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Mediating Effect of Sustainable Manufacturing Practices between Green Innovation Capability and Sustainability Performance among Malaysian Manufacturing SMEs

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Abstract

The level of innovative activities in Malaysia is still low compared to that of other nations, which is attributed to the scarcity of green innovation capability (GIC) and the minimal acquisition of new technological knowledge. Studies revealed that Malaysian manufacturing small and medium enterprises (SMEs) encounter the challenges of operation and supply chain disruption and tight cash flows. These firms would not want to venture into green equipment and eco technologies if there is no certainty of promising returns. Overall, studies on sustainable management systems in the Malaysian manufacturing SMEs have revealed that firms are still in the early stages of implementation, such that sustainable manufacturing practices (SMPs) are predominantly production- and process-oriented, neglecting the importance of the product life cycle and sustainable end-of-life management. The aim of this paper is: (1) To examine the effect of GIC on firm sustainability performance (SP) and (2) To investigate the mediating effect of SMPs on relationship between GIC and firm SP. Smart PLS 3.0 was applied to analyze the data collected among 150 ISO 14001 certified local SMEs manufacturers. The study demonstrated the non-significant result between GIC and SP; while SMPs mediated the relationship between GIC and SP. This study enriches the Dynamic Capability View (DCV) by extending the sustainability model to better explain the sustainable development process in the context of Malaysian manufacturing SMEs. This article does not just inform firms on the importance of SMPs for performance but also guides firm managers towards understanding and improving their current SMPs. These results also help Malaysian policy makers in providing appropriate assistance to improve current firm operations, and subsequently, sustainability-related outcomes. Following this, various kinds of assistance (e.g., strategic planning, governance, facility, financing, and technology) can be provided to support SMEs manufacturers.

Keywords: sustainable manufacturing practices, sustainability performance, green innovation capability, manufacturing SMEs

1. Introduction

Manufacturing small and medium enterprises (SMEs) can be defined as firms with a sales turnover not exceeding RM50 million or employment not exceeding 200 workers. In Malaysia, SMEs constitute 907,065 (98.5%) of total business establishments (SMECorp, 2019). Hence, any economic turmoil that impacts various SME sectors unavoidably impacts national economic progress as well (Svatošová, 2019). Manufacturing SMEs are thus the backbone of the economy and the second largest sector contributing to national GDP growth after the services sector. The manufacturing SMEs segment, in particular, contributed 34.6% to Malaysian GDP and 46.7% to employment in the year 2019 (Department of Statistics Malaysia, 2020). The manufacturing sector itself, in 2019, contributed RM 316 billion (22.3%) to Malaysia's GDP of RM 1.4 trillion, evidencing its significant role in the development of the Malaysian economy.

Despite SMEs' significant contribution to country's development, the adoption of green innovation has yet to penetrate Malaysian manufacturing SMEs. SMEs in Malaysia has lower level of innovative activities as compared to that of other nations, attributed to the scarcity of green innovative capability (GIC) and the minimal acquisition of new technological knowledge (Udriyah, Tham, & Azam, 2019). Based on statistics from the Malaysia Science and Technology Information Center (MASTIC), Malaysia's ranking in the Global Innovation

Index declined from 32nd to 35th position in 2019 (MASTIC, 2020). This is an alarming signal for the government and local communities to take action to sustain the goal of becoming a high-income and high technology nation. Meanwhile, the manufacturing SME industry has high dependency on the foreign workforce. The heavy reliance on low-skilled labor has hindered manufacturers from achieving greater levels of innovation, research and development (R&D), and Industry 4.0 technologies. These drawbacks have created industry gaps between SMEs and multinational giants, hampering the competitive strength of SMEs (Craven, Liu, Mysore, & Wilson, 2020; Smith-Bingham & Hariharan, 2020). Besides, SME manufacturers are reluctant to implement GIC due to extra investment costs at the initial stage of implementation (Zhang & Yang, 2016). As innovation is key to sustainability, GIC is imperative as a major working system that contributes new competitive edges for manufacturing SMEs to sustain in the long run.

Manufacturing SMEs generally face financial and operational challenges following the pandemic crisis (Che Omar, Ishak, & Jusoh, 2020). The series of lockdowns and MCOs have caused SMEs to encounter supply chain disruptions and tight financial cash flows. Thus, these firms tend to prioritize financial returns rather than sustainable operations, thereby subjecting themselves to a high risk of deterioration. The lack of concrete sustainable practices has caused the depletion of natural resources, the generation of significant amounts of waste, and overutilization of energy (Salwa, Novita, Raja, & Ramayah, 2017).

Furthermore, the implementation of sustainable manufacturing practices (SMPs) in Malaysia are predominantly production- and process-oriented, neglecting the importance of the product life cycle and sustainable end-of-life management. Previous studies have reported the occurrence of sustainability-related scandals as a result of operational deficiencies, such as the milk powder scandal in China in 2008, the horse meat scandal in Europe in 2013, and the clothing industry's modern slavery scandal in the United Kingdom in 2016 (Hallikas, Lintukangas, & Kahkonen, 2020). If these problems are left unresolved, sustainability-related failures will persist in future and continue to harm firms and societies (Xu, Cui, Hu, Xu, Zhang, Liang, & Qu, 2019).

The Covid-19 pandemic crisis has exacerbated existing issues, as Malaysia has suffered economically, socially, and environmentally from its effects. Firms with good environmental, social, and governance (ESG) have appeared to be more resilient, especially during the pandemic, because of investors' growing concern about sustainability. Their changing expectations of businesses' role in improving society and protecting the environment have led them to place more value on the effective management of ESG risks. Thus, SMPs are necessary to form the basis of firms' sustainability, dynamism, and competitiveness in the long run.

In this study, SMPs are focusing on strategies that create value for manufacturing SMEs by developing opportunities and mitigating risks related to sustainability. Specifically, SMPs support sustainable development goals (SDG 11) - Sustainability, under which the United Nations (UN) intends to make cities inclusive, safe, resilient, and sustainable (The United

Nations, 2020). Towards this end, the implementation of sustainable initiatives would support local governments and firms by contributing knowledge for informed decisions, mitigating economic impacts, initiating recovery, and ultimately, providing sustainable solutions for a cleaner and healthier community. In such, the objective of this paper is to fill the gap by developing and validating a research model that includes key elements affecting sustainability performance (SP) in Malaysian manufacturing SMEs. Hence, the aim of this study is: (1) To examine the effect of GIC on firm SP and (2) To investigate the mediating effect of SMPs on relationship between GIC and firm SP.

