

After making sure that the acquired contact email addresses were the current ones, the data collection team called the entrepreneurs to confirm their email addresses before sending them a link to the online questionnaire. Attached with the questionnaire were a letter informing the participants about the objectives of this study and promising that they will be provided with the research's managerial implication section once data analysis is finished.

All of the 500 surveys were distributed electronically in November 2020. However, the response rate was very low at five per cent despite the team's several attempts to follow up with the recipients.

Phase 2

To make up for the low response rate in Phase 1, the team decided to change the strategy by looking out for trade exhibitions in which hundreds of exporters attend in order to show their products and find trade partners. Next, the team contacted exhibition organizers, who are mainly from the Commercial or Trade Ministries, to ask for their permission to perform data collection at an intended exhibition. After receiving an authorization, data were collected at the exhibition using a hard-copy questionnaire. The response rate of data collection at the exhibition hall was found to rise to 50 per cent with a total of 60 returned questionnaires.

Phase 3

To reach a targeted minimum of 200 participants, informal networks, including the alumni of Chiang Mai University's Executive MBA program, were engaged in the survey. The team called the chosen alumni to inform them about this study and ask them to help complete the questionnaire in one week. We follow-up by phone call and send LINE (online messenger) to the participant every two weeks. We also offered a summary result of the study to encourage participants to respond the survey.

The overall process from phase 1 to phase 3 took almost three months (November and December 2020, and January 2021). Of 265 returned questionnaires, only 220 were applicable for data analysis, and the 45 inapplicable questionnaires were subsequently dismissed.

4.8 Demographic characteristics of the study sample

The majority of respondents were firms that have employee less than 19 (50.5%), and the rest of them are medium and large. The average age of firms is 19.1 years. Furthermore, Among the respondent firms, 25.5% are food and beverage industry, and the remainder are other industry.

Table 4. Sample profile (N= 220)

Industry		**Frequency**	**%**
	Food and beverage	56	25.5
	Textiles, clothing, leather, and footwear	19	8.6
	Furniture	12	5.5
	Facecare and skincare	13	5.9
	Toys and Jewelry	31	14.1
	Medical equipment	5	2.3
	Clothing	11	5

	Automotive	4	1.8
	Electronics	5	2.3
	Mining	1	0.5
	Agriculture	16	7.3
	Printing	1	0.5
	Others	46	20.9
	Total	220	100
Sizes	**Number of employees**	**Frequency**	**%**
	1-19	111	50.5
	20-49	39	17.7
	50-99	23	10.5
	100-249	23	10.5
	more than 250	24	10.8
	Total	220	100
Ages	**Years**	**Frequency**	**%**
	1-5	43	19.5
	6-10	45	20.5
	11-19	39	17.7
	20-39	69	31.4
	40 onwards	24	10.9
	Total	220	100

4.9 Self-selection and non-response bias

Non-Response Bias

For non-response bias, the study followed Armstrong and Overton (1977)'s procedure. Upon dividing the respondents into early and late ones, the t-statistics suggested no significant difference between these two groups, indicating that non-response bias was not a serious concern.

Common Method Variance (CMV)

In each firm, information was drawn from different participants: the SME owner and one of the management team were asked to provide operational level information, such as new foreign

markets, production processes and knowledge shared from customers. To ensure that the participants were pertinent and reliable, only the owners or top management were contacted and requested to complete the questionnaire. In the case that two informants per one firm were not feasible, various procedural remedies were applied so as to avoid the issue of self-reporting from a single informant. These measures included: 1) using different scales and changing the Likert Scale anchors (Podsakoff et al., 2003); 2) calling every informant before sending him/her a survey to inform him/her that there is no right or wrong answer as well as providing him/her with the definition of key terms; 3) informing the respondents that the data they provided would be confidential throughout the survey process; 4) making sure that at certain firms, the questionnaire was given to at least two respondents.

For a statistical remedy, a method suggested by Podsakoff et al. (2003) was deployed to examine the severity of common method variance. Common Method Bias was handled using Harman's one-factor test (Harman, 1967). In this connection, all of the items concerning tacit knowledge acquisition (M_TACIT), product innovation (M_PRD), process innovation (M_PROC), and digital capabilities (M_PLAT) constructs were entered into an exploratory factor analysis. The results showed that no single factor emerged from the analysis. The first factor accounted for 27.99 per cent of the explained variance. The un-rotated single factor containing all variables accounted for less than 50 per cent of the variance. Therefore, it can be concluded that CMV should not be a concern for this study.

4.10 Endogeneity issue

Within the context for LBE, non-endogenous links between export and innovation has been discussed pervasively in the literature. Cassiman and Golovko (2011), using a matching model framework, found that productivities affect both innovation and export simultaneously. In

addition, firms with high productivities are likely to have the potential to export since the fixed costs have been controlled. Wei and Liu (2006) found support that increased productivities facilitate firms to accumulate resource slacks and promote R&D. Salomon and Jin (2010) posit that export activities can enhance a firms R&D through learning from interactions with foreign markets.

In the context of this research, endogeneity as a result of sample selection is not an issue due to the randomness in sample selection. Thus, the issue of simultaneity and omitted variable must be dealt with. From a methodological perspective, the literature offers ways to correct for endogeneity bias. de Oliveira et al. (2021) uses fixed effects to control for time-variant between years and to handle the impact of firm characteristics. Nguyen et al. (2008), using data from Vietnam, employs both the instrumental variable approach and the bivariate probit model to deal with the endogeneity of innovation. Furthermore, prior research has used propensity score matching (PSM) (Cassiman and Golovko, 2011) and Heckman selection model (Heckman, 1979) in dealing with endogeneity issue. We apply this PSM methodology to match non-export persistent firms with export persistent firms and the result is presented below;

Propensity score matching (PSM)

VARIABLES	(1) M_PRD2	(2) M_PROC
EX_PERS	0.5162***	0.4536***
	(0.1998)	(0.1387)
Observations	10	10
Observations %	4.7%	4.7%

Propensity score matching (PSM) is used for further robustness to match non-export persistent firms with export persistent firms based on the following characteristics: firm size, industry, foreign ownership, and government support. A logit model and nearest neighbor matching (1:1) utilized in the PSM procedure. This procedure allows for two sub samples of export persistent firms to be created based on these covariates, with 10 firms in each export persistent group being matched. The results show that there is an increase in product innovation and process innovation of 0.52 and 0.45, respectively, for firms that stop exporting for one year when compared to firms that continue to export year after year.

Additionally, we also apply a qualitative approach through evidence gathered from interviews in order to prove no endogeneity.

Evidence from Case Study

This approach follows the suggestion of prior research that raise endogeneity concerns in IB (Reeb et al., 2012) and suggest researchers observe real-world phenomena. The in-depth interviews were conducted with general managers, SMEs owners, and marketing managers to understand the nature of causality between export and innovation. The summary of the case studies below shows that most of the firms in Thailand acquired a piece of crucial market information and production techniques to enhance their innovation processes from foreign customers. They are not likely to rely on their internal resources to innovate before exporting. Thus, this phenomenon aligns with the empirical research studies that the LBE concept is pertaining to exporting firms in emerging economies and less developed countries (de Oliveira et al., 2021, Aliasghar et al., 2019). A case study approach, as details below, show that my result do not suffer from endogeneity and establishes a causal link between export activity and innovation performance.

Firm A (**De Leaf Tanaka)**, a beauty and skincare product company, was first launched in 2011in the Burmese market. The main market share is from Myanmar and Thailand with secondary market shares from Laos and Malaysia. Other export markets include Vietnam, India, Indonesia, and China. The main distribution channel relies on local retailing stores (> 95%).

The firm has built a relationship with middlemen in Myanmar and learned from the middlemen about the customers' tastes. The owner also made several market visits (every month for their primary market) to discuss and ask the feedback from salespeople and customers at the retail stores.

The owner stated that a market visit allows him to learn about consumer behaviors and preferences. For example, the owner found the pain point of using the product (Tanaka powder) that is difficult to use from interviewing with customers at the retail stores in Myanmar. Therefore, they developed the product (Duo powder and foundation), combining two products into one product package. This innovative product is much easier for customers to use. This new product innovation is derived from customer feedback from market visits.

In addition, the firm learnt that Myanmar customers use social media to communicate. As a result, the firm utilized social media to interact with consumers through online comments, chat boxes on social platforms, and one-on-one interviews to get consumer insights. The owner mentioned that entering Myanmar helped them accumulate market knowledge and international knowledge to initiate innovative product ideas and expand product lines.

"The more we visit and talk with end consumers and local distributors in Myanmar, the better we gain market insights. As a result, this interaction helps us develop ideas to initiate new products."

Firm B (Ceramics Qualitier) is a manufacturer of porcelain tableware. The main market is in the Netherlands and other European countries (70 per cent of total sales). The main sources of

innovation products and processes are derived from the local distributors, which provide firms with customer needs, new market trends, and new technology for production improvement. For example, the main customer in the Netherlands sent their designers to Thailand and taught them how to design products to meet market trends and improve efficiency in their production processes. The firm has an R&D team that has specialists in using clay and uses robot warehouses to manage their inventory.

Furthermore, the customers taught them to use different techniques to create specific colors that meet market trends and customers' demands. However, developing the production process did not occur quickly. The company needed to go through several trials and follow the suggestions from customers. For example, the firm learned new technique of coloring allowing the firm to add the coloring at the time of clay molding rather than applying the color after clay firing. This new technique required special glazing and gloss firing at 1300 degrees.

New products or new collections in each season come from foreign orders. However, the company acquired new techniques and production processes from advice from foreign customers and distributors. The owner revealed that lack of market knowledge is the primary cause of business failure. However, the failure to enter into a new market without market knowledge leads the firm to see the importance of participation with foreign customers and extract valuable knowledge and information to develop their products and processes. The regular meeting between the marketing team and customers and market visits fosters knowledge acquisition. The owner stated that their employees had developed their expertise from increased interactions with the customers. After exporting, foreign customers' ideas and market information allow the firm to access market insights and technology knowledge that firms can utilize to differentiate their products from global

competitors. Furthermore, firms have more flexibility in continuously improving their operational processes.

Firm C (Ton Tum Rub) sells healthy beverages with Cambodia as the primary export market. The main distribution channel is gas stations convenience stores and family-owned shops. The critical knowledge source is the local agents in each country. The state agency leads firms to have connections with foreign customers.

"Thai local farmers still lack knowledge and experiences in international marketing so the product development, pricing, packaging, and transportation are critical issues that need to be guided and trained by experts." Currently, support from the government is insufficient. Therefore, the company needed to build an informal network to know the customers wants and needs. This firm does not focus on NPD (New Product Development) but pays more attention to optimizing the manufacturing process, such as product shelf-life extension based on information gained from the local agents.

