Export Performance in Four ASEAN Countries: The Role of International Quality Certification, Information and Communication Technology Capability, and Innovation

Journal:	*Business Strategy and Development*
Manuscript ID	BSD-22-0277.R2
Wiley - Manuscript type:	Research Article
Keywords:	export performance, international quality certification, ICT capability, innovation, ASEAN

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The aim of this paper is to examine empirically the relationship between international quality certification, and information and communication technology (ICT) capability with the firm's export performance by considering the variables of the firm's innovation as a mediator. The data used in this research is derived from the Enterprise Survey from the World Bank involving total more than 4000 firms' respondents from four countries in ASEAN including Indonesia, Malaysia, Philippines and Vietnam. Analyzed using the Partial Least Square (PLS) technique, the findings show that both international quality certification and ICT capabilities, mediated by innovation, has a significant effect to export performance. The study's findings can help managers and policymakers in developing economies, particularly in ASEAN, improve their firms' export performance.

Keywords: export performance, international quality certification, ICT, innovation, ASEAN

1. INTRODUCTION

In the past few decades, internationalization has been growing rapidly in developing economies (Haddoud, 2020). Exporting is encouraged by governments in emerging markets and developing economies. Exporting can have a positive impact on boosting the economy by generating foreign exchange, stimulating quality and technological advancement, as well as creating more job opportunities (Xie & Li, 2018). Various incentives are provided to encourage companies to engage in exporting, such as tax benefits, promotion programs, or infrastructure support for export activities (Hashim, 2015). Previous studies indicate that exporting tend to improve the quality of their products and processes and help firms be more innovative (Díaz-Chao et al., 2015; Xie & Li, 2018)

Among the benefits of exporting is that tapping into international markets through exports encourages companies to pay more attention to quality due to the international pressure to manufacture products that conform to international standards (Atkin et al., 2017). Firms need to pay attention to every stage in their operations and conduct rigorous quality control to improve their overall production quality. Such international pressures may influence the decision to adopt international certification (Zhu et al., 2012). Gallego & Gutiérrez Ramírez (2023) states that certification provides firms with access to new markets and customers, and has a positive impact on innovative behavior, thus improving corporate performance. Once a firm has achieved international certification, it commits

to complying with a chosen standard and may be audited by a third party (Fikru, 2014). Firms must ensure that in producing their goods/services, they have implemented the requirements of quality management system standards that are accepted both nationally and internationally to be able to enter the export market.

In line with the importance of international quality certification, the capability of information and communication technology (ICT) is seen as having a significant influence on determining the business and economic performance of countries (Díaz-Chao et al., 2015; Jin et al., 2022). Previous researchers have revealed that ICT is one of the capabilities that can lead to a competitive advantage (Wade & Hulland, 2004). ICT can play a complementary role with other factors such as knowledge transfer or customer relationship management to have an impact on firm competitiveness in facing a dynamic environment (Iyengar et al., 2015; Mikalef & Pateli, 2016). The use of ICT in firms has two important roles in economic activity. First, ICT plays a role in driving economic growth and can also directly increase productivity, while the second role is that ICT can lead to firm innovation which can also increase the total factor productivity (TFP) of the economy (Díaz-Chao et al., 2015). ICT-based innovations and applications have become major drivers of enhanced organizational performance, economic growth, and social change (Harsanto, Mulyana, Faisal, & Shandy, 2022; Harsanto, Mulyana, Faisal, Shandy, et al., 2022; Yunis et al., 2018).

Based on several studies, research on international quality certification mostly connects it with the firm's performance in general and still rarely connects with specific performance such as export performance (e.g., Haddoud et al., 2021). Export performance is the indication of firm's success in the export. High export performance is important for enterprises in terms of ensuring sustainability of the firm in the long term (Zehir et al., 2015)). Drawing from resource-based view (RBV) theory, firm's capabilities and resources were recognized as important elements to develop firm's competitive advantage (Barney, 1991). This study considers the capability to conforms to international standard reflected by international quality certification variable, and ICT capability as two crucial aspects to attain firms' export performance. Further, with short product lifecycles in the market and high new product launching rates, innovation capabilities are essential for firm's performance (Harsanto, Mulyana, Faisal, & Shandy, 2022). Several studies indicated that innovation has the potential to play a role as a mediator between international quality certification and ICT capability for performance (Yunis et al., 2018).