This study enriches the theory of dynamic capability by extending the sustainability model to explain the sustainable development process of SP among manufacturing SMEs. This article does not just inform firms on the importance of SMPs for performance but also guides firm managers towards understanding and improving their current SMPs. Managers in the manufacturing sector would benefit from this paper by learning and implementing effective sustainable strategies in their operations management to improve sustainability-related outcomes.

2. Conceptualization and Development of Constructs

2.1 Categorization of Green Innovation Capability

Green innovation is an emerging necessity and is perceived as a value-added capability that helps firms remain competitive in the industry (Dangelico, Pujari, & Pontrandolfo, 2016). As sustainability issues become increasingly crucial, scholars have shifted their views in innovative management and innovative economy. Instead of focusing on the economic contribution of technological innovation, attention is now given to the value creation of technological innovation in terms of green concept and eco-friendliness (Wang, Yu, Yan, Yao, & Liu, 2017).

In the sustainability framework, GIC can be described as “firm ability to produce radically new or significantly improved green products, create new green product categories, respond to customer needs, identify new opportunities and new green markets that are crucial for survival and success of business” (Slater, Mohr, & Sengupta, 2014, p. 13). GIC outlines a firm’s ability to transform and make use of resources from their relational capital to attain the aim of merging sustainable initiatives into their operation. Indeed, recent literature has shown that innovative manufacturing plays a crucial role in the economic growth of developing countries. According to Cainelli, Marchi, and Grandinetti (2015), innovation strategies are complicated and affect firms in various aspects, ranging from product design and marketing practices to diverse technical knowhow whereby firms compete in their area of expertise. In the past, innovation is deemed as an important constituent of dynamic capability, comprising five determinants that contribute to a firm's comprehensive innovativeness. These determinants are product innovativeness, process innovativeness, strategic innovativeness, market innovativeness, and behavioral innovativeness (Bhupendra, 2015).

In the past, considerable literature reviews have been conducted on eco and green innovations, finding that most empirical work surrounds the internal aspects of eco-innovation. The term "eco-innovation" has been used interchangeably with the term "green innovation". Both terms carry the similar meaning as "ecological", "environmental", "green" and "sustainable innovation" as all are intended to reduce environmental impacts. In most previous publications, technological innovation dominates over non-technological innovation (Rashid, Jabar, Yahya, & Shami, 2015). This is due to technological innovations function as one system under sophisticated environmental technology improvement that aims to create environmentally friendly products and processes. On the other hand, non-technological innovations focus on the enrolment of management to carry out non-technological advancement and cultural shift. Thus, based on previous studies, GIC can be divided into three interrelated components, namely eco process innovation, eco product innovation, and eco organizational innovation. These three components are elaborated in the following subsections.

2.1.1 Eco Process Innovation

Eco process innovation is considered a part of technological eco-innovation. Eco process innovation refers to the introduction of new elements into the current firm production system in order to manufacture products with green and eco-friendly features (Negny, Belaud, & Robles, 2012). Generally, eco process innovation can be defined as the process to improvise current manufacturing flows and integrate new features into the process to minimize the impacts on the environment. Eco process innovation can be in any form, for instance, the application of alternative solutions to current production processes, the replacement of inputs and substrates, process optimization, and the improvement of production output efficiency. The expected outcomes of eco process innovation include modified firm processes and systems, reduction in operational cost per unit, new or improved green products, and the mitigation of negative effects on the environment.

2.1.2 Eco Product Innovation

Eco product innovation is considered a part of technological eco-innovation. While eco process innovation focuses on introducing new features into the process, eco product innovation introduces new or improved features and traits into current products, for example, technically new elements and ingredients (Christensen, 2011). Generally, eco product innovation is driven by internal and external factors, such as leading green technologies, initiatives to enhance product life cycles, and competitive business environment (Carrillo-Hermosilla, Del Río, & Könnölä, 2010). Eco product innovation further emphasizes the application of products and their impacts on the environment. Hence, its main concerns pertain to the issues of energy consumption, waste effluents discharge, emission of poisonous gas, and disposal of carcinogenic heavy metals like lead, arsenic, and mercury. Eco product innovation takes account of the entire product life cycle, which focuses on the overall improvement of a product from its development to application to final outcome in order to reduce environmental impacts.

2.1.3 Eco Organizational Innovation

Eco organizational innovation is considered a part of non-technological eco-innovation. While both eco process and product innovations have direct impacts on the environment, eco organizational innovation has an indirect impact on the environment. The main role of eco organizational innovation is to assist the progress of eco process and eco product innovations to achieve the ultimate goal of eco-innovation. In other words, eco organizational innovation plays an administrative role in refreshing organizational practices and operational procedures to attain eco-innovation (Cruz, 2015). Eco organizational innovation specifies the enhancement of firm administration procedures via the application of green and eco concepts in organizational routines. Eco organizational innovations can be in terms of training programs related to green and eco concepts, green product design, and eco learning. In addition, a special task unit can be set up to manage firm environmental issues. Thus, firm performance can be improved via eco organizational innovation by lowering departmental costs and enhancing job satisfaction in the organization.

2.2 Sustainable Manufacturing Practices

The term 'sustainable development' was first introduced by the UN in 1987 as "development that meets the needs of the present without compromising the ability of future generations to meet their needs". In other words, firms' aim to both restore resources that are being consumed today and generate resources for the future is considered as a sustainable approach that directs firms towards sustainable development. As far as sustainable development is concerned, the ethical standard of achieving equity between the present and future generations is the priority. In simpler terms, sustainable development refers to the process of implementing sustainable practices that are environmentally sound, economically healthy, and societally just in an industry.

The notion of sustainable development in manufacturing was developed in the 20th century. The essence of sustainable manufacturing appears to be process configuration to generate high-value products by revamping the production system with higher outputs, green technology support, and economies of scale (Lee, Rahmat, & Heng, 2017). In order to be sustainable, it is crucial to keep absorptive and regenerative capacities well above waste generation and resource extraction rates. However, environmental issues such as global warming and ozone depletion clearly demonstrate that waste generation rates and energy resource extraction rates are exceeding the world's natural capacity to regenerate and consume (Mohd Helmi, Suhaiza, Mohammad, & Foroughi, 2019). Since manufacturing industries are causing higher environmental and social impacts, it is essential to inculcate sustainability to mitigate the risks arisen from its operational activities (Rosini & Hakim, 2021).