In summary, this subset of interviews confirm that firms are likely to learn from exporting before they initiate both innovative products and processes. The results of in-depth interview demonstrates that firms in emerging market may not be able to leverage their innovative ideas in promoting their export activities. Even though many firms try to upgrade their products but they may use only simpler technologies that do not enough to initiate innovation products to export.

In addition, the owners and managers also highlight the importance of regular interaction with foreign customers that facilitate them to acquire market insights and obtain deep knowledge embedded in foreign customers and institutional contexts abroad. Nevertheless, most interviewees

pay more attention to process innovation rather than product innovation since process or production directly affects the firm's efficiencies and costs.

4.11 Data analysis

The confirmatory factor analysis (CFA) with maximum likelihood estimation was applied to investigate the validity of the measurement model (The details are shown in Chapter 6: Validity and Reliability Analysis). We check loading coefficients and modified by eliminating only one items from product innovation due to weak loading coefficients.

As we use multiple questions to measure each construct, the structural equation model (SEM) was applied to examine relationships between and among independent and dependent variables. CFA has been confirmed by SEM.

However, when we check all multiple fit indices, the path-analysis provides the better fit than SEM. This implied that using path-analysis will more appropriate to examine in this study.

Chapter 5: Findings of Descriptive Statistics

5.1 Descriptive statistics and correlation matrix

Table 5. Descriptive statistics, correlation Matrix, and VIF

No	Descriptions	1	2	3	4	5	6	7	8	9	10	11	12	13	Mean	Std. Deviation	VIF 1	VIF 2
1	PRODUCT INNOVATION	1.00													3.39	0.96		
2	PROCESS INNOVATION	.212**	1.00												3.78	0.85		
3	TACIT KNOWLEDGE ACQUISITION	.242**	.415**	1.00											3.52	0.86	1.11	
4	EXPORT INTENSITY	0.06	.208**	0.07	1.00										2.37	1.52	1.40	1.37
5	NO OF MARKETS	0.04	0.03	-0.06	.334**	1.00									7.17	8.74	1.69	1.66
6	NO OF CUSTOMERS	0.07	0.01	0.00	.293**	.651**	1.00								16.56	29.91	1.35	1.35
7	EXPORT PERSISTENCY	0.01	-0.03	-0.01	-.302**	-.364**	-.340**	1.00							0.32	0.47	1.32	1.31
8	FIRM AGE	-0.08	-0.07	-0.11	0.12	.557**	.341**	-.244**	1.00						19.10	16.93	1.37	1.36
9	MACHINE IMPORT	0.08	.212**	-0.02	.222**	.187**	.133*	-.156*	.145*	1.00					0.50	0.50	1.27	1.27
10	SIZE	-0.02	0.10	-0.03	.344**	.444**	.350**	-.410**	.373**	.417**	1.00				2.20	1.57	2.06	2.05
11	R&D EXPENSES	0.09	.156*	0.01	.215**	.151*	0.09	-0.12	-0.07	.277**	.207**	1.00			11.64	15.67	1.16	1.16
12	GOVERNMENT SUPPORT	-0.01	.176**	-0.03	-0.02	.178**	.149*	-0.12	0.05	0.02	0.00	0.12	1.00		0.65	0.48	1.07	1.07
13	DIGITAL CAPABILITY	.250**	0.12	.221**	-.142*	0.06	0.10	-0.09	-0.03	0.06	-0.06	.169*	0.12	1.00	4.74	1.68	1.25	1.19

** Correlation is significant at the 0.01 level (2-tailed), * Correlation is significant at the 0.05 level (2-tailed), VIF 1: Dependent variable are product and process innovation, VIF 2: Dependent variable is tacit knowledge acquisition

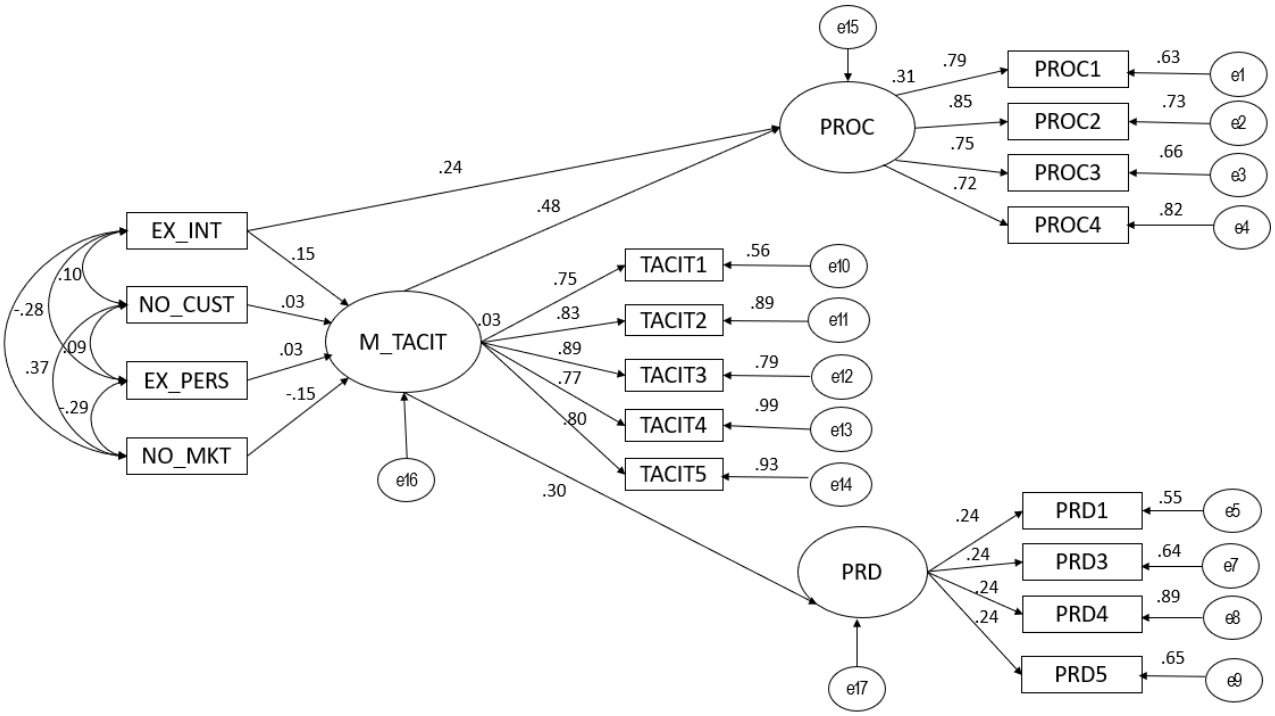
Chapter 6: Validity and Reliability Analysis

A confirmation factor analysis (CFA) using AMOS was performed to assess the scales' properties and ensure that the model fits the data relatively well.

The chi-square/df ratio is another measure that is difficult to interpret as it is unclear what is a good or bad cutoff (Kenny, 2014). Therefore, other indices -- for example the incremental fit indices (CFI, NFI), which should be greater than 0.95, -- was taken into consideration. The absolute fit indices (GFI, AGFI), which should be greater than 0.9 in order to be considered as a good fit (Jöreskog and Sörbom, 1993), was also contemplated. Finally, the root-mean-square error of approximation (RMSEA), which should be less than 0.05 to indicate a good fit (MacCallum et al., 1996, Browne et al., 1993), was examined.

The result of CFA showed the chi-square/degree of freedom (χ^2/df) =1.644, p<0.001; comparative fit index (CFI) = 0.961; Tucker-Lewis's index (TLI) = 0.952; incremental fit index (IFI) = 0.961; goodness-of-fit index (GFI) = 0.918; adjusted goodness-of-fit index (AGFI) = 0.886; and root mean square error of approximation (RMSEA) = 0.054. The CFA model indicated a close fit to the data, as detailed below, suggesting that the model fit was acceptable.

Figure 2. Confirmatory factor analysis (CFA) with maximum likelihood estimation



Chi-square = 180.824, DF = 110, P=.000, Chi-square/DF = 1.644, GFI=.918, AGFI =.886, CFI=.961, RMSEA =.054, Model = Standardized estimates.

All items achieved adequate reliability, validity, and construct reliability, as detailed below.

To evaluate the reliability of the indicator, squared multiple correlations and item-total correlations were examined. The result showed that squared multiple correlations of all items were greater than 0.5, which are considered substantial. Furthermore, the item-total correlations of all items were greater than 0.3 or 0.4, which are also considered substantial.

In addition, the factors loading was greater than 0.6 (Nunnally, 1994), and all of them were significant at the p-value of less than 0.05.

To evaluate construct reliability, the Cronbach's alpha of Tacit knowledge acquisition (M_TACIT), product innovation (M_PRD), and process innovation (M_PROC) were scrutinized and found to be greater than 0.70 (Nunnally and Bernstein, 1994). Besides, the Composite Reliability (CR) of all items was greater than 0.6 (Bagozzi and Yi, 2012), and the Average Variance Extracted (AVE) were greater than 0.50 (Fornell and Larcker, 1981). Therefore, the results showed good reliability and validity as mentioned in the table below;

Table 6. Scale assessment and confirmatory factor analysis results

Constructs	Indicators	Descriptions	Validity	Construct Reliability		
			Factor Loadings	Average Variance Extracted (AVE)	Composite Reliability (CR)	Cronbach's Alpha
TACIT KNOWLEDGE ACQUISITION	TACIT1	New technological expertise	0.742			
	TACIT2	New product development expertise	0.830			
	TACIT3	New manufacturing expertise	0.892			
	TACIT4	New marketing expertise	0.766			
	TACIT5	New managerial expertise	0.785	0.648	0.901	0.899
PROCESS INNOVATION	PROC1	Labor cost reduction	0.789			
	PROC2	Product flexibility	0.853			
	PROC3	Improved capability	0.800			
	PROC4	Reduction of materials	0.712	0.624	0.869	0.865
PRODUCT INNOVATION	PRD1	The level of newness of new products	0.767			
	PRD2	The use of lastest technological innovations in new product development	0.692			
	PRD3	The speed of new product development	0.824			
	PRD4	The number of new prodcuts our firm has introduced to the market	0.909			
	PRD5	The number of our new products that is first-to-market	0.794	0.641	0.898	0.894

Model Fit Assessment

Multi-collinearity among any variables was examined by calculating the variance inflation factor (VIF) for each independent variable. All variation inflation factor (VIF) of independent variables

were ranged from 1.07 to 2.06, which were lower than the threshold level of 5.0, which indicates that multi-collinearity not a major concern (Hair et al., 2009).

Chapter 7: Results of Hypotheses Tests

7.1 Structural model and hypothesis testing

After confirming that the data fit the model by means of CFA, path analysis was performed using the AMOS program. We did not use multiple regression analysis because this method is able to simultaneously examine a series of dependent relationships (Shook et al., 2004). In addition, path analysis provides us a better new fit index.