To address the deficiencies identified above, we use samples from the Enterprise Survey from the World Bank (2015) with a focus on ASEAN countries, particularly Indonesia, Malaysia, Philippines and Vietnam. Despite representing regions in the world with one of the highest growth rates, ASEAN receives scant attention in research on international quality certification and export performance. Based on this background, the problem that can be formulated in this study is: "What is the relationship between international quality certification and information and communication technology (ICT) capabilities and export performance in ASEAN countries by considering the variables of corporate innovation mediators?"

This paper offers three contributions. First, research on international quality certification mostly connects it with the firm's performance in general and still rarely connects with

specific performance such as export performance. Second, research that examines the relationship between international quality certification and ICT capabilities to export performance through the firm's innovation mediator is a novelty that can contribute to the development of science in the field of quality management and import exports. Third, this research focuses on Asean, one of the regions in the world with the highest growth rate that still receives little attention in research on international quality certification and export performance.

The remainder of the paper is arranged as follows. Section 2 begins our inquiry with a description of the research context prior to hypotheses development and reviewing the dimensions to be examined. Section 3 describes the method which includes the data, measurement and sample characteristics of the data utilized in this paper. Section 4 gives detailed empirical results. In section 5, a discussion is initiated and followed by, conclusions and contributions.

2. RESEARCH CONTEXT

The Association of Southeast Asian Nations (ASEAN) is a regional bloc that promotes economic growth, political stability and security in its member countries (Lee & Oh, 2020). ASEAN is the fifth largest economy in the world with combined revenues of US$3.2 trillion and is projected to become the fourth largest by 2030 (Ahmad et al., 2022). ASEAN comprises ten nations, including Thailand, Indonesia, Malaysia, Vietnam, Singapore, and the Philippines. These economies are highly interlinked and depend on exports, travel, and tourism.

ASEAN economies are known for their vibrant and growing economic activities, creating new opportunities for many nascent entrepreneurs (Virasa et al., 2022). Increased investment in these emerging countries such as Indonesia and Vietnam have contributed significantly to the economic growth of the region. With the implementation of the ASEAN Free Trade Area (AFTA) in 1992, ASEAN shifted its focus to the promotion of economic and social benefits (Lee & Oh, 2020).

ASEAN has a high degree of trade openness, where the export and import ratio of goods and services of the five major ASEAN countries is high, greatly exceeding that of China (Nguyen-Van & Chang, 2021). Figure 1 shows the exports of goods and services of the four countries discussed in this paper. The export and imports value are presented as a function of GDP.

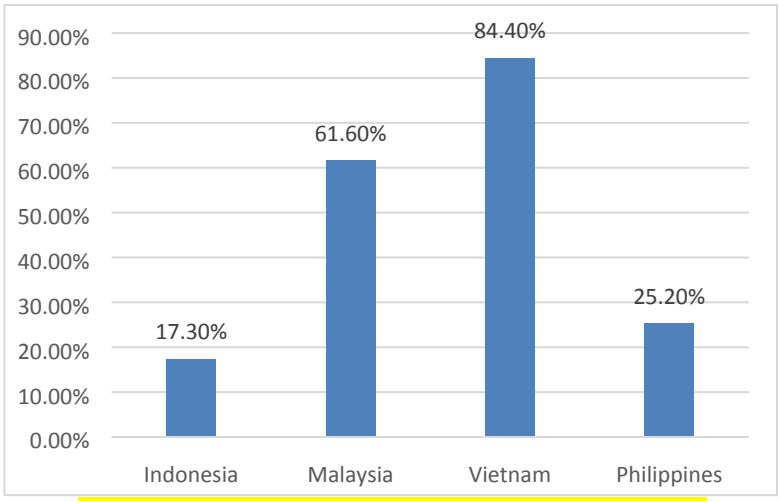

Fig. 1 Exports of goods and services (% of GDP)
Source: The World Bank (2020)