Environmental issues have led consumers to demand to "green their own supply chain" and urge upstream firms to provide green and biodegradable products. Stakeholders' growing expectations pertaining social issues have also pushed firms to pay attention to corporate social responsibility (CSR), a healthy corporate image, and social compliance to avoid dissatisfaction and public protests. Moreover, to adopt a sustainable action plan, firms have been encouraged to change their attitudes, cultures, and interests to address the human aspect of sustainable management (Renwick, Jabbour, Muller-Camen, Redman, & Wilkinson, 2016). Jabbour (2015) concluded that many firms are converting to the green phase on account of consumer demands, green consumerism, and sustainability requirements.

In this paper, we posit SMPs as "an important strategic action applied by manufacturing firms to preserve the environment and improve the quality of human life through their activities" (Salwa et al., 2017, p. 184). SMPs can also be referred as "the ability to use natural resources in manufacturing intelligently to fulfil economic, environmental, and social aspects and thus, preserve the environment and improve the quality of life" (Garetti & Taisch, 2012, p. 22). Thus, it is crucial for firms to incorporate the environmental, economic, and social aspects of sustainability into their daily operations to improve SP. Schrettle, Hinz, Rathje, and Friedli (2014) mentioned that firms that have already obtained a track record in sustainability by gaining experience and important capabilities in sustainability management are better positioned to engage in further sustainability initiatives. In the same study, they recognized that new technologies which include sustainability efforts facilitate SMPs and the development of green products. Therefore, with increasing competition, SMPs should be acknowledged as a strategic action that improves productivity, green image, and quality status, thereby granting a greater competitive edge and performance in the market.

Therefore, to achieve the status of a developed nation, it is important for Malaysian firms to improve their sustainable development process. Despite various types of assistance provided by the authorities to stimulate sustainable production, the implementation of sustainable manufacturing by Malaysian firms is still ambiguous. A study conducted among 36 manufacturing firms from various sectors supported previous findings that the adaptation of sustainable practices remains limited to the 6R approach, namely reduce, reuse, recycle, recover, redesign, and remanufacture (Hami, Yamin, Shafie, & Muhamad, 2019).

Meanwhile, a research on 150 Malaysian manufacturers discovered that while the application of internally focused SMPs is substantial, the implementation of externally-focused SMPs is only average, indicating that firms are unprepared to thoroughly consolidate sustainability requirements and guidelines when dealing with the expectations of external stakeholders, namely consumers, suppliers, and societies (Shakeel, Tolba, Al-Makhadmeh, Zafer, & Mustafa, 2019). Thus, manufacturers should now be aggressive by incorporating sustainability concepts into their strategic actions than merely attain better financial achievement to safeguard the environment and improve social welfare.

2.3 Sustainability Performance

Sustainability refers to the goal or endpoint of sustainable development. Hence, a firm that has undergone the sustainable development process is a firm that has reached sustainability. Meanwhile, there has been no common definition of sustainability thus far. Debates about the definition of sustainability range from philosophical viewpoints to multidimensional explanations. Nevertheless, the main concern of various definitions has always been the influence of current decisions on upcoming generations (Iranmanesh, Jayaraman, Imrie, & Zailani, 2016). A number of scholars defined sustainability by focusing on dimensions related to the triple bottom line (TBL). For example, Elkington (1997) recommended sustainability as "an extension of the organizational perspective, in consideration of equalizing economic, environmental, and social aspects of sustainability". Meanwhile, the Oxford Dictionary described sustainability as "the avoidance of the depletion of natural resources in order to maintain an ecological balance".

Numerous studies have attempted to prove that sustainability is a capability that allows firms to adapt and alter themselves in different situations to achieve sustainability performance (SP) (Leonidou, Leonidou, Fotiadis, & Aykol, 2015; Mohd Helmi et al., 2019; Raza, Liu, Zhang, Zhu, Hassan, Gul, & Hussain, 2021). A new sustainability model should integrate sustainability into firms' core strategy to create significant social and environmental value on top of economic returns. Such model will address current issues and provide solutions that embed environmental and social considerations for a better and brighter future. Within the sustainability context, economic value creation cannot be taken as the sole contributor to firms' performance. Indeed, the assessment of SP can include new dimensions such as environmental, social, communication, and governance (Rosini & Hakim, 2021).

Salwa et al. (2017) referred SP as "the evaluation of firms' performance by incorporating the effect of manufacturing activities on environmental and social aspects". On top of that, SP represents a firm's ability to acquire an everlasting competitive edge in financial returns by taking into-account the effects of operational activities on the ecological and societal system while concurrently fulfilling stakeholders' requirements (Paulraj, 2011). Consequently, a new development strategy should encompass political, economic, social, technological, and environmental dimensions. In order to shift into this new paradigm, McCormick, Neij, Mont, Ryan, Rodhe, & Orsato (2016) urged that a thorough and thoughtful change is required not only in firms' present production system but also in their ways of managing issues related to society and the consumption of natural resources essential to human life.

In this paper, SP covers the economic, environmental, and social performance of manufacturing SMEs. Economic performance specifies firms' growth in sales and profit relative to competitors, increase in market share, return on investment, and return on sales. Environmental performance is signified by a reduction in waste discharged to the environment, a decrease in the consumption of hazardous materials, a decline in energy consumption, compliance with environmental regulations, and a decrease in the frequency of environmental accidents. Social performance indicates the ability of firms to improve overall stakeholder welfare and community health and safety, reduce environmental impacts on the general public, and improve awareness and protection of human rights in the community served (Mohd Helmi et al., 2019).

Despite these past studies, detailed research on dynamic capabilities for SP is inadequate in the literature. There is a need for future research to further assess the link between dynamic capabilities and sustainability so that firms can establish required practices and modify their strategies to face sustainability issues (Leonidou et al., 2015; Raza et al., 2021). In addition, limited studies have examined TBL dimensions when evaluating the effect of sustainable development on manufacturing firms' SP. Moving forward, scholars should look into the directions and action plans for firms to implement innovative technologies and environmental strategies in favor of achieving greater SP (Kuo & Smith, 2018). In line with this, absorptive capacity, internal R&D collaboration, and knowledge sharing are essential factors to improve the innovativeness of SMEs manufacturers in Malaysia (Yuen & Ng, 2021).