In overall, the general hypothesized model fits the data reasonably well. The overall $\chi 2$ value was found to be 29.742, with a degree of freedom equal to 17 (P-value < 0.01), and the ratio of the chi-square statistic to the respective degree of freedom (χ^2/df) equal to 1.75. This ration ≤ 2 indicates a fit between the hypothesized model and the data (Cole, 1987).

However, since the χ^2/df ratio was likely to be difficult for interpretation because it is unclear what is a good or bad cutoff (Kenny, 2014), multiple fit indices were therefore assessed in order to check the overall model fit.

The incremental fit indices indicate how much the fit has improved from the null model to hypothesized model. Here, the Comparative Fit Index (CFI), which weighs heavily on any model misspecification errors, was 0.993; the Normed Fit Index (NFI) = 0.986; the Tucker-Lewis

Coefficient (TLI) = 0.96; the Incremental Fit Index (IFI) = 0.994; and the Relative Fit Index (RFI) was 0.911. Regarding the literature of Bagozzi and Yi (2012), these indices indicate a good fit. This means the model acceptably fits the data.

The root means square error of approximation (RMSEA), which focuses on the discrepancy between reproduced and actual variance-covariance matrices, showed a reasonable fit at 0.059 (< 0.08), based on the fit indices as suggested by Browne et al. (1993) and MacCallum et al. (1996). Therefore, it can be presumed that this model achieves a good fit.

Figure 3. The full model of path analysis

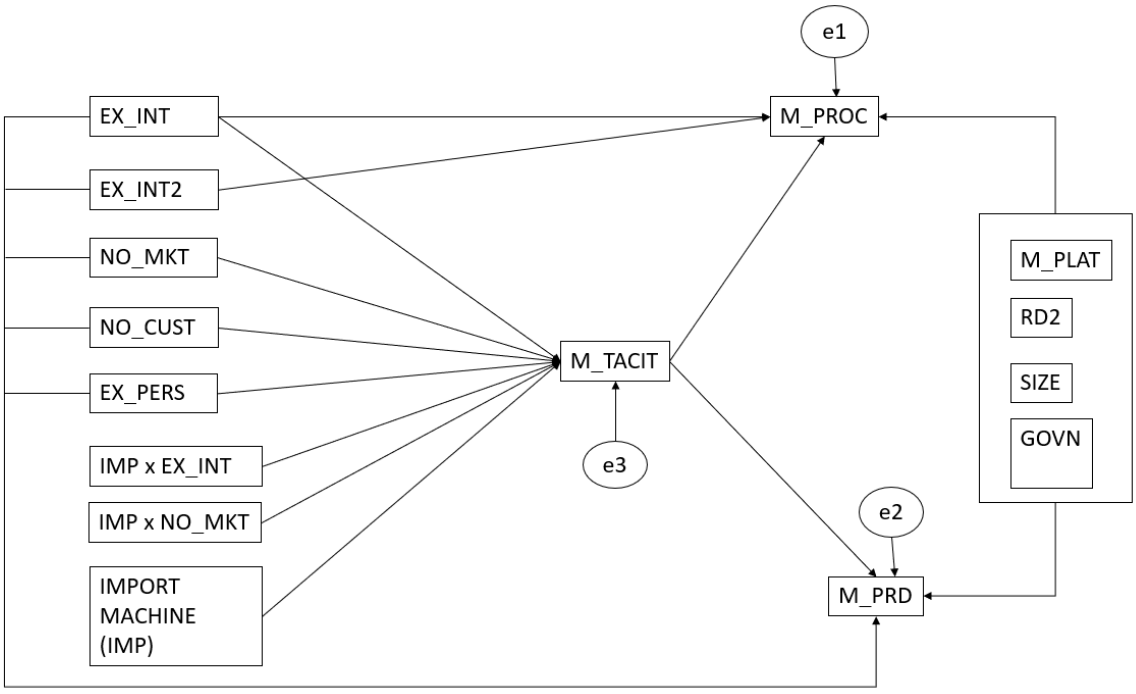


Table 7. Variable descriptions

Abbreviation	Description	Measures
EX_INT2	Export intensity (quadratic)	(EX_INT) ^2
EX_INT	Export intensity	**The percentage of export sales over total sales** **(1) less than 20%** **(2) 21-40%** **(3)41-60%** **(4)61-80%** **(5) more than 80%**
NO_MKT	Number of markets	Continuous variables
NO_CUST	Number of foreign customers	Continuous variables
EX_PERS	Export persistence	yes =0, no=1
IMP	Import machine	import =1, no import =0
IMP X NO_MKT	Interaction term between import machine and No of markets	MINVI (0 vs1) x NO_MKT
IMP X EX_INT	Interaction term between import machine and Export intensity	MINVI (0 vs1) x EX_INT
SIZE	Number of employees	Continuous
RD2	Average percentages of R&D budget	percent
GOVN	Government support	yes =1, no=0
M_PLAT	Digital capability	7 points- Likert scales
M_TACIT	Tacit knowledge acquisition	5 points Likert scales
M_PROC	Process innovation	5 points Likert scales
M_PRD	Product innovation	5 points Likert scales

7.1.1 Relationship between export activities (export intensity, export persistency, number of markets and number of customers) and tacit knowledge acquisition

Table 8. Summary of main effects results

Hypotheses	Model relationships	Standardized Regression Weights	Unstandardized Regression Weights	P-Value	Results
1	Export intensity --> Tacit knowledge acquisition	0.329	0.186	0.001	Support
2	No of markets--> Tacit knowledge acquisition	-0.531	-0.052	0.001	Support
3	No of customers --> Tacit knowledge acquisition	0.056	0.002	0.439	Unsupported
4	Export persistency --> Tacit knowledge acquisition	0.041	0.076	0.552	Unsupported
5	Tacit knowledge acquisition --> Process innovation	0.445	0.439	0.001	Support
6	Tacit knowledge acquisition --> Product innovation	0.228	0.254	0.001	Support

According to the abovementioned table of summary of main effects results,

the value in hypothesis 1 shows that export intensity has a positive impact on tacit knowledge acquisition ($\beta=.186,\ p < 0.01$). The more export sales the firms generate, the higher the tacit knowledge acquisition from foreign countries. As a direct link between export intensity and tacit knowledge acquisition is significant, this hypothesis is therefore supported.

Hypothesis 2 predicts that there would be a negative relationship between the number of markets and tacit knowledge acquisition. The result is negative and significant ($\beta=-0.052,\ p < 0.001$). it means the more markets a firm exports its products to, the less tacit knowledge it has acquired. With reference to the previous literature, the negative significance can be explained as follows; when firms have to deal with too many complex and complicated regulations and requirements,

they do not have enough potentials and skills to manage diverse requirements from each of the different countries. Hence, Hypothesis 2 is supported.

Hypothesis 3 suggests that the number of foreign customers has a positive impact on tacit knowledge acquisition. However, the coefficients for a number of foreign customers to tacit knowledge acquisition link is very low (*β=.002, p >0.10),* which is not significant. Therefore, hypothesis 4 is unsupported.

Hypothesis 4 shows insignificant results: the standardized coefficients for the direct part between export persistence and tacit knowledge acquisition are very low (β=.076, *p>0.10*). Hence, Hypothesis 4 is unsupported.

7.1.2 Relationship between tacit knowledge acquisition and innovation performance (both product and process innovation)

Hypothesis 5 and 6 predict that tacit knowledge acquisition will positively impact process innovation and product innovation respectively. The coefficient for tacit knowledge to process innovation is found to be positive and significant (*β=.439, p < 0.01),* and it is also positive and significant for tacit knowledge to product innovation *(β=.254, p < 0.01).* Therefore, hypothesis 5 and 6 are supported.

7.1.3 Non-linear relationship between export intensity and process innovation

Hypothesis 7 suggests that there is a non-linear relationship between export intensity and process innovation. In this regard, export intensity (INT2) was squared and put in the path analysis model, then linear export intensity and squared export intensity were compared. The result shows the

quadratic significance ($\beta = .862, p < 0.01$). Meanwhile, the linear model is also significant in the negative sign ($\beta = -.668, p < 0.05$). The result portrays the non-linear U shape of the relationship between export intensity and process innovation, indicating that an increase in export intensity at the low level (less than 20 per cent of export sales over total sales) lessens process innovation at a certain point, and afterwards process innovation increases in alignment with export intensity. In this respect, it can be stated that the more export intensity, the higher process innovation will be.

Therefore, it can be concluded that hypothesis 7 is supported.

7.1.4 Mediation effect analysis of tacit knowledge acquisition

It is purposed in Hypothesis 8a that tacit knowledge acquisition mediates the relationship between export intensity and a firm's process innovation. To test the mediating effects of tacit knowledge acquisition, the bootstrapping method (Preacher and Hayes, 2004) was adopted using a bootstrap sample size of 1,000 plus replacement with bias-corrected confidence intervals at the 5 per cent level and maximum likelihood estimation. With regards to mediating effects, the results are as follows:

Table 9. Mediating effects

Relationships	AMOS Bootstrap 95% CI			Indirect effects	Standardized Indirect Effects	Result
	Lower Bounds	Upper Bounds	Two Tailed Significance			
EX_INT --> M_TACIT--> M_PROC	0.036	0.273	0.007	0.007***	0.147***	mediation
EX_INT --> M_TACIT--> M_PRD	0.010	0.181	0.013	0.015**	0.075**	mediation
NO_MKT --> M_TACIT--> M_PROC	-0.309	-0.020	0.003	0.005***	-0.236***	mediation
NO_MKT --> M_TACIT--> M_PRD	-0.451	-0.073	0.013	0.017**	-0.121**	mediation

Notes: *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level respectively. 'ns' in parentheses indicates non-statistical significance

The Sobel tests indicate that the indirect effects of export intensity (EX_INT) on product innovation (M_PRD) and process innovation (M_PROC) via tacit knowledge acquisition (M_TACIT); and the indirect effects of number of markets (NO_MKT) on product innovation (M_PRD) and process innovation (M_PROC) via tacit knowledge acquisition (M_TACIT) are significant at the 5% level, confirming that tacit knowledge acquisition mediates among those relationships above.

7.1.5 Moderator effect (Multigroup analysis)

Hypothesis 9 suggests that the relationship among these export activities (EX_INT, NO_MKT, NO_CUST) and innovation performance (PROC, PRD2) are different in young and mature firms. To investigate whether firm age can moderate the proposed relationship of export activities (export intensity, number of markets, and number of customers) and tacit knowledge acquisition, multiple-group SEM was performed to test these moderation effects. In this connection, age was used in justifying young and mature firms: a young firm refers to a firm that has been in operation for less than 15 years (N=111), while a mature firm is a firm that has been operated for 15 years and longer (N=109).