ASEAN countries are now transitioning to more innovative economies to enhance their sustainable development and competitiveness (Harsanto & Firmansyah, 2023; Harsanto & Permana, 2019; Nguyen-Van & Chang, 2021). Therefore, examining the relationship between such internationalization modes and innovation outcomes in ASEAN is an interesting research topic.

3. THEORETICAL BACKGROUND & HYPOTHESIS DEVELOPMENT

3.1. International Quality Certification and Firm Innovation

Globalization encourages ASEAN countries to join international free trade organizations such as the World Trade Organization (WTO), Asia Pacific Economic Cooperation (APEC), the ASEAN Free Trade Area (AFTA), and the ASEAN Economic Community (MEA). Given these circumstances, businesses must compete by increasing their competitive advantage in terms of added value and competitiveness. According to (Weng Kar et al., 2016), this competition prompted firms to adopt international certifications (ICs) to help them compete in an increasingly competitive environment.

There are various types of ICs, the most common of which are issued by the International Organization for Standardization (ISO), one of the world's largest standards developers. ISO 9001 is an international certification standard given to firms that have adopted a number of quality management principles, including a focus on customer, innovation and process approaches and continual improvement that aims to improve quality products and processes (Latan et al., 2020). The prior literature indicates that firms with international quality certification (IQC) have a tendency to be more innovative than those who do not have it (Omar et al., 2020). The importance of quality certification standards in improving business performance, providing a framework for cost savings, increasing customer satisfaction, and facilitating firms' access to new markets cannot be overstated (Albulescu et al., 2016).

Economic globalization means that innovation is becoming more and more relevant to our business and is a key factor in improving our competitiveness in uncertain environments. (Hernández-Perlines et al., 2019). Innovation is a source of business value and plays an important role in national competitiveness and productivity (Azis et al.,

2017; Ortigueira-Sánchez et al., 2022). Innovation leads to higher productivity and development of new products and services, improving the export situation of the firm (Dai et al., 2018). Zehir et al. (2015) defines innovation capability as the improvement and management of existing technologies, skills and knowledge needed to create new technologies, skills and knowledge. In this environment dominated by rapidly changing high-tech applications, it is imperative to develop the ability of the enterprise to innovate, as it provides a dynamic competitive advantage.

Quality management practices have a positive influence on process innovation. it may be said that quality management practices (leadership, personnel management, customer focus, supplier management, process management, etc.) facilitate innovation (Lestari, Nurainun, Kurniawati, Adzkia, Pocklington, et al., 2020; Widianto & Harsanto, 2017). ISO 9001 certification has a positive impact on the process of innovation and firms' ability to innovate (Latan et al., 2020). In the same vein, Shi et al. (2019) demonstrate that the ISO 9000 quality management system has a positive effect on facilitating the creative process and innovation. Therefore, the following hypothesis is proposed:

H1: International quality certification has a positive relationship with firm innovation

3.2 Information and Communication Technology (ICT) and Firm Innovation

ICT capabilities as an enterprise's ability to mobilize and deploy a wide range of ICT-based resources (network devices, intranets, extranets, hardware, software, etc.) to support the production and operation of an organization ICT capabilities can be a source of great performance (Yunis et al., 2018). ICT capabilities help firms capture, evaluate, and integrate internal and external data/information to deploy new products and processes in response to market changes (Spiezia, 2011). ICT helps firms introduce new products and services, become customer-centric, and better respond to, or innovate, market changes (Yunis et al., 2018).