3. Conceptual Framework

3.1 Impact of Green Innovation Capability on Sustainability Performance

It is well documented in the extant literature that firms' performance and survival are highly dependent on their innovativeness. Notably, firms' level of innovativeness is essential in connecting environmental practices with environmental capabilities, helping firms seek creative solutions to environmental issues. Firms are urged to improve their capability to make improvements in their current product offerings and business processes, which are the important functions for the selection and enforcement of environmental management practices. Firms are also required to establish the capacity to re-assess and re-examine the way current practices are carried out so they can integrate sustainability into their daily business operations.

From an alternative viewpoint, sustainability can be built when firms develop innovative strategies that engage society members in defining environmental and social value. In the sustainability literature, process innovation is created when lean and environmental practices are combined (Fercoq, Lamouri, & Carbone, 2016). Process innovation, in turn, helps firms to improve SP by minimizing raw material inputs and maximizing productivity (Piercy & Rich, 2015). Huo and Wang (2019) further reported that green practices and lean manufacturing perform various roles in accomplishing SP. From a customer point of view, lean manufacturing is the main enabler of superior SP as it positively impacts social, environmental, and economic performance. From a supplier standpoint, green initiatives play a key role in bringing firms to a higher level of SP by facilitating societal and economic performance.

Bhupendra (2015) stated that distinctive innovative technologies that are able to create breakthroughs in the market will assist organizations' sustainable growth in the long run. In addition, improvements in terms of manufacturing processes, product features, and firm-level innovativeness can be considered as important dynamic capabilities that entail new concepts in the manufacturing field, consumers, and natural surroundings (Gabler, Richey, & Rapp, 2015). In order to inculcate innovation into sustainability, it is usually contended that firms must consolidate environmental and social aspects parallel to the economic aspect. Hence, it is a challenging task for firms to implement innovation strategies because it involves firms' abilities to adapt and prepare for new complexities (Mousavi, Bossink, & Vliet, 2018).

According to Roxas and Chadee (2016), innovation that exists even in its simplest form can be a crucial driver of the competitive edges of firms, especially in developing countries where SMEs compete in a dynamically changing business environment. As such, firms need to swipe away the "business as usual" concept because they can do more than just engaging in normal operations. To further comprehend the concept of innovation management for sustainability, scholars applied the DCV as a convincing way to understand the said relationship (Amui, Jabbour, Sousa, & Kannan, 2017; Darmani, Niesten, & Hekkert, 2017). Innovative solutions with high novelty need to be assimilated into firms' core business in order to solve production-related issues that negatively affect the natural ecosystem and to concurrently enhance overall firm performance. When firms perform innovatively sustainable activities and increase their capacity to innovate, they transform resources and organizational capabilities into valuable and non-imitable ones which provide competitive advantages in the long run. Since innovation activities are hard to be imitated by competitors, firms can achieve a sustainable competitive advantage by engaging in continuous innovation efforts. It is thus essential for firms to continuously obtain, develop, and upgrade their innovation competencies and capabilities to achieve sustainability.

Firm innovativeness as well as creativity act as internal drivers in establishing green capability. Firms that embed innovativeness can more easily communicate their green approaches to stakeholders, whereby this interplay supports the development of GIC (Gabler, Richey, & Rapp, 2015). In the context of sustainable green operations, GIC enables firms to identify opportunities from green markets and generate innovative responses to environmental issue. Effective green management develops value, leverages competitive advantage, and boosts firms' performance. Previous researches (Amores-Salvado, Martín-de Castro, & Navas-Lopez, 2014; Marin, Marzucchi, & Zoboli, 2015) has proven that the 'green concept' is the main basis of efforts to examine eco-innovation and environmental issues effectively. Hence, GIC is important to get innovative, cost-efficient, and dynamic ways to support firms' SP (Roxas & Chadee, 2016). Hence, this study proposed the following:

H1: Green Innovation Capability (GIC) positively impacts Sustainability Performance (SP).

3.2 Mediating Effect of SMPs between Green Innovation Capability on Sustainability Performance

Previous studies have demonstrated mixed results on the link between GIC and firm performance. Some researchers revealed a direct relationship, while others highlighted that this link is mediated and moderated by other variables (Graham & McAdam, 2016). From the innovation point of view, some studies argue that GIC positively affect firms' performance (Cheng, Yang, & Sheu, 2014). This is supported by research from Bhupendra and Sangle (2015) suggesting that firms' capacity to innovate and apply new technologies to handle sustainable matters allows firms to implement sustainable growth in the long-term. In contrast, from an economic perspective, others contend that firms may need to face a trade-off between the benefits gained from the implementation of eco-innovation practices and the cost incurred due to technological complexity in its implementation stage (Li, 2014; Marin, 2014; Zhang & Sara, 2015).

Considering that firms are dealing with unexpected sustainability issues, they should look into the sustainability paradigm to adapt to changes and turbulences in the business environment (Hahn, Pinkse, Preuss, & Figge, 2015). Given the inconsistencies in previous findings, SMPs act as dynamic strategic action, internal to the firms, which transforms firm capabilities into multidimensional SP. Firm capabilities have to be integrated with adequate strategic actions to be competent (Shuen, Feiler, & Teece, 2014), as strategic actions outline the activities required by firms to realize the value of their capabilities. Strategic action thus defines "what the firm does" while capabilities define "how well the firm does it". Strategic actions also complement firm capabilities by capitalizing on them and aiding the implementation of initiatives. Therefore, a research framework that considers the mediating effect of strategic actions between firm capabilities, i.e GIC and SP would provide insight into how valuable capability can be utilized to positively contribute to SP (Kauppila, 2015).

Beske, Land, and Seuring (2014) argued that the application of dynamic capability for sustainable supply chain management can provide superior SP to firms in the supply chain, which include environmental performance. This is because dynamic capabilities allow firms to explore the opportunities available from business environment and actively establish their supply chains in a sustainable manner. Similarly, Das (2018) examined the relationship between environmental management practices and firm operational performance in the Indian manufacturing industry, finding that environmental management practices lead to competitiveness and firm performance when mediated by environmental performance. Zaid, Jaaron, and Bon (2018) investigated green supply chain management practices among manufacturing firms in Palestine. Their results proved that both green human resource management and green supply chain management practices have a positive effect on SP. Aboelmaged and Hashem (2019) investigated the mediating role of sustainable capabilities in the relationship between absorptive capacity and green innovation adoption of SMEs in an emerging economy context. The analysis result showed that sustainable orientation capability is a powerful mediator that mediates the effect of absorptive capacity on green innovation adoption.