In the first place, firm ages were applied as moderators at the model level. Testing for cross-group invariance involved a comparison between two nested models: one was an unconstrainted model, where all parameters were allowed to be freely estimated, and the other was structural weights

model, where all paths were constrained to be invariant between two groups, leaving covariates free in the model. The fit indices for unconstrained model are as follows; $\chi 2$ (40) of 27.286. For the constrained model; $\chi 2$ (37) of 46.69. All of the indices indicate acceptable fit (Bagozzi and Yi, 2012).

Next, we checked the Nested model comparison, the χ^2 between the unconstrained and constrained model were compared, and changes in chi-square ($\Delta\chi 2$) were checked. The chi-square change is found to be insignificant (P=0.976): $\chi 2 = 1.224$, degree of freedom =6.

These indicators indicate that groups are not different at the model level with 90 per cent confidence. Therefore, the relationships amongst export intensity, number of markets, number of customers, and tacit knowledge acquisition are not different between young and mature firms.

We also conduct Chow-test to robust that whether there is a different among the variables between mature and young firms at model level. The result shows insignificant at model level and these results align with the test by using multigroup analysis in SEM.

Therefore, *Hypothesis 9 is not supported at the model level*.

Thus, we continue to check the difference at the path level for testing the sub-hypotheses H9a-H9f

H9.1: There is a difference in the relationship between export intensity and tacit knowledge acquisition varying across firm age.

H9.2: There is a difference in the relationship between number of markets and tacit knowledge acquisition varying across firm age.

H9.3: There is a difference in the relationship between number of foreign customers and tacit knowledge acquisition varying across firm age.

H9.4: There is a direct impact between number of markets and product innovation varying across firm age.

H9.5: Tacit knowledge acquisition mediates the relationship between export intensity and process innovation varying across firm age.

The details of path level and the chow-test results show in Table 10 and Table 11 as below;

Table 10. Multigroup analysis and chow-test results

		Group 1 = Young firms (N=111)					Group 2 = Mature firms (N=109)					Chow-test Results
From	**To**	**Standardized estimates**	**Unstandardized estimates**	**S.E.**	**C.R.**	**P**	**Standardized estimates**	**Unstandardized estimates**	**S.E.**	**C.R.**	**P**	
Export intensity	Tacit knowledge acquisition	0.352**	0.186**	0.074	2.518	0.012	0.268*	0.161*	0.089	1.813	0.070	Not significant
No of markets	Tacit knowledge acquisition	-0.08	-0.022	0.038	-0.571	0.568	-0.657***	-0.053***	0.017	-3.079	0.002	Not significant
No of customers	Tacit knowledge acquisition	-0.076	-0.002	0.003	-0.811	0.417	0.222**	0.006**	0.003	1.969	0.049	Significant
Export persistence	Tacit knowledge acquisition	-0.019	-0.033	0.169	-0.192	0.848	0.028	0.057	0.197	0.291	0.771	Not significant
Tacit knowledge	Process innovation	0.427***	0.446***	0.082	5.457	0.000	0.440***	0.414***	0.076	5.454	0.000	Not significant
Tacit knowledge	Product innovation	0.161*	0.185*	0.101	1.826	0.068	0.158*	0.170*	0.097	1.761	0.078	Not significant
Export intensity	Process innovation	-1.174**	-0.649**	0.271	-2.397	0.017	-0.481	-0.271	0.249	-1.088	0.276	Not significant
Export intensity2	Process innovation	1.454***	0.138***	0.047	2.909	0.004	0.667	0.064	0.042	1.512	0.131	Not significant
No of markets	Product innovation	0.328***	0.103***	0.03	3.487	0.000	-0.001	0.000	0.009	-0.014	0.989	Significant
Import machine	Tacit knowledge acquisition	0.186	0.306	0.309	0.991	0.322	0.11	0.2	0.329	0.607	0.544	Not significant

Import machine * no of markets	Tacit knowledge acquisition	0.286	0.08	0.053	1.528	0.127	0.445*	0.035*	0.019	1.806	0.071	Not significant
Import machine * export intensity	Tacit knowledge acquisition	-0.621***	-0.294***	0.105	-2.81	0.005	-0.225	-0.115	0.117	-0.98	0.327	Not significant
Controls												
Size	Process innovation	-0.103	-0.092	0.086	-1.064	0.287	-0.006	-0.003	0.055	-0.061	0.952	Not significant
Size	Product innovation	0.022	0.018	0.073	0.244	0.807	0.072	0.033	0.04	0.835	0.404	Not significant
R&D expenses	Process innovation	0.146	0.008	0.005	1.597	0.11	0.072	0.005	0.007	0.763	0.446	Not significant
R&D expenses	Product innovation	0.03	0.001	0.004	0.363	0.717	0.029	0.002	0.005	0.331	0.741	Not significant
Government support	Process innovation	-0.05	-0.099	0.177	-0.556	0.578	-0.093	-0.187	0.186	-1.01	0.312	Not significant
Government support	Product innovation	0.119	0.211	0.143	1.478	0.139	0.208**	0.366**	0.145	2.53	0.011	Not significant
Platform capabilities	Process innovation	0.133	0.071	0.048	1.49	0.136	0.06	0.029	0.041	0.698	0.485	Not significant

Notes: *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Table 11. The chow-test results

From	To	F - Value	P>F	Results	Interpretation
Export intensity, no of markets, no of customers, and Export persistence	Tacit knowledge acquisition	1.25	0.29	Not significant	The mature and young firms are the same at model level.
Export intensity	Tacit knowledge acquisition	0.6	0.44	Not significant	
No of market	Tacit knowledge acquisition	1.8	0.18	Not significant	
No of customer	Tacit knowledge acquisition	4.26	0.040**	Significant	There is a difference at the path level
Export persistence	Tacit knowledge acquisition	0.01	0.92	Not significant	
Export intensity	Process innovation	0.69	0.50	Not significant	
Tacit knowledge acquisition	Process innovation	0.04	0.96	Not significant	
Tacit knowledge acquisition	Product innovation	0.25	0.78	Not significant	
No of markets	Product innovation	5.65	0.004***	Significant	There is some difference at the path level

Notes: *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

The results show that only H9.3 and H9.4 are different in path level. However, the findings demonstrate the non-significant for H9.1, H9.2, and H9., meaning that it is no difference between young and mature firms.

Hypothesis 9.3 states that there is a difference in the relationship between the number of customers and tacit knowledge acquisition which varies across firm age

The result shows the insights that mature firms can acquire tacit knowledge from a multitude of foreign customers (β=0.006, $p<0.05$), but we do not find any significant result in young firms. The underlying mechanism is that mature firms have a long-lasting, strong relationship with foreign customers, and this relationship engenders the customers' trust, thus leading to their willingness to share and exchange knowledge with the firms (Dhanaraj et al., 2004). In addition, the existing knowledge stocks accumulated through long experiences accommodate a profound comprehension of new knowledge and help firms sense new opportunities from interactions with a variety of foreign networks. Therefore, the number of customers positively impacts firms' tacit knowledge acquisition for mature firms.

On the contrary, young firms in emerging countries do not have the capabilities to acquire tacit knowledge through exporting to a greater number of customers. A lack of experience to simultaneously manage multiple contacts accompanying complicated international transactions is found to be the main reason for these non-impactful results.

Unlike mature firms, young firms have much more of a challenge to acquire tacit knowledge deriving from having a greater number of customers. The liabilities of newness become one of the issues that limit young firms to establish trust with customers. In addition, the fewer experiences in doing business, compared to mature firms, hamper young firms to extract implicit knowledge from foreign networks.

Hypothesis 9.4 states that there is a direct impact between the number of markets on product innovation, which varies across firm age.

The empirical results of this study provide supportive evidence that young firms in emerging countries do not have the capabilities to acquire tacit knowledge through exporting to a greater number of markets. The result in this connection shows negative insignificance.

Even though export to multiple markets does not facilitate firms to acquire tacit knowledge, the number of markets has a direct impact on increasing product innovation for the young firms *(*$\beta = 0.103, p < 0.001$). The direct effect of the number of markets on product innovation can be explained by the need to sustain their business and survive in the diverse markets they export to (Bartelsman et al., 2005). Young firms seek to maintain flexibility in adapting themselves to changing circumstances and in promptly creating new products to satisfy diverse market demands.

The study focuses on the direct effect between the number of markets on product innovation, not process innovation since process innovation takes more time to develop and is more likely to be complex, requires changes in firms' operational routines, and involves additional or even new human resources(Gopalakrishnan et al., 1999). If young firms are not likely to acquire tacit knowledge, process innovation is even harder to develop.

Therefore, hypothesis 9.4 is supported.

In summary, even though the result shows unsupported of the model level in main hypothesis 9, the path level analysis provides significant to support sub-hypothesis 9.3 and 9.4.

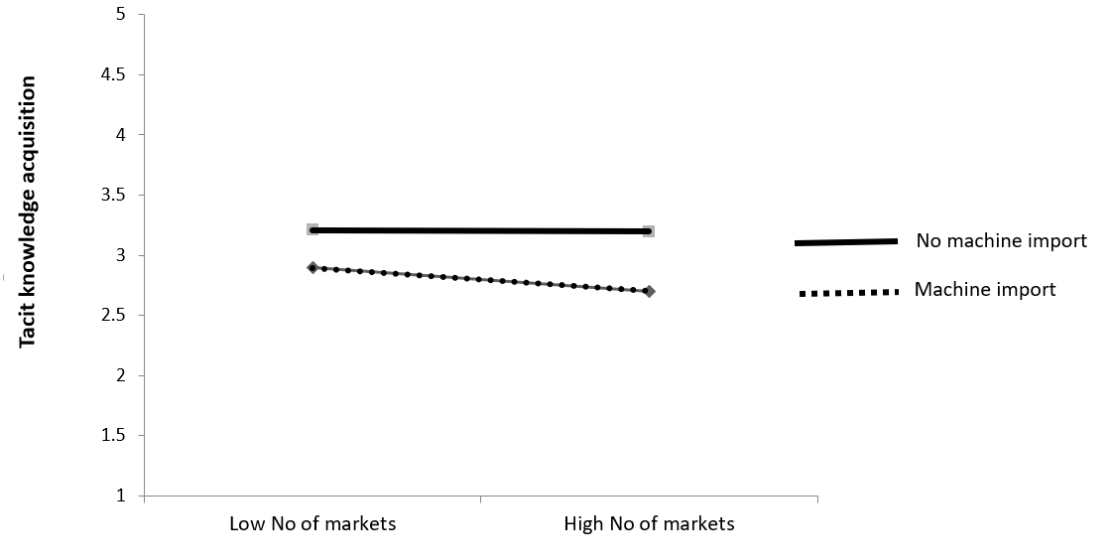
7.1.6 Moderator effect of machine import on the relationship between export intensity and tacit knowledge acquisition

At this step, the study seeks to examine the moderating effects of importing advanced machines on the relationship between number of market and tacit knowledge acquisition (Hypothesis 10) and the relationship between the export intensity and tacit knowledge acquisition (Hypothesis 11). The full model was thereby run by including interaction effects and control variables.