Information and communication technologies (ICT)-based innovations and applications have become major drivers of enhanced organizational performance, economic growth, and social change. Importance of having certain complementary factors in an organization to enable better use of ICT and accordingly reaping its benefits towards creating innovative business opportunities and achieving competitive advantage (Yunis et al., 2018). Today, ICT and innovation play a vital role in seizing opportunities to achieve a firm's action plans and strategic goals, such as operational excellence, new product and service launches, and customer intimacy. Therefore, the following hypothesis is proposed:

H2: Information and communication technology (ICT) capabilities have a positive relationship with firm innovation

3.3 Innovation and Export Performance

Export performance shows the firm's successful exports. Export performance, defined as a result of overseas sales movements under various organizational and environmental conditions, is important to businesses and communities for two reasons (Zehir et al., 2015). Export development is crucial to macroeconomic development, including trade balance, production and employment. (Staehr, 2021)

Exports are considered the first mode of entry into the market, so it is important to understand the impact of innovation on exports (Ortigueira-Sánchez et al., 2022). Innovation creates a competitive advantage in the global market by allowing businesses to benefit from economies of scale and overcome constraints on the size of the domestic market (Silva et al., 2017). The relationship between innovation and export performance is well established (Ortigueira-Sánchez et al., 2022)

Prior empirical studies have shown that there is a positive link between a firm's innovative capabilities and its export performance. Other scholars disagree with this view, arguing that innovation and export performance are mutually causal (Gupta & Chauhan, 2021). It also shows that the ability to innovate has a positive impact on export performance. This makes firms that develop and implement innovation-oriented export ideas successful (Zehir et al., 2015) Innovation is vital for growing aggressive gain in worldwide markets to permit corporations to gain from economies of scale (Silva et al., 2017). Therefore, the following hypothesis is proposed:

H3: Firm innovation has a positive relationship with export performance

3.4 Mediation of Innovation

Innovation is the key mediator of various relationships between variables that lead to firm performance. Innovation is a key mediator of various relationships between variables that lead to firm performance (e.g., Hernández-Perlines et al., 2019; La Hatani 2022). In the context of the relationship between quality certification and firm performance, innovation plays a key role as a mediator variable that is important for this connection (Haddoud et al., 2021). Innovation also indirectly affects how the performance in the organization, especially export performance and also the use of ICT (Yunis et al., 2018). Several studies show that ICT has a positive relationship with exports. In the use of ICT, organizations usually have innovations in practice. Innovation in ICT is widely recognized as one of the key drivers of national competitiveness. ICT innovation significantly contributes to the growth of productivity and economic development (Lee et al., 2016). To identify whether innovation has a significant mediating role on the relationship between International Quality Certification, Export Performance, and Information and communication technology (ICT), the following hypothesis is formulated:

H4: Innovation plays a mediating role in the relationship between international quality certification and export performance

H5: Innovation plays a mediating role in the relationship between Information and communication technology (ICT) and export performance

4. METHOD

4.1 Data and measurements

This research examined the data from World Bank Enterprise Survey – manufacture firm-level data (World Bank Group, 2017). This follows previous research by Hudson et al. (2012); Nguyen and Jaramillo (2014), Adegboye and Iweriebor (2018) and Haddoud et al., (2021). The data comes from the 2015 Enterprise Survey which covers four countries in ASEAN including Indonesia, Vietnam, Malaysia, and the Philippines. Other ASEAN countries such as Thailand and Singapore were not included in the analysis due to data

availability reasons. For instance, the available data for Thailand is 2016, while in this manuscript, we are analyzing enterprise survey data of 2015. As for Singapore, this country is not included in the coverage of countries included in the Enterprise Survey.

The missing data from the survey were deleted and obtained a total of 4132 data. For measurement, the model includes four main variables named ICT Usage (ICT), International Certificate Holder (CER), Innovation Within Firm (INV), and Export Performance (EXP). CER and EXP constructs were measured using a single item. For the scale used, all the exogenous variables were binary data (Yes/No). The dependent variable (EXP) had a continuous scale (0-100%). Table 1 concludes the outlines of the measurement.