It is essential to ascertain how some firms leverage their capabilities via strategic actions in support of sustainability while others do not. In firms that do not apply strategic actions, it is important to explore the alternate initiatives and practices that help them mediate sustainability issues (Rashid et al., 2015). Thus far, the extant literature has lacked an explanatory model that provides decision-making solutions to manufacturing SMEs encountering sustainability issues. Researchers have instead focused on the individual relationships among firm capabilities, SMPs, and firm performance, largely neglecting to integrate all relevant variables in a complete framework in the context of Malaysian manufacturing SMEs. Moreover, though earlier studies have demonstrated the direct relationship between firm capabilities and firm performance, limited research has concurrently examined the interrelationships between GIC, SMPs, and SP, especially in the context of manufacturing SMEs.

As highlighted in earlier sections, the mixed results and gaps between firm capabilities and performance can be filled by implementing strategic actions. GIC is important in generating a sustainable competitive advantage and improving SP; however, GIC must be integrated with adequate strategic actions to be effective. SMPs functions as an important strategic action that outlines the activities required by firms to capitalize on GIC and assist the implementation of initiatives. SMPs are an appropriate strategic action for green-directed firms to enhance SP by inculcating innovation and sustainability into daily operations (Marin et al., 2015). Through SMPs, firms can better innovate green products, explore green markets, and implement advanced technologies. Ergo, the relationship between GIC and SP can be improved via the implementation of SMPs. Hence, this study proposed the following:

H2: Sustainable Manufacturing Practices (SMPs) mediates the relationship between Green Innovation Capability (GIC) and Sustainability Performance (SP).

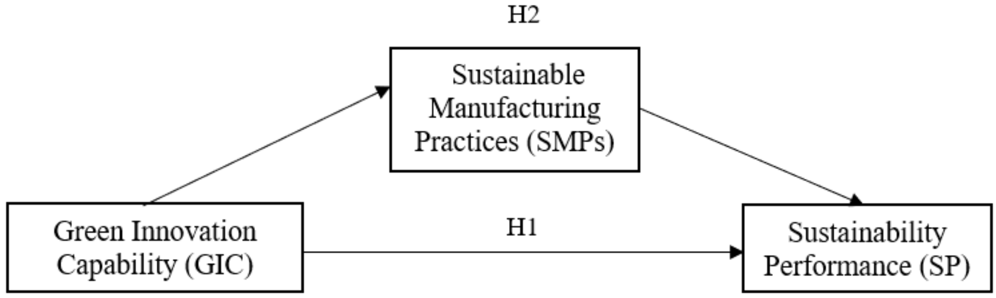

Figure 1. Proposed research framework

H1: Green Innovation Capability (GIC) positively impacts Sustainability Performance (SP).

H2: Sustainable Manufacturing Practices (SMPs) mediates the relationship between Green Innovation Capability (GIC) and Sustainability Performance (SP).

4. Research Methodology

4.1 Development of Survey Questionnaire

This study used validated instruments to measure the variables (GIC, SMPs, and SP) and their various dimensions. Using established instruments is common in quantitative research because they had already been tested for validity and reliability, making it possible to compare results (Sekaran & Bougie, 2016). The research instrument applied under this study is questionnaire which provided a set of questions to be answered by respondents in a field of expertise (Sekaran & Bougie, 2016). In this research, the questionnaire was adopted from previous literature. Table 1 lists the number and sources of the items used to measure each construct. The Cronbach’s Alpha (α) of constructs adopted from different sources of measurement were also assessed and presented. It is observed that all the constructs were well above the recommended threshold value of 0.70, indicating a high level of internal consistency reliability (Hair, Hult, Ringle, & Sarstedt, 2017).

Table 1. Total of scale items used to measure each construct

Constructs	Number of items	Reliability (α)	Source
Green Innovation Capability	17	0.87-0.93	Cheng et al. (2014)
Sustainable Manufacturing Practices	28	0.86-0.94	Salwa et al. (2017)
Sustainability Performance	14	0.89-0.92	Huo & Wang (2019); Paulraj (2011)

The measurement of GIC, SMPs and SP involved multi-dimensional level, however, the multidimensions were combined into uni-dimensional for analysis purpose. Since previous studies have been conducted and analysed on the interrelationship at multi-dimensional level, this study did not relook into multi-dimensional level, instead, it focused on the entire construct of the variable as a whole. For instance, studies of GIC on dimensional level, i.e. eco process, eco product, and eco organizational innovation have been conducted by (Dangelico, Pujari, & Pontrandolfo, 2016; Dooley, 2016; Wang et al., 2017). Meanwhile, the analysis of SMPs on dimensional level, i.e. sustainable product design and development, sustainable manufacturing process, sustainable supply chain management, and sustainable end of life management have been attended by (Salwa et al., 2017; Schrettle et al., 2014). Lastly, the investigation of SP on dimensional level, i.e economic, environmental and social performance have been done by (Das, 2018; Henao, Sarache, & Gomez, 2019; Huo et al., 2019).

In this study, the 5-point Likert scale (1 = “Strongly Disagree”; 5= “Strongly Agree”) was applied to measure the different attitudes of respondents towards the items. According to Joslin and Muller (2016), diverse scales have been used to avert the effect of common method bias. However, this study employed the 5-point Likert scale to prevent complex situations when analyzing the data. The questionnaire was further pre-tested and refined by consulting three experts in the management field of study for content validity and reliability. Once the reviewers had completed their review, the questionnaire was sent to another two industry experts for review and finalization.

4.2 Sampling Characteristics and Data Collection Method

The population of this research was Malaysian manufacturing firms. In effect, the target population of this research was Malaysian manufacturing SMEs with ISO 14000 certification from various fields, namely automotive, power generation, electrical and electronics, chemical and petroleum, food and beverages, and others manufacturing. In accordance with Zailani, Jeyaraman, Vengadasan, and Premkumar (2012), firms that are certified with ISO 14000 tend to adapt environmental practices, comprising of green supply chain initiatives and environmental design and resource recovery initiatives.