The results support both Hypotheses 10 and 11. For Hypothesis 10 is noted: machine import strengthens the relationship between the number of markets and tacit knowledge acquisition

(β= 0.472, $p < 0.01$). That is, the negative link between the number of markets and tacit knowledge acquisition is intensified by importing technology, implying that firms are not likely to acquire more tacit knowledge when they import machines. The rationale is that importing process creates an obstacle, thus hindering tacit knowledge acquisition.

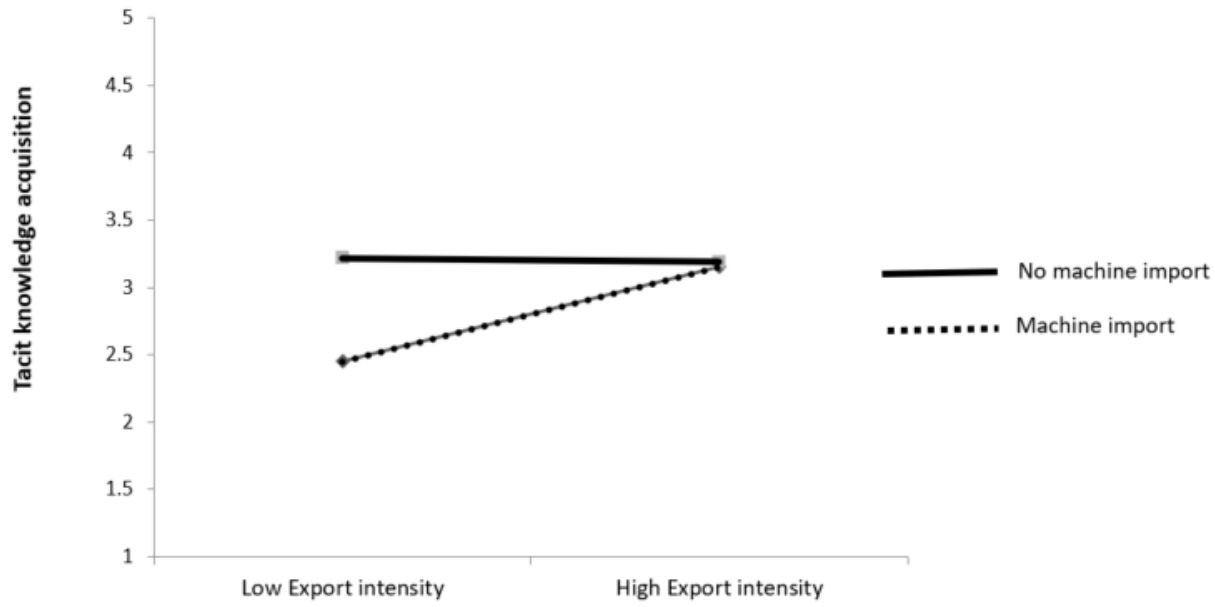
Figure 4. The moderating effects for hypothesis 10



For Hypothesis 11, the impact of export intensity on tacit knowledge acquisition is declined when firms import machines. Specifically, firms show less inclination to acquire tacit knowledge from export intensity when they import machines. The rationale in this regard can be explained by the learning-by-importing concept, which suggests that learning-by-importing could serve as an alternative source of foreign knowledge (Wang and Tao, 2019). The result yields at (β= -0.314, $p < 0.05$); therefore, machine import weaken the relationship between export intensity and tacit knowledge acquisition.

Hypothesis 11: Machine import dampens the positive relationship between export intensity and tacit knowledge acquisition

Figure 5. The moderating effects for hypothesis 11



Therefore, hypotheses 11 and 10 are supported.

Machine import for multigroup (young and mature firm)

Different results are detected when examining the interaction of technology import across multigroup: machine import is negative and significant in the relationship between export intensity and tacit knowledge acquisition (β= *-0.294*, $p < 0.01$) in young firms, but there is no significant moderating effect in the mature firm.

In contrast, machine import has a positive and significant moderating effect on the link between the number of markets and tacit knowledge acquisition (β= *0.035*, $p < 0.1$) in mature firms, but there is no moderating effect in young firms.

A conceptual framework with the results

Figure 6. A conceptual framework with the results

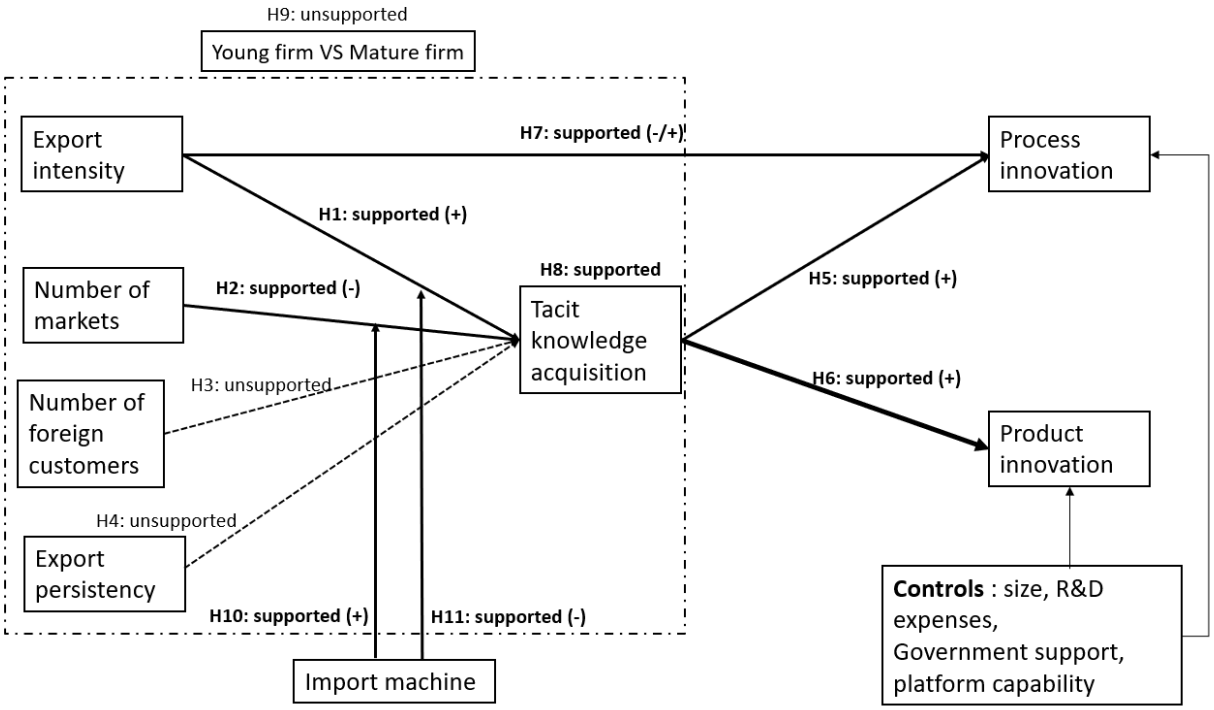


Table 12. Results summary

Hypotheses	From	To	Standardized regression weights	Unstandardized regression weights	S.E.	C.R.	P-value	Results
1	Export intensity	Tacit knowledge acquisition	0.329	0.186	0.057	3.271	0.001	Support
2	Number of markets	Tacit knowledge acquisition	-0.531	-0.052	0.014	-3.644	0.001	Support
3	Number of customers	Tacit knowledge acquisition	0.056	0.002	0.002	0.773	0.439	Unsupported
4	Export persistency	Tacit knowledge acquisition	0.041	0.076	0.127	0.595	0.552	Unsupported
5	Tacit knowledge acquisition	Process innovation	0.445	0.439	0.056	7.844	0.001	Support
6	Tacit knowledge acquisition	Product innovation	0.228	0.254	0.074	3.453	0.001	Support
7	Export intensity	Process innovation	-0.668	-0.372	0.177	-2.106	0.035	Support
	Export intensity (Quadratic)	Process innovation	0.862	0.082	0.03	2.727	0.006	
10	Import machine X No of market	Tacit knowledge acquisition	0.472	0.046	0.016	2.891	0.004	Support
11	Import machine X Export intensity	Tacit knowledge acquisition	-0.314	-0.154	0.077	-1.999	0.046	Support
Moderator	Import machine	Tacit knowledge acquisition	0.057	0.098	0.216	0.455	0.649	
Control	Size	Product innovation	-0.092	-0.056	0.05	-1.129	0.259	
Control	Size	Process innovation	0.041	0.022	0.033	0.679	0.497	
Control	R&D Expenses	Product innovation	0.14	0.009	0.004	2.064	0.039	
Control	R&D Expenses	Process innovation	0.063	0.003	0.003	1.076	0.282	
Control	Government support	Product innovation	-0.027	-0.055	0.134	-0.408	0.683	
Control	Government support	Process innovation	0.174	0.31	0.1	3.092	0.002	
Control	Digital platform capability	Tacit knowledge acquisition	0.217	0.111	0.034	3.279	0.001	
	Export Intensity	Product innovation	0.023	0.015	0.046	0.318	0.75	
	Number of markets	Product innovation	0.055	0.006	0.009	0.666	0.506	
	Export persistency	Product innovation	-0.027	-0.056	0.15	-0.37	0.711	
	Number of customers	Product innovation	0.002	0	0.002	0.029	0.977	

7.2 Robustness tests

The interaction of age on the relationship between export activities and tacit knowledge acquisition

We also conduct the interaction term in STATA. The results from interaction with age dummy (1 = Mature firm; 0 = young firm) yields consistent results as seen in the Chow test. Number of customers has significantly more of an impact on tacit knowledge acquisition (0.100) for mature firms as compared to younger firms. Furthermore, the impact of number of markets on product innovation (-0.101) is significantly lower for mature firms as compared to young firms.

Table 13. Table of robustness test for the Chow-test

Dependent Variable:	*M_TACIT*	*M_PROC*	*M_PROC*	*M_PROD*	*M_PROD*
	(1)	(2)	(3)	(4)	(5)
AGE_DUMMY	-0.187	-0.128	-0.079	-0.123	0.321*
	(-0.67)	(-0.29)	(-0.38)	(-0.23)	(1.68)
EX_INT	0.042		0.156***		
	(0.75)		(2.91)		
EX_PERS	0.036				
	(0.20)				
NO_CUST	-0.002				
	(-0.70)				
NO_MKT	0.015				0.100***
	(0.52)				(3.32)
M_TACIT		0.440***		0.202*	
		(5.05)		(1.86)	
AGE_DUMMY * EX_INT	0.063		-0.032		
	(0.78)		(-0.43)		

AGE_DUMMY * EX_PERS	0.028				
	(0.10)				
AGE_DUMMY * NO_CUST	0.009**				
	(2.06)				
AGE_DUMMY * NO_MKT	-0.042				-0.101***
	(-1.34)				(-3.30)
AGE_DUMMY * M_TACIT		0.016		0.020	
		(0.14)		(0.14)	
Observations	220	220	220	220	220
R^2	0.06	0.26	0.09	0.10	0.11

Notes: *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

The results remained the same as the test by using multigroup analysis.