Table 1 Measurement Items

Variable	Items	Scale
ICT	At the present time, does this establishment use e-mail to communicate with clients or suppliers?	Yes/No (1/0)
	At the present time, does this establishment have its own website?	Yes/No (1/0)
CER	Does this establishment have an internationally-recognized quality certification?	Yes/No (1/0)
INV	During the last three years, has this establishment introduced new or significantly improved products or services?	Yes/No (1/0)
	During the last three years, has this establishment introduced any new or significantly improved methods of manufacturing products or offering services?	Yes/No (1/0)
	During the last three years, has this establishment introduced any new or significantly improved logistics, delivery, or distribution methods for inputs, products, or services?	Yes/No (1/0)
	During the last three years, has this establishment introduced any new or significantly improved supporting activities for your processes, such as maintenance systems or operations for purchasing, accounting, or computing?	Yes/No (1/0)
	During the last three years, has this establishment introduced any new or significantly improved organizational structures or management practices?	Yes/No (1/0)
	During the last three years, has this establishment introduced new or significantly improved marketing methods?	Yes/No (1/0)
	During the last three years, did this establishment spend on formal research and development activities, either in-house or contracted with other firms, excluding market research surveys?	Yes/No (1/0)
EXP	Coming back to fiscal year [insert last complete fiscal year], what percentage of this establishment's sales were. (Direct Export)	Continuous (0-100%)

4.1.1 Sample characteristics

In this data sample, 30,95% of the data came from Indonesia, follow by Philippines with 26,28%, Vietnam 22,12% and Malaysia 20,64%. Total 3.580 data collected from firms who operates in capital city (86,64%). As for firm who located in main business city, 60,67% were located in main business city and 39,33% were not. In term of size, 37,37

% were small business, 34,73% were medium business and 27,73 % were large business. Table 2 describes these percentage.

Table 2 Sample Characteristics

Country	**Freq.**	**Percent**
Indonesia	1,279	30.95
Malaysia	853	20.64
Philippines	1,086	26.28
Vietnam	914	22.12
Total	**4,132**	**100**
Located in Capital City	**Freq.**	**Percent**
No	3,580	86.64
Yes	552	13.36
Total	**4,132**	**100**
Main Business City	**Freq.**	**Percent**
No	2,507	60.67
Yes	1,625	39.33
Total	**4,132**	**100**
Sampling Size	**Freq.**	**Percent**
Large	1,146	27.73
Medium	1,435	34.73
Micro	7	0.17
Small	1,544	37.37
Total	**4,132**	**100**

The samples used in this study were firms in Indonesia, Malaysia, Philippines and Vietnam. Based on the survey results, out of a total of 4132 firms, Malaysia has the most IQC that described in the Table 3 and Fig 2.

Table 3. IQC Ownership

Country	**Freq**	**Countries that owning IQC**		**Percent**
		Yes	***No***	
Malaysia	*853*	*255*	*598*	*29,89%*
Indonesia	*1,279*	*251*	*1028*	*19,62%*
Philippines	*1,086*	*202*	*884*	*18,60%*
Vietnam	*914*	*159*	*755*	*17,40%*

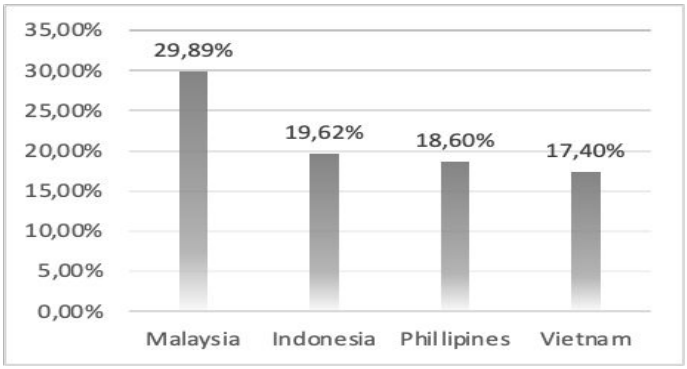

Fig. 2 IQC Ownership Percentage

In this data sample, firm in Malaysia is mostly owning IQC with 29.89%, followed by Indonesia 19.62%, Philippines 18.60% and Vietnam 17.40%.