As of 2019, there were 237 ISO 14000 certified local Malaysian manufacturing SMEs recorded in the Federation of Malaysian Manufacturers (FMM) Directory. The FMM directory has remarks on the qualification standard and certification obtained by each firm; thus, it was convenient to identify and select the samples accordingly. In order to have a good sample representation, the target population of all 237 ISO 14000 certified local Malaysian manufacturing SMEs listed in the FMM directory were selected and used as the sampling frame. Thus, the census technique was applied to select the required samples and key personnel from all firms that agreed to participate in the study. The census technique was deemed the most appropriate to ensure that all firms with ISO 14000 certification from different fields were adequately represented in the study. This approach covered all industries of the manufacturing SMEs and ensured no industry was left out.

This research employed the self-completed questionnaire in the progress of acquiring data from the respondents. Data collection had been conducted by hand and by emailing the questionnaire to the respondents. The Unit of Analysis (UOA) of this study was at the firm level. Important employees of the firms, for example, the senior management level (28 respondents), middle management level (72 respondents), junior management level (75 respondents), and other supervisory level (32 respondents) were chosen to represent the firms because they were deemed to be the key personnel playing a crucial role in contributing to the sustainability of manufacturing SMEs. These personnel have hands-on experience on the implementation and formulation of sustainable initiatives in their corresponding firms. Eventually, 207 fully answered questionnaires were received from the firms, yielding a response rate of 87.3%. Follow-up calls and emails were made a week after the questionnaires were distributed. Although respondents were given ample time to complete the questionnaire, they were reminded to return the survey within a specific deadline.

This research focused on the target population of manufacturing SMEs from various fields, namely automotive (12 %), power generation (2 %), electrical and electronics (23 %), chemical and petroleum (7 %), food and beverages (8 %), and others manufacturing SMEs (48 %). The participants' demographic profile was developed using a frequency test. Table 2 summarizes the demographic characteristics of the participants. Data collection was completed over a period of nine months. The reason for this extended time was the series of MCOs imposed by the Malaysian government during the Covid-19 pandemic. The data collection process was slowed down during this period as only manufacturing firms providing essential services were allowed to operate. Firms from non-essential services were either operating partially or not operating. Due to the conditions and restrictions, the collection progress of completed questionnaire was delayed.

Table 2. The demographic characteristics of the respondents

Profile		Frequency	Percent (%)
Type of industry	Automotive	25	12
	Power generation	4	2
	Electrical and electronics	48	23
	Chemical and petroleum	14	7
	Food and beverages	17	8
	Others manufacturing*	99	48
Number of employees in firm	Less than 51	33	16.1
	51-100	136	65.5
	101-150	30	14.4
	151-200	8	4.0

Note: * refer to clothing and textiles; wood, leather and paper industry

5. Results

5.1 Common Method Bias

Common Method Bias (CMB) needs to be examined when data is collected via self-reported questionnaires, especially when both the predictor and criterion variables are assessed by the same person (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). One of the common methods used to detect this issue is Harman's single factor test. This is done by entering all the principal constructs into a principal component factor analysis. The threshold value of the total variance for a single factor is 50% and below, as recommended by Podsakoff et al. (2003). In the analysis, the results returned that the first factor explained 39.19% of the variance, which was less than the threshold value of 50%. Thus, it was confirmed that CMB was not a serious problem in this study and did not affect the results.

5.2 Measurement Model

Smart PLS 3.0 was applied to analyze the data collected in this study. It is essential to establish the reliability and validity of the latent variables to complete the examination of the structural model. In this study, convergent and discriminant validity had been carried out for reflective indicators used in the measurement model. Convergent validity refers to the degree which all indicators/items associated with the construct (Hair et al., 2017). Item loading (λ), composite reliability (CR), and average variance extracted (AVE) were used to measure validity of the studied items.

From Table 3, high levels of internal consistency reliability were demonstrated by the latent variables, whereby all constructs' composite reliabilities were greater than the threshold value of 0.70 (Hair et al., 2017). On the other hand, the indicator reliability of the reflective indicators is computed by squaring their item loadings. Since this was an exploratory research, an indicator reliability of 0.4 or higher was considered acceptable (Hulland, 1999). Most of the indicators had reliabilities far higher than the minimum level of 0.4 and closer to the preferred level of 0.7. With these recommendations, 13 items (EOI15, EPROCI2, EVP2, SEOLM3, SEOLM4, SMP5, SMP6, SPDD1, SPDD6, SSCM2, SSCM3, SSCM6 and SSCM9) had to be deleted from further analysis to increase AVE and CR scores. Besides, this study's measurement model achieved adequate convergent validity with all the constructs exhibiting AVE values exceeding the minimum value of 0.50 (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). Meanwhile, Table 4 exhibits the results for the Fornell-Larcker criterion. Since the overall square roots of AVE for each construct were higher than other constructs' correlation coefficients in the rows and columns, discriminant validity was established for all constructs. Henseler, Ringle, and Sarstedt (2015) suggested that a HTMT above 0.85 indicates a lack of discriminant validity. Table 5 shows that all the values fulfilled the $HTMT_{0.85}$ criterion, indicating that discriminant validity was achieved in this study.

Table 3. Results summary for measurement model

Latent Variable	Indicators	Item Loadings >0.70	Indicator Reliability >0.40	Cronbach Alpha >0.70	Composite Reliability >0.70	AVE >0.50
Green Innovation Capability	EOI1	0.768	0.590	0.940	0.948	0.548
	EOI2	0.685	0.469			
	EOI3	0.819	0.671			
	EOI4	0.801	0.641			
	EOI5*					
	EOI6	0.629	0.396			
	EPROCI1	0.621	0.385			
	EPROCI2*					
	EPROCI3	0.772	0.596			
	EPROCI4	0.738	0.545			
	EPRODI1	0.732	0.536			
	EPRODI2	0.837	0.701			
	EPRODI3	0.771	0.595			
	EPRODI4	0.708	0.501			
	EPRODI5	0.683	0.467			
	EPRODI6	0.729	0.532			
	EPRODI7	0.772	0.595			
Sustainable Manufacturing Practices	SEOLM1	0.647	0.419	0.937	0.943	0.482
	SEOLM2	0.688	0.474			
	SEOLM3*					
	SEOLM4*					
	SEOLM5	0.676	0.457			
	SMP3	0.637	0.406			
	SMP4	0.650	0.423			
	SMP5*					
	SMP6*					
	SPDD1*					
	SPDD2	0.724	0.524			
	SPDD3	0.678	0.459			
	SPDD4	0.735	0.540			
	SPDD5	0.646	0.417			
	SPDD6*					
	SPDD8	0.737	0.543			
	SPDD9	0.712	0.507			
	SSCM1	0.630	0.397			
	SSCM2*					
	SSCM3*					
	SSCM4	0.751	0.564			
	SSCM5	0.699	0.489			
	SSCM6*					
	SSCM7	0.654	0.427			
	SSCM8	0.686	0.471			
	SSCM9*					
	SSCM10	0.782	0.611			
	SSCM11	0.737	0.543			