7.3 Summary of the results

Table 14. Summary of hypotheses statement and results

Hypotheses	Hypotheses and expected sign	Statement	Result	Results
1	EX_INT -----> TACIT (+)	Export intensity has a positive effect on tacit knowledge acquisition.	+	Supported
2	NO_MKT ---> TACIT (-)	Number of foreign markets has a negative effect on tacit knowledge acquisition.	-	Supported
3	NO_CUST ---> TACIT (+)	Number of foreign customers has a positive effect on tacit knowledge acquisition.	Not significant	Not Supported

4	EX_PERS ---> TACIT (+)	Export persistency has a positive effect on tacit knowledge acquisition.	Not significant	Not Supported
5	TACIT --> M_PROC (+)	Tacit knowledge acquisition has a positive effect on process innovation.	+	Supported
6	TACIT --> M_PRD (+)	Tacit knowledge acquisition has a positive effect on product innovation.	+	Supported
7	EX_INT --> M_PROC (-/+)	There is a nonlinear relationship between export intensity and process innovation.	-/+	Supported
8a,8b, 8c and 8d	EX_INT --> M_TACIT --> M_PRD EX_INT --> M_TACIT --> M_PROC NO_MKT --> M_TACIT --> M_PRD NO_MKT --> M_TACIT --> M_PROC		mediation	Supported
9	Age of a firm moderates the relationship among export intensity, no of markets, no of customers, tacit knowledge, and innovation.	There are the difference relationships among young firms and mature firms	No Different relationships among two groups in model level but there is significant in path-level	Unsupported
10	The import machine positively moderates the relationship between number of markets and tacit knowledge acquisition.	The negative effect of number of markets on tacit knowledge acquisition strengthen by import machine.	positive moderate	Supported

11	The import machine negatively moderates the relationship between export intensity and tacit knowledge acquisition	The positive effect of export intensity on tacit knowledge acquisition weakens by importing machine.	negative moderate	Supported

7.4 Additional analysis

Given that the tacit knowledge acquisition is only significant only for some dimensions of export activities (export intensity and number of markets) in the main conceptual model. However, the finding shows insignificant effect of export persistence on tacit knowledge acquisition. Therefore, we ran the additional model to see whether tacit knowledge acquisition can play as alternative role as the moderator among export persistence and innovation relationship. We used seemingly unrelated regression (SUR) to see the effects. Here below are the results

The results of seemingly unrelated regression (SUR)

VARIABLES	(1) M_PRD2	(2) M_PROC	(3) M_PRD2	(4) M_PROC
NO_CUST	-0.000321	-0.00133	-0.000486	-0.00128
	(0.00238)	(0.00187)	(0.00236)	(0.00182)
NO_MKT	0.00426	-0.00309	0.00486	-0.00236
	(0.00897)	(0.00703)	(0.00888)	(0.00685)
M_TACIT	0.208***	0.419***	0.0393	0.636***
	(0.0746)	(0.0584)	(0.148)	(0.114)
EX_PERS			0.564	1.771***
			(0.629)	(0.485)
EX_PERS x M_TACIT			-0.155	-0.442***
			(0.171)	(0.132)
EX_INT	0.0513	0.129***	-0.263	0.310**
	(0.0476)	(0.0373)	(0.185)	(0.143)
EX_INT x M_TACIT			0.0893*	-0.0504
			(0.0506)	(0.0390)
RD2	0.00596	0.00126	0.00541	0.00266
	(0.00420)	(0.00329)	(0.00421)	(0.00325)
M_PLAT	0.107***	0.0306	0.113***	0.0287

	(0.0405)	(0.0318)	(0.0403)	(0.0311)
GOVN	-0.0921	0.343***	-0.0875	0.350***
	(0.133)	(0.104)	(0.132)	(0.102)
SIZE	-0.0322	0.0615	-0.0367	0.0619
	(0.0498)	(0.0391)	(0.0494)	(0.0381)
EX_PERS	0.0223	0.185		
	(0.152)	(0.119)		
Constant	2.059***	1.467***	2.628***	0.675
	(0.354)	(0.277)	(0.571)	(0.441)
Observations	219	219	219	219
R-squared	0.106	0.298	0.125	0.334

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Export persistence (EX_PERS) is measured by dummy variable (1 means firms used to stop exporting at least one year, and 0 is otherwise)

The result shows the significant result that export persistence itself is not significantly impact on a firm's innovation product, but impact on process innovation. This means that firms that experienced exit from foreign market at least one year, are likely to develop process innovation. This result aligns with the current study of Klammer and Gueldenberg (2009) mentions that firms a rapid withdrawal from foreign markets may not diminish firms learning. The rationale is that when firms have assimilated knowledge, they tend to develop suitable routines that may difficult to change or unlearn the process.

In addition, the model shows that tacit knowledge acquisition influences the relationship between export persistence and process innovation. This means that firms with high tacit knowledge acquired from foreign markets, and persistence in exporting, are likely to yield process innovation more than those firms with low tacit knowledge acquisition. Firms that have high level of knowledge tend to utilize valuable foreign knowledge to add value to the firms (García et al., 2012).

Chapter 8: Discussion, Implications, and Limitations

This study seeks to emphasize the mediating role of tacit knowledge acquisition as one of the crucial mechanisms to enhance firms' innovation performance from export activities. Previous studies lack scrutiny in diverse and different contexts and conditions. The study draws upon the concept of learning by exporting (LBE), also adopting knowledge-based view theory. The assessment of the hypotheses developed in this paper comprehensively explains the mixed results between learning by exporting and innovation performance, thereby substantially filling both research and knowledge gaps in the IB discipline. Furthermore, the results will add insights to IB literature in the context of emerging countries.

Additionally, distinguishing LBE for product and process innovation is crucial since the results show that both innovation types required different sub-dimensions of export activities. Export intensity itself enhance process innovation but not product innovation. While firms that export to a number of markets needs to acquired tacit knowledge acquisition in order to improve their process innovation. In addition, the results have not shown the direct and indirect effect of export activities on product innovation. Previous LBE research studies are not likely to disentangle the distinguish between product and process innovation (Adner and Levinthal, 2001, Robertson et al., 2012). Here below are more details about theoretical contribution, managerial implication, and implications for public policy makers.

8.1 Theoretical contributions

This study furnishes the LBE literature with the following novel building blocks:

8.1.1 Sub-dimensions of export activities

This study contributes to the existing LBE literature in several aspects. First, whereas previous research studies offer mixed results regarding the relationship between export activities and innovation (Fernandes and Isgut, 2005, Golovko and Valentini, 2011), this research provides comprehensive results of an integrative investigation into the relationship between the sub-dimensions of export activities and innovation performance through tacit knowledge acquisition. Similarly, when only a few empirical studies specify which sub-dimensions of export are good determinants for tacit knowledge acquisition, or what the relationships between each sub-dimension and tacit knowledge acquisition look like, this research, on the other hand, illustrates how export activities can exhibit firms' knowledge acquisition differently, thus adding to the extant LBE literature.

Specifically, the study highlights the sub-dimensions of export activities that provide different patterns of knowledge acquisition, hence differing from the previous LBE studies that are likely to focus only on each of them such as export intensity and export status. This research decomposes export activities and elaborates on attributes of each sub-dimensions so as to emphasize that, in order to fully explain the impact of learning by exporting on innovation performance, it may not be sufficient to investigate only one dimension of export activities. The different results of the sub-dimensions of export activities illustrated in this research can probably add value to the existing LBE literature to a good extent.

Apart from clarifying the inconclusive effect of LBE on innovation performance, the study emphasizes that the aspects of export status used pervasively in the previous literature (Blalock and Gertler, 2004, Aw et al., 2000, Greenaway and Kneller, 2007, Salomon and Jin, 2008, Salomon and Jin, 2010) should be scrutinized at a deeper level. Focusing on export status alone can be too insubstantial or superficial to identify how a learning process occurs.

This study aspires to explain why it is necessary to classify the sub-dimensions of export activities. First, export intensity is closely associated with a commitment in a firm's resources (Kiss et al., 2018, Pla-Barber and Alegre, 2007, Wang and Ma, 2018). An intense involvement in export activities includes regular interactions with foreign customers, which consequently leads to knowledge transfer, especially in-depth customer knowledge. A strong relationship with customers resulted from intense export sales then provides firms with opportunities to absorb and acquire tacit knowledge. Therefore, the higher the firm's export intensity is, the more comprehensive tacit knowledge it gains.

Furthermore, the study addresses the number of markets to offer an argument with the existing literature, which posits that diverse knowledge sources are necessary for learning and innovation (Lu and Beamish, 2004, Yeoh, 2004). However, the study predicts that the number of markets has a negative impact on tacit knowledge acquisition. This is because multiple export markets come with complexity in terms of market requirements. Different cultures and business practices from multiple international networks are issues that require firms' resources and capabilities to manage them effectively. Moreover, language barriers apparently diminish firms' potentials to leverage the multiple networks acquired when exporting to many countries. The above-mentioned problems go beyond the capability of SMEs in emerging economies, such as Thailand, to deal with, not to mention acquiring tacit knowledge from those markets. The results support the hypothesis stating that the number of markets has a significantly negative impact on tacit knowledge acquisition.

These results seem to be in contradictory to a notion suggested in the previous studies (Hitt et al., 1997, Lu and Beamish, 2004, Zahra et al., 2000), which argue that firms need a diversity of knowledge to build their knowledge stocks and to enhance new knowledge acquisition. However, they may become a set of evidences for further research in this area.

The next element included in the sub-dimensions of export activities is the number of customers, the characteristics of which may not be observed before in the extant LBE literature. This study stands out from others by showing that some firms probably have several foreign customers while exporting to only a few countries. On the other hand, there are a number of firms that export to multiple countries but have only one customer per country. The study's results demonstrate that the number of customers does not significantly affect tacit knowledge acquisition. However, upon investigating young versus mature firms, there is a certain degree of significance in mature firms' tacit knowledge acquisition through having multiple foreign customers, while the same does not exist among young firms.