4.2 Analysis

This study used non-linear partial least square modeling (PLS-SEM) technique. The PLS-SEM model is recommended when the research is exploratory and the model is complex (Hair et al., 2011; Sarstedt et al., 2016). Furthermore, PLS-SEM model has been used in many research related to social science and technology usage Hair et al., 2017; Sarstedt et al., 2016). To test the hypothesis this study used SmartPLS4 software.

4.2.1 Constructs' reliability and validity

This study construct reliability and validity for latent variables are used (Table 4). In this study, ICT and INV are the latent variables that assessed trough composite reliability (CR) and Cronbach's Alpha (α), as for validity is assessed using the average and variance extracted (AVE). The variance inflation factor (VIF) is used to check collinearity for all variables (latent and single item). All the values meet the general acceptance thresholds 0,6 for reliability (Ursachi et al., 2015), 0,5 for AVE (Schmiedel et al., 2014) and 5 for VIF (Hair et al., 2011).

Table 4. Detail constructs' reliability and validity

	ICT	INV												
CR	0.603	0.849												
α	0.604	0.851												
AVE	0.716	0.527												
	CER	EXP	ICT1	ICT2	INV1	INV2	INV3	INV4	INV5	INV6	INV7	LOC	SIZ	SEC
VIF	1.000	1.000	1.229	1.229	1.428	1.953	1.781	1.994	1.534	1.734	1.358	1.000	1.000	1.000

ICT = Information and Communication Technology Usage; CER = International Quality Certification; INV = Innovation; EXP=Export Performance; LOC=Firm Location; SIZ= Firm Size; SEC = Firm Sector

4.2.2 Hypothesis Testing

The model is analyzed by using the path coefficient (β) and the p values of the relationship of the variables. Fig 3 describes all the related values. From the model, it can be concluded that CERT has a positive and significant relationship to INV ($\beta =$ 0.131***, t = 7.179, ρ = 0.000). The result also shows that ICT has a positive and significant relationship with INV ($\beta =$ 0.281***, t = 23.981, ρ = 0.000). The relationship between INV with EXP was also found to have a positive and significant association ($\beta =$ 0.095 **, t = 2.175, ρ = 0.030).