Latent Variable	Indicators	Item Loadings >0.70	Indicator Reliability >0.40	Cronbach Alpha >0.70	Composite Reliability >0.70	AVE >0.50
Sustainability Performance	ECP1	0.798	0.636	0.926	0.937	0.533
	ECP2	0.787	0.620			
	ECP3	0.766	0.587			
	ECP4	0.801	0.642			
	ECP5	0.735	0.540			
	EVP1	0.654	0.427			
	EVP2*					
	EVP3	0.631	0.398			
	EVP4	0.677	0.459			
	SP1	0.683	0.467			
	SP2	0.693	0.480			
	SP3	0.767	0.589			
	SP4	0.687	0.472			
	SP5	0.785	0.616			

Note. * items dropped as the indicator reliability below values of 0.40.

Table 4. Results for Fornell-Larcker criterion

	1	2	3
1. Green Innovation Capability	**0.740**		
2. Sustainable Manufacturing Practices	0.751	**0.694**	
3. Sustainability Performance	0.629	0.772	**0.730**

Note. the values in the boldface are square root of AVE.

Table 5. Results for Heterotrait-Monotrait ratio

	1	2	3
1. Green Innovation Capability			
2. Sustainable Manufacturing Practices	0.781		
3. Sustainability Performance	0.658	0.808	

5.3 Structural Model

The structural model assessment involves examining the model's predictive capabilities and hypothesized relationships. The procedure assesses collinearity issues, the coefficient of determination (R^2) value, the effect size (f^2), the predictive relevance (Q^2), and hypotheses testing (Hair et al., 2014). Referring to Table 6, the values of tolerance were well above the threshold of 0.02 while all VIF values were less than the threshold value of five. Therefore, no critical collinearity issues were observed for the constructs, allowing the next steps of assessment. R^2 of SP (0.601) indicates that the exogenous latent variables (GIC and SMPs) moderately explained 60.1% of the variance in SP. Meanwhile, the R^2 of SMPs (0.564) indicates that the only exogenous latent variable (GIC) moderately explained 56.4 % of the variance of SMPs. Meanwhile, SMPs (f^2= 0.515) had a large effect on producing the R^2 of SP while GIC (f^2=0.014) did not affect SP. On the other hand, GIC (f^2= 1.295) had a large effect on producing the R^2 of SMPs. The Q^2 results indicate that the value of predictive relevance of the endogenous latent variables SMPs (Q^2=0.254) and SP (Q^2=0.311) were well above the threshold of zero, suggesting that the model had sufficient predictive relevance (Hair et al., 2017).

Table 6. Results summary for VIF value

SP as dependent variable			**SMPs as dependent variable**		
Constructs	**Tolerance**	**VIF**	**Constructs**	**Tolerance**	**VIF**
GIC	0.378	2.648	GIC	0.435	2.301
SMPs	0.425	2.353		-	

Note. GIC= Green Innovation Capability, SMPs= Sustainable Manufacturing Practices, SP= Sustainability Performance.

5.4 Discussion

5.4.1 H1. Green Innovation Capability (GIC) Positively Impacts Sustainability Performance (SP)

The direct hypothesis test result was summarized in Table 7. GIC (β=0.114, p>0.05) did not influence SP directly. The hypothesized path relationship between GIC and SP was not statistically significant at 0.05 level of significance (t < 1.96). Thus, the direct relationship of GIC-SP was not significant (H1 was not supported).

Table 7. Results summary of direct hypotheses testing

Hypo-thesis	**Relationship**	**Standard Beta (β)**	***t*-value >1.96**	***p*-value <0.05**	**Percentile bootstrap 95% confidence interval Lower Upper**	**Decision**
H1	GIC→SP	0.114	1.413	0.158	-	Not supported

Note. GIC= Green Innovation Capability, SP= Sustainability Performance.

Although previous studies showed that GIC has a positive impact on SP (Amores-Salvado et al., 2014; Chang, 2016; Cheng et al., 2014; Hofmann, Theyel, & Wood, 2012; Marin et al., 2015; Roxas & Chadee, 2016), no significant result was found in the present study. GIC did not predict SP directly, possibly because Malaysian manufacturing SMEs perceived investing in green innovation and technologies to involve enormous capital expenditure in the initial stage. This finding was supported by Musa and Chinniah (2016), who studied the green development and green prospects of Malaysian SMEs. In their research, firms were found to be reluctant to expand into green innovation due to huge initial start-up costs and high raw materials costs. Thus, rising expenses could lead to an increase in manufacturing cost, which eventually incurs higher loan amounts to operate the business and diminishes firms' competitive advantage.

Studies in Malaysia have shown that these local SMEs face difficulties in achieving a high level of green innovation through R&D, because it is tough for them to get rid of traditional approaches in their operations (Craven, Liu, Mysore, & Wilson, 2020; Musa & Chinniah, 2016; Smith-Bingham & Hariharan, 2020). In addition, these SMEs manufacturers are reluctant to adopt green innovation due to their risk-averse nature which makes them fearful of venturing into something that is new and out of their core business (The Edge Markets, 2021). On top of this, the series of MCOs and lockdowns imposed by the government to contain the pandemic threw these local manufacturers running traditional businesses into financial meltdowns and risk of bankruptcy, as only industries providing essential services and products were allowed to operate during the MCO period. Consequently, they had tight cash flows to implement green innovation and problems foreseeing future business directions (Azmi, Aida, & Diana, 2020). Due to limited resources in terms of finances and skilled workforce, the development progress of GIC among local manufacturing SMEs have been dampened. This explains why they could not generate a competitive edge from GIC to drive SP (Che Omar, Ishak, & Jusoh, 2020).