The last element of the sub-dimensions of export activities covers export persistence. It is evident in the prior literature that persistence in exporting allows firms to accumulate market experiences, thus leading to their enhanced performance (Alvarez and Robertson, 2004). Similarly, another set of evidences show that persistence in exporting is related to learning (Timoshenko, 2015). However, it is also found that the ability to learn suffers if information is not renewed. Continuous exporting therefore allows firms to acquire a substantial amount of new necessary information and business practices (Artopoulos et al., 2013) from the markets. Nevertheless, the study's results in this regard might not make a significant contribution as the finding is consistent with the existing studies indicating that export persistence gives firms sufficient opportunities to acquire knowledge from foreign countries (Andersson and Lööf, 2009a). Moreover, limitations in the explanatory ability of this construct may vary across contexts.

In summary, the major aim of examining different patterns of a link between export and a firm's tacit knowledge acquisition is addressed by decomposing export activities into the above-mentioned sub-dimensions. This also helps to reconcile the inconsistent relationship between LBE

and innovation performance as well as to clarify 'how' and 'why' some firms may not improve their innovation performance despite the fact that they have been involved in export activities for a period of time.

8.1.2. Tacit knowledge as learning mechanism

This study advances the LBE literature by introducing the role of tacit knowledge acquisition, using the knowledge-based view (KBV) to answer the question as to why the LBE concept is practicable only to some, not all, exporting firms. Principally, the study emphasizes that firms that acquire tacit knowledge are likely to enhance their innovation performance.

Even though several studies have explored the importance of tacit knowledge in product innovation (Lijuan and Xiaoying, 2014, López-Cabarcos et al., 2019), they do not integrate tacit knowledge acquisition into the LBE literature. This study stresses that tacit knowledge, not general knowledge (or explicit knowledge), is counted as a firm's valuable assets under KBV.

Hence, tacit knowledge acquisition as a mediator answers a research question as to why exporting firms perform innovation differently. Omitting tacit knowledge acquisition mechanism may lead to a bias in the LBE literature.

8.1.3. Multigroup of firm age

The study adds another layer of analysis to enrich the existing LBE literature by examining moderating effects that render different conditions from the previous studies. This research accentuates that firms' characteristics, such as ages, can provide sufficient conditions in the LBE process. With the multigroup analysis method, young and mature firms can be investigated simultaneously, and the relationships among groups can be distinguished.

The rationale behind an inclusion of firms age is that age reflects accumulated experiences (Gkypali et al., 2015). The experiences of young and mature firms make them react differently when confronting foreign market demand conditions. While young firms may aggressively pursue product innovation without paying attention to knowledge acquisition, acquiring tacit knowledge through foreign connections and use it to achieve innovation might be a more worthwhile mean for mature firms.

While results in this regard show an insignificant difference, indicating that both young and mature firms are not different in their relationships across the group at the model level, the analysis of a relationship in each construct reveals unique learning patterns. The findings of the analysis show two different novel relationships: one is that the number of customers positively impacts tacit knowledge acquisition of only mature firms, not young firms; and the other is the direct effect of the number of markets on product innovation in young firms but not in mature firms.

The relationship between the number of customers and tacit knowledge acquisition of mature firms can be explained by a firm's experiences. Mature firms' experiences can help them gain new knowledge from foreign customers, and, at the same time, their existing knowledge stocks enable them to leverage their connections with customers and understand customer or market needs better than young firms.

Unlike mature firms, a non-significant relationship between the number of customers and tacit knowledge acquisition in young firms can be due to the fact that young SMEs have limited resources and experiences in managing their relationship with foreign customers. In addition, the difficulty of coping with many requirements from too many customers may obstruct their capabilities to acquire and digest new knowledge from customers.

On the other hand, the results reveal a direct link between the number of markets and product innovation in young firms but not in mature firms. This is in line with this research's emphasis, which states that the unique characteristics of young and mature firms result in different mechanisms to enhance their innovation. In this case, young firms have to accelerate themselves to pursue a market position in foreign markets, and they strive to produce innovative products in order to sustain their immature businesses.

This study therefore provokes IB researchers to consider the age of firms in their further LBE research as well as adding new insights to the LBE and Knowledge Acquisition literature in the context of SMEs in emerging economies.

8.1.4. Moderating role of machine import

This research poses another question from the current literature: 'what' are other factors influencing the impact of export on tacit knowledge acquisition? Besides, what makes firms differ in their tacit knowledge acquisition through export activities? As previous evidences show that manufacturing-exporting firms pay most of their attention to production-oriented tasks, it is speculated that factors facilitating their production processes could be imported machines, which is previously overlooked in the LBE literature. This study aims to verify that LBE can also be improved by considering the inflow of alternative knowledge sources under the KBV theory. The underlying mechanism to justify this construct is the embedded knowledge of imported machines and international participation through import activities.

Empirical evidences strongly suggest that export activities and tacit knowledge acquisition are significantly yet differently moderated by machine import from foreign countries. In this connection, this study highlights the importance of considering whether learning through machine

import can strengthen or weaken the impact of export activities on tacit knowledge acquisition. It is then discovered that 1) machine import intensifies the negative effect of the number of markets on tacit knowledge acquisition; and 2) machine import weakens the positive effect of export intensity on tacit knowledge acquisition.

At the same level as export, machine import provides technological knowledge and, consequently, market knowledge through information exchanges. However, the extant literature posits that machine import is likely to associate with explicit knowledge rather than tacit knowledge (). The moderating role of machine import then enables an opportunity to make a theoretical contribution to the LBE notion in the emerging economies' context.

8.1.5. Non-linear relationship of export intensity and process innovation

The study contributes to the LBE literature by raising questions regarding the existing linear relationship between export intensity and innovation performance. The complexity of learning to innovate in the context of manufacturing firms in emerging economies needs a better clarification. While prior research studies present a linear relationship, this study attempts to articulate that a U-shape relationship occurs in this case.

A curvilinear relationship between export intensity and innovation process brings a new perspective to the traditional LBE literature, which examines only linear relationships. The results support the hypothesis indicating that the impact of export intensity on firms' process innovation is likely to be more pronounced after they achieve a certain volume of export and have learned throughout export processes. That is, at the early stage of export, firms have a tendency to prioritize export sales boost over other tasks, hence a decline in process innovation. After reaching a certain

level of export intensity, firms then look to develop and innovate their process so as to enhance productivity, therefore resulting in more emphasis on process innovation.

8.2 Managerial implication

The result of this study supports to answer; what should SMEs in emerging countries do to promote their innovation performance?

Firstly, the results show the significant of tacit knowledge from foreign markets. This signals that SMEs should focus not only on generating sales from exporting but also focus on the mechanism to facilitate them to master new knowledge in different areas, such as marketing, operation, new product development and technology from interactions with foreign markets. Therefore, SMEs should emphasize on learning and leverage their foreign networks for becoming the expert in the areas that pursue their innovation performance.

Secondly, the effects of sub-dimension of export activities provide the signal for firms to carefully consider their export strategies since different export behaviors that pertain to different learning pattern. For example, export to a greater number of markets may reduce their capabilities to acquire tacit knowledge which is necessary for innovation development. On the other hand, it is advantage for continually boost export sales, which are the crucial factor for knowledge spillovers from foreign countries. The intense interactions allow knowledge spillovers.

Thirdly, this study also a difference at the path level of multigroup analysis prevails that young versus mature firms have in different conditions to pursue their innovation performance.

For young firms, this study aspires to export to many markets benefits young firms to increase their product innovation as compared to mature firms. The reason is that young firms are more

flexible than mature firms, changes in their product so as to meet customer requirements can be made more easily.

For mature firms, it is suggested that they pay more attention and put effort into acquiring new skills from foreign markets. Tacit knowledge, which covers marketing, managerial, production and so on, plays a crucial role in their endeavor to pursue process innovation. In addition, the evidence indicates that the number of foreign customers supports firms more significantly than what export sales does in new knowledge and expertise acquisition, it is recommended that mature SMEs leverage foreign networks and assimilate knowledge from them. When firms gain enough tacit knowledge stocks, they will have enough potentials to pursue their process innovation.

Lastly, regarding the implication for the influence of importing technology, this study gives exporters a clear picture that machine import is an alternative mean to acquire foreign knowledge. Even though machine import enables them to acquire new technology and knowledge through interactions with foreign machine vendors, learning from import machine occurred in short-term. Machine may impede the attention of firms to obtain experiential learning that have accumulated from personal interactions with foreign customers. Therefore, firms that import machine needs to be pay attention to foreign customers' needs otherwise firms may overlook the acquisition of value and useful tacit knowledge.

Import machine might worsen the learning from export to multiple markets because firms are not likely to have the capabilities to manage complex requirements and multiple foreign networks simultaneously. Adding more tasks to exporters who are already occupied with responding to diverse needs may hamper the knowledge acquisition process.

8.3 Implications for public policy makers

For policy makers, the results emphasize the role of tacit knowledge acquired from exporting activities on firms' innovation performance, which lead to overall growth national innovation. The study shows that sub-dimension of export, particularly in export intensity, plays a crucial role in process innovation, not product innovation. Thus, governmental innovation policies can promote firms' export activities by incentivising firms to increase export intensity to increase process innovation.

Additionally, governments should support SMEs in pursuing export sales to reap the benefits from foreign customers by acquiring new knowledge and skills for their product and process development. While high export intensity can benefit firms in process innovation through tacit knowledge acquisition, the evidence suggests that exporting to multiple countries decreases a firm's tacit knowledge acquisition. These findings remind policymakers to launch support schemes for SMEs to concentrate on exporting to core markets at first and not encourage them to expand markets too quickly without giving them the necessary tools for acquiring valuable knowledge from their foreign customers. Furthermore, there are also negative consequence of rapidly increasing the number of export market on firm's product innovation (D'Angelo et al., 2020).

Moreover, governments should support SMEs to concentrate on leveraging their foreign networks by establishing their reliability and trust with foreign customers because strong social interactions facilitate knowledge acquisition and knowledge transfer (Laursen and Salter, 2006). As supported by the evidence in this study, acquiring valuable knowledge leads to increased firm innovation performance. From a macroeconomic perspective, process innovation is crucial for gross domestic product growth (GDP), and policy makers should encourage SMEs in emerging markets to have intense export sales to enhance their innovation processes.

Similarly, the result of multigroup analysis between young and mature firms provides empirical evidence to policymakers that the government needs to be more selective in choosing the policy for driving innovation of SMEs in Thailand. Specifically, young and mature SMEs may require different mechanisms to enhance their innovation performance. Young firms can innovate directly from export activities due to the required flexibility in responding to new opportunities in order to survive. In contrast, mature firms have the advantage of stronger long-term relationships with foreign customer and, as a result, tacit knowledge acquisition is essential for them to innovate. The distinct learning mechanisms necessary for both young and mature firms require governmental policy makers to have differing incentive programs in order to enhance innovation performance.