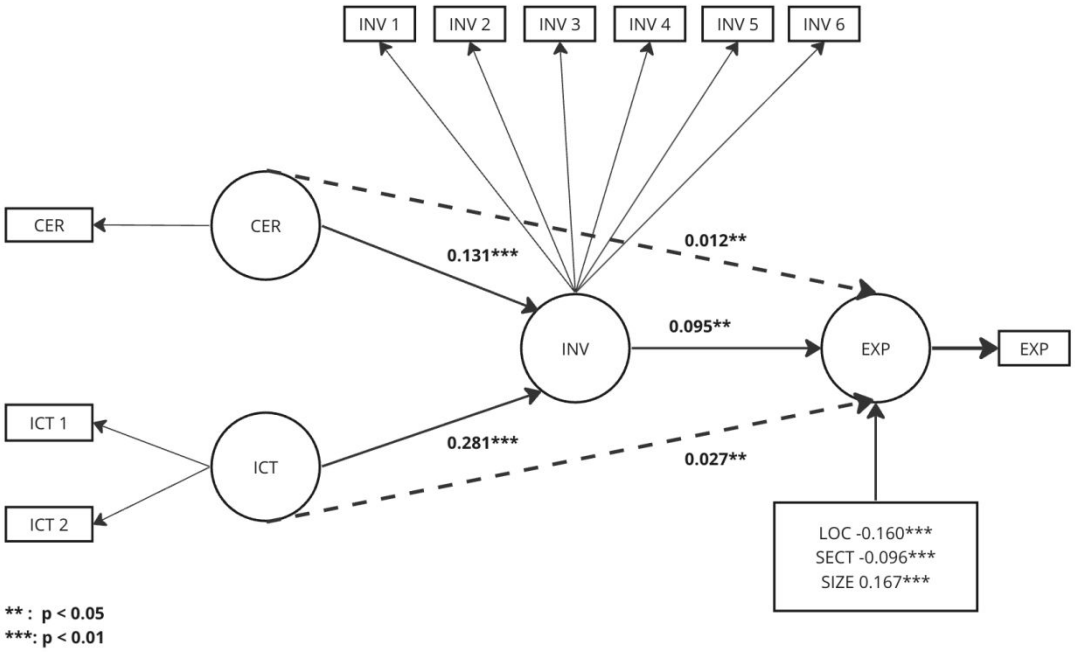

Fig 3. Structural Model

As for the mediation role of INV, the result found that CERT and ICT were mediated positively and significantly through INV toward EXP ($\beta =$ 0.012 **, t = 2.019, ρ = 0.044 ; $\beta =$ 0.027 **, t = 8.890, ρ = 0.029 respectively).

Table 5. Direct and indirect effects

Effect	Hypothesis	Path	Path Coefficient	Sd	t-value	Finding
Direct	H1	CERT -> INV	0.131***	0.018	7.179	Supported
	H2	ICT -> INV	0.281***	0.012	23.981	Supported
	H3	INV -> EXP	0.095**	0.043	2.175	Supported
Indirect	H4	CERT -> EXP	0.012**	0.006	2.019	Supported
	H5	ICT -> EXP	0.027**	0.012	2.180	Supported

***: $p < 0.01$; **: $p < 0.05$

In summary, all the hypotheses are all supported (Table 5). For the R^2, it can be concluded that the full model explains 6% of variation in export. This model also included control variables such as firm location (LOC), firm sector (SEC) and firm size (SIZ). All the control variables have a significant relationship to export performance.

5. DISCUSSION

This research has investigated the influence of international quality certification and ICT capability on firm innovation and, in turn, the influence of firm innovation on export performance. The results indicated that international quality certification positively affects firm innovation. Prior studies indicated that the implementation of international quality certification has had a mixed impact, with some successful and unsuccessful impact in raising firm performance. The findings of this study are in line with the findings of previous studies, which found that the effect of international quality certification on firm innovation is positive and significant, as identified in Ullah (2022) or Lestari, Nurainun, Kurniawati, Adzkia, Rahman, et al. (2020). This implies that internationally certified companies are more innovative than uncertified ones. However, other studies detailing the type of innovation—product innovation and process innovation—resulted in different effects. The study by Terziovski and Guerrero (2014) found that international quality certification did have a positive impact on process innovation but no impact on product innovation. In this study, we combine product and process innovation to avoid separation of the two types of innovation in the analysis. Our findings show that the effect of international quality certification on firm innovation is positive and significant, which is applicable to both product and process innovation. Moreover, past studies have examined a larger umbrella than quality certification, namely total quality management (TQM), which was observed to have a positive impact on firm innovation, particularly in practices related to leadership, process management, and open organizations (Hoang, Igel, & Laosirihongthong, 2006). These aspects are included in international quality certifications e.g., ISO 9001, which includes principles such as leadership, process approach, and relationship management (ISO, 2015).

The results from the second hypothesis indicated a positive and significant relationship between ICT capabilities and firm innovation. This finding is in line with many previous studies that found a positive relationship between ICT capabilities and firm innovation, such as Chege, Wang, and Suntu (2019), Verstegen (2019), or Karakara & Osabuohien (2020). ICT capabilities can help firms become more innovative through their role in assisting decision-makers in understanding the market and the surrounding environment, including competition (Yunis et al., 2018). Internally, ICT capabilities can help process improvement through operational efficiency and product quality improvement, which in turn can help companies be better able to innovate (Pratali, 2003). As international quality

certification is strongly influenced by leadership, ICT capabilities are also influenced by top management's view of certain technologies and their role in increasing the firm's competitive advantage (Alyahya & Suhaimi, 2013). The findings of this study are indeed different from recent findings from Usai et al. (2021), who found that ICT capabilities had a low impact on firm innovation and suggested that R&D was the main predictor of firm innovation success. This is interesting for future elaboration considering that R&D is not included as variable in this study.