Chapter 9: Summary

Innovation has pervasively been discussed vis-à-vis export activities**.** It is apparent that export activities promote innovation, and the effectiveness of learning from exporting is reflected through a firm's innovation performance (Salomon and Shaver, 2005, Salomon, 2006, Salomon and Jin, 2008, Salomon and Jin, 2010) rather than productivity, as indicated in the previous findings that use productivity to determine how much firms learn from export (Aw et al., 2000, Van Biesebroeck, 2005).

The advent of the LBE concept implies that firms learn from interaction with foreign customers, supply chain partners, and foreign competitors (Love and Ganotakis, 2013). Knowledge spillover experienced when entering foreign markets gives firms new information they cannot acquire domestically, especially in emerging countries with insufficient resources and knowledge.

This study's scope covers Southeast Asia's emerging economies, namely Thailand, which effectively represents a middle-income country in the region, and some export-led countries such as Malaysia, Indonesia and Vietnam. The income that generates these countries' economic growth primarily comes from export activities. Unfortunately, it has been found that their high involvement in export activities is not likely to benefit their innovation performance. The poor innovation performance of these firms despite export activities hence leads to the motivation of this study: what factor(s) distinguish(es) a firm's innovation performance, and why the LBE concept fails to explain this issue.

A review of the existing LBE literature from the international business perspective allows us to notice some underexplored areas. **Firstly,** the results of pervasive studies about the direct effect of LBE on innovation performance could play a vital role in explaining the heterogeneity of innovation performance after firms' engagement in export. Therefore, the study proposes tacit knowledge as a mediator, among other constructs.

Besides, the relationship between export and innovation may not be necessarily linear. In this context, a curvilinear relationship tends to be more plausible to explain the phenomena. The study therefore proposes that export intensity has a non-linear relationship with process innovation.

Secondly, mixed results between LBE and innovation performance are probably caused by a lack of scrutiny over the nature of export activities' sub-dimensions, which drive firms to acquire tacit

knowledge differently. Hence, the study deconstructs export activities into sub-dimensions, namely export intensity, number of markets, number of customers and export persistence. It is predicted that each element poses a different impact on tacit knowledge acquisition.

Thirdly, the previous LBE literature overlooks the unique characteristics of young versus mature SMEs. Long-established firms' business experiences are likely to facilitate them to leverage strong connections, consequently enabling them to acquire tacit knowledge crucial for innovation improvement. Unlike mature firms, young firms with less experiences in establishing strong business connections may have difficulty acquiring tacit knowledge from foreign markets. Thus, this research postulates different patterns for these two groups in their pursuit of innovation through tacit knowledge acquisition.

The last point involves alternative knowledge sources that may foster or hamper export activities and tacit knowledge acquisition. Cost-effectiveness is one of the key concerns for every production-oriented manufacturer, and it is achievable via productivity improvement. While importing machines is one solution to enhance productivity, it is also regarded as a channel for the inflow of knowledge from overseas. However, to the best knowledge of the researcher, machine import as a construct has not been considered in the previous LBE literature. Thus, this study regards machine import as an alternative knowledge source that, according to the findings, weakens the relationship between export intensity and tacit knowledge acquisition. On the other hand, the machine import construct intensifies the negative impact of the number of markets on tacit knowledge acquisition.

To examine the gaps addressed above, the study has borrowed the KBV and learning theories under the framework of the LBE literature. Data were collected through in-depth interviews with owners or managers and then utilized to create a survey questionnaire. In this connection, 220

usable responses were received from manufacturing-exporting SMEs in Thailand. Next, path-analysis in structural equation model (SEM) with Amos v. 27 program was employed. The bootstrapping procedures were used to test the mediating effects of tacit knowledge acquisition, and a Chow test and multigroup analysis were applied to test the variance and invariance between mature and young firms.

Overall, the hypotheses are supported. The results confirm that tacit knowledge acquisition partially mediates export intensity and process innovation performance. These results answer to the primary research motivation: firms in export-led countries, such as Thailand, still cannot have good innovation performance after exporting to foreign destinations despite the LBE concept suggesting that they should learn and innovate more after export. Firms that lack tacit knowledge are not likely to perform well on innovation, especially on process innovation. In addition, the findings support the existence of a curvilinear relationship between export intensity and process innovation but not product innovation.

The findings also reconcile the mixed results of the current LBE on innovation by introducing the sub-dimensions of export activities (export intensity, number of markets, number of customers and export persistence) and examining their roles on innovation performance. The results align with the anticipation and reveal that different sub-dimensions of export activities exhibit different unique learning patterns, as described below;

Export intensity positively impacts knowledge acquisition: higher commitment and involvement in export activities leads to firms' potentials to extract tacit knowledge from foreign customers. While export intensity benefits firms' tacit knowledge acquisition, *the number of markets*, on the contrary, has a negative impact on tacit knowledge acquisition. Nevertheless, the complexities of

entering multiple markets create issues and hurdles that might go beyond a firm's capabilities to manage them. Such hurdles include diverse cultures, language barriers, business practices, and technological distance between a host and home markets (Yeoh, 2004, Zahra et al., 2000).

The next element under the sub-dimensions of export activities is *the number of customers*. Firms may have only one or few foreign customers, yet it is viable that these customers require firms to export to many of their business branches dispersed across the world.

Hence, one foreign customer who comes with multiple markets may have different impacts on a firm's tacit knowledge acquisition from several foreign customers in several markets. For instance, one manufacture has IKEA as a primary customer who generates more than sixty percent of their overall sales, and IKEA requests that the firm export products to its branches in several countries.

Even though the finding shows that the number of customers has no impact on tacit knowledge acquisition in the primary conceptual model, when two groups of firms -- young and mature -- are separately tested in the path level, it appears that the number of customers directly impacts product innovation in mature firm while there is no significant result in young firms. A discussion in this aspect will be extended in following paragraph.

According to the multigroup analysis and Chow test, which are utilized to examine differences in the relationships among young versus mature firms in this conceptual model, the results show no difference between these two groups at the model level. However, they reveal new insights when considering each path of the relationship. The findings help us understand two relationships that are significantly different at the path level. *First*, the role of age in differences between the impact of the number of customers on tacit knowledge acquisition in young versus mature firms. This can be explained that mature firms with absorptive capabilities and plenty of experiences can increase

their tacit knowledge acquisition by having more foreign customers. In contrast, young firms may not have enough capabilities to manage multiple foreign customers. Thus, mature firms and young firms exhibit different results. *Second*, the impact of the number of markets on product innovation, which is significantly different in young versus mature firms.

This can possibly be explained that young firms have more flexibility to innovate and develop new products. Moreover, since young firms have to accelerate their business growth in order to sustain their survival and maintain their market position overseas, they are more eager to satisfy market demands by rapidly embracing product innovation. Also, it is very challenging for young firms to extract or acquire tacit knowledge from immature relationships with foreign partners, unlike mature firms who are already adept in leveraging strong connections from different markets. As a result, both links confirm that there are some distinctions in the characteristics of young versus mature firms upon pursuing innovation performance with different driving mechanisms.

Lastly, this study confirms the synergizing effect of learning by exporting and machine import.

The learning that firms acquire during the import process and a machine that firms import can become alternative international knowledge sources that diminish the importance of acquiring tacit knowledge from export activities. Drawing on the previous LBE literature which may overlook the interactions between export and import activities, this study's results regarding the interactions between the sub-dimensions of export activities and machine import fill the void in the literature by explaining how both of them are related, emphasizing firms' learning process in tacit knowledge acquisition. The results reveal that machine import benefits firms in a sense that it generates knowledge spillovers as well as allowing firms to gain international operational

experiences. Machine import is found to lessen the role of export intensity in tacit knowledge acquisition. In addition, it intensifies the negative impact of the number of markets on tacit knowledge acquisition. This result aligns with previous inward – outward internationalization relationship studies (Li et al., 2012; Li, Yi and Cui, 2017), which suggest that inward internationalization reduces the propensity to seek external technological knowledge from outward international activities.

This study makes theoretical contributions to the LBE literature as mentioned in chapter six by highlighting the crucial mediating role of tacit knowledge acquisition between export activities and innovation performance. Furthermore, it encompasses the multifaceted nature of export activities, elucidating that each aspect of the sub-dimensions of export activities exhibit different learning patterns on tacit knowledge acquisition.

9.1 Limitations and Future Research Directions

This study has some limitations that should be addressed in further research. First, the study collected data from exporting SMEs in Thailand. While Thailand can well represent the emerging countries, data analyses of this study would be more generalizable, especially for the LBE literature, if the data were obtained from a multitude of countries, including developed countries for the comparison purpose. Besides, the questionnaire could not provide the exact percentage of export intensity since the participants were reluctant to disclose their information. In this respect, they were asked to identify their export sales in the categories instead. Therefore, using data from the secondary sources might yield more accurate results.

Secondly, this study concentrated on business-to-business (B2B) firms, not business-to-consumer (B2C) firms or those adopting an e-commerce model (consumer-to-consumer/ C2C firms).

Each type of business has its own unique aspects and characteristics, leading to a different strategy to pursue innovation. While it is found that tacit knowledge acquisition is an adequate mechanism for enhancing B2B's innovation performance, other driving mechanisms may suit B2C and C2C better.

Most export sectors in emerging economies have been driven through B2B, which fits the notion of tacit knowledge acquisition through interactions with customers, referring in this context to business partners. Unlike B2B, B2C or C2C have a tendency to innovate through other mechanisms. For example, e-commerce businesses can utilize their online information to initiate new solutions and set new trends for their online customers. Tacit knowledge may not be necessary in this case.

It may be interesting for further research to also consider B2C and C2C in order to investigate whether B2B and the others have a different patterns or perspectives regarding the impact of learning by exporting on innovation performance. Would e-commerce firms still need export activities to acquire tacit knowledge? Can e-commerce firms acquire marketing knowledge and other tacit knowledge through data analytics without replying too much on interactions through export activities? Alternatively, firms may not need to acquire tacit knowledge to enhance their innovation performance if they have sufficient data literacy.

Thirdly, this study examined the contingent roles of machine import in the relationship between 1) the positive impact of export intensity on tacit knowledge acquisition; and 2) the negative impact of the number of markets on tacit knowledge acquisition. Nevertheless, other moderating factors,

such as the level of global supply chain's involvement, are also worth exploring. It is possible that firms having an intensive engagement with global supply chain (GVC) may obtain advanced technological and operational knowledge from their global supply chain partners.

This is because these GVC partners serve as firms' knowledge sources, providing valuable knowledge and equipping them with necessary technologies. Besides, as firms need to keep abreast of global quality standards, they perpetually maintain their learning capabilities in order to sustain their competitiveness.

As a result, the high level of engagement with global supply chain may devalue the LBE practices. In addition, further research might look into other inward or outward factors, apart from export and import.

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