The next finding from this research is that innovation has a significant positive effect on export performance. This reinforces previous findings from Tavasolly (2018), Rialp-Criado and Komoshova (2017), and Ganotakis and Love (2011), which found that product and process innovation can improve performance in both domestic and international markets. In more detail, what type of innovation has a positive and significant impact on export performance? Previous authors have different opinions on this matter. Haddoud et al. (2021) found that it was the innovation process that influenced better export performance, while product innovation did not. Contrasting findings were put forward by Tavasolly (2017) and Gajewski and Tchorek (2017), who found that product innovation is more of a determinant for a firm's export performance. Meanwhile, this study does not distinguish the role of both product and process innovation in determining export intensity, so it is not in a position to detail the roles of the two types of innovation.

The last findings indicate that firm innovation has a significant and positive impact on both international quality certification and ICT capabilities in terms of export performance. The reason for firm innovation is that by having international quality certification and ICT capabilities, a firm can meet the demands of the global market, allowing it to be more innovative and, as a result, improve its export performance. There are numerous studies that show the importance of firm innovation in mediating the relationship between various business capabilities and firm performance. For example, Kafetzopoulos, Gotzamani, and Skalkos (2019) discovered that in Greece, firm innovation mediates the relationship between European Foundation for Quality Management (EFQM) enablers and firm performance. Alternatively, see Li, Liao, and Albitar's (2019) study that advances innovation by mediating specific environmental engagement with firm value. The study has a common goal in mind when it comes to improving various aspects of firm performance, despite the fact that in the study, quality is measured specifically through certification of international standards. In terms of firm performance, the study specifically uses export performance as a measure of a firm's internationalization. From the perspective of firm innovation mediating, this study advances research that connects quality certification with firm performance, which was previously limited to human capital as a mediator. From the standpoint of ICT, prior research has shown that ICT capabilities are critical in achieving firm performance (Yunis et al., 2018). In the context of this study, ICT capabilities have a positive impact on achieving firm innovation in ASEAN countries, and when combined with international quality certification, they help businesses improve their export performance.

6. CONCLUSION AND IMPLICATIONS

This study used data from four ASEAN countries, including Indonesia, Malaysia, the Philippines, and Vietnam, to investigate empirically the relationship between

international quality certification, information and ICT capabilities, and business export performance, with firm innovation serving as a mediator. This research has found that international and quality certifications and ICT capabilities have a positive and significant impact on firm innovation. Both have a positive and significant effect on how well exports do, with firm innovation acting as a link between the two.

Given the scarcity of knowledge regarding the relationship between the variables analyzed and export performance, this study offers useful managerial implications. According to the research, organizations with international quality certifications are more inventive. As a result, export-oriented businesses that have not yet been certified may want to explore getting certified in the future since, while it is not everything, it can help organizations be more inventive and, eventually, increase export success.

Likewise, managers are encouraged to improve their firm's ICT capabilities, including by investing in the development of appropriate hardware and software, considering that evidence shows that these capabilities also have a positive and significant impact on firm innovation and ultimately on export performance. Managers, of course, need to be aware that the increase in ICT capabilities should not just follow the trend but really meet the needs. Companies need to design training programs or incentives so that the ICT skills of their employees increase and the firm's ICT capabilities also increase.

The scope of this study is limited to four ASEAN countries, so the results and implications apply to that context. Understanding the context of countries in ASEAN as a region that is becoming one of the world's economic and geopolitical attention centers is important and certainly contributes to understanding other contexts or regions that have similar characteristics. Future studies can be carried out in other contexts or regions. Data from the four countries in this study were processed as an aggregate to provide an overview at the ASEAN regional level. Future research can compare countries to provide a more comprehensive picture.

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