Previous studies have demonstrated that firms would not want to venture into green equipment and eco technologies if there is no certainty of promising returns (Zhang et al., 2016). This applies to the context of Malaysian manufacturing SMEs as well. The finding of this study was consistent with some previous research which contended that firms need to face a trade-off between the benefits gained from the implementation of green innovation practices and the cost incurred from technological complexity in its implementation (Li, 2014; Marin, 2014; Zhang & Sara, 2015). Due to limited cash flows, these traditional and locally owned businesses might need to bear extra investment costs to improvise their facilities and processes. In such unfavorable conditions with high barriers of entry, Malaysian SMEs manufacturers faced difficulties in managing their current green facilities and developing new ones as the management observes environmental and corporate social responsibilities to be extremely pricey (Musa & Chinniah, 2016).

Besides, even if manufacturing SMEs are equipped with green facilities and equipment, they may be underused. This is due to the lack of expertise and the insufficient understanding of the potential benefits of green innovation among SME managers. Furthermore, in most cases, Malaysian SMEs owners do not perceive the necessity to handle environmental issues in a sustainable way, as they presume the impact from environmental risk is less significant (Moorthy, 2012). Thus, the benefits of green innovation do not diffuse easily and quickly into the firms' system to lead to SP. Although the DCV (Teece, 2017) states that the reconfiguration and development of innovation competencies bestows firms the ability to adapt to volatile environments and increase competitiveness, this study failed to observe a significant relationship between GIC and SP.

Generally, green innovation incorporates the innovation of technical know-how for energy saving, pollution prevention, waste recycling, green product design, and corporate environmental management. On top of huge capital expenditures incurred during the R&D process, manufacturing SMEs are required to achieve the minimum standards of environmental regulations set by the authorities. The process of validating and verifying the technologies and equipment to ensure firms are meeting stringent environmental standards and social compliance is time consuming. Besides, SMEs are reportedly not aggressive in participating in training programmes to strengthen the innovation skillsets and technical know-how of their workforce (Chin, 2006; Musa & Chinniah, 2016). For this reason, the green innovation of Malaysian manufacturing SMEs is still in its premature stage. The impact of green innovation on firm value is thus more likely to take on a substitution effect and does not lead to SP.

Additionally, it was revealed that eco product innovation, eco process innovation, and eco organizational innovation are important indicators of GIC, based on their high item loadings. Although applying innovative manufacturing processes, developing new eco products, and actively engaging in eco-innovation activities drive manufacturing SMEs to achieve green innovation, focusing on these areas does not significantly impact SP. Another possibility for the non-significant result between GIC and SP could be due to GIC-related issues not addressed during data collection in the lockdown period.

5.4.2 H2. Sustainable Manufacturing Practices (SMPs) Mediates the Relationship between Green Innovation Capability (GIC) and Sustainability Performance (SP)

Even though the direct relationship of GIC-SP was not significant (H1 was not supported), this study went on to test their mediation relationships. In the past, Baron and Kenny’s (1996) mediation method emphasized that the indirect effect of an independent variable (IV) on a dependent variable (DV) through a mediator is significant only if the IV significantly affects the DV; the IV significantly affects the mediator; and the mediator significantly affects the DV. However, this method has been criticized by Preacher and Hayes (2004), Hayes (2009), and Zhao, Lynch and Chen (2010). Alternatively, several scholars have suggested that a direct effect does not necessarily need to be significant to analyze its mediation effect (Zhao et al., 2010). In other words, it is possible that mediation exists even though the direct effect is insignificant. Hair et al. (2017) further supported bootstrapping procedures for mediation analysis.

As shown in Table 8, the indirect path of GIC to SP via SMPs ($\beta=0.516$, $t= 9.005$, $p<0.05$) was significant. Moreover, the confidence interval values did not straddle zero, indicating significant mediating effects. Consequently, it can be concluded that SMPs significantly and fully mediated the relationship between GIC and SP, given its indirect relationship. Since the variance accounted for (VAF) value of 96.8% is more than 80%, SMPs acted as a full mediator between GIC and SP (H2 was supported).

Table 8. Results summary of indirect hypotheses testing

Hypo-thesis	Relationship	Standard Beta (β)	t-value >1.96	p-value <0.05	Percentile bootstrap 95% confidence interval		Decision
					Lower	Upper	
H2	GIC→SMPs→ SP	0.516	9.005	0.000	0.514	0.533	Supported

Note. GIC= Green Innovation Capability, SMPs= Sustainable Manufacturing Practices, SP= Sustainability Performance.

SMPs was found to mediate the relationship between GIC and SP, which is in line with previous findings (Bhupendra & Sangle, 2015; Marin et al., 2015; Rashid et al., 2015) that strategic actions are required to improve and explain the relationship between firm level innovativeness and firm performance. This study proposes that GIC is likely to push firms to implement SMPs that boost their SP, given that firms with a positive GIC can better position themselves in terms of products, processes, organizational methods, and social and institutional structures (Kemp, 2010). As innovation is key to firms' long-term sustainability, GIC provides Malaysian manufacturing SMEs the ability to explore new ideas and possibilities that are crucial for the survival and success of their business (Slater et al., 2014).

Through eco process innovation, firms can innovatively upgrade manufacturing processes to reduce contaminations and meet the standards of environmental regulations. Firms often place emphasis on developing new eco products through new technologies to reduce waste-related damages and minimize energy consumption. Once green innovation is established, firms can outline detailed activities required to carry out SMPs, hence increasing the level of SP. Under a high level of GIC, firms can design the ways of implementing green concepts and developing eco-innovation technologies into production and operating systems that achieve superior SP. While firms may be reluctant to venture into the development of green innovation due to its higher start-up cost in the initial stage, through SMPs, firms can become better at detailing the activities.

For example, they can implement step-wise changes in their operation process and action plans to equip themselves for an extreme change in the use of technology to establish products that are environmentally sound (Zhang & Sara, 2015). Besides, firms can draft out detailed activities of SMPs in terms of long-term plans and organizational structure required to cater for radical innovation. Malaysian manufacturing SMEs could also review their current level of SMPs and select sustainable initiatives that are crucial in reducing their destructive impacts on environment and communities. Sustainable practices such as sustainable product design and development to eliminate the use of hazardous materials and promote the use of environment-friendly materials in product manufacturing will subsequently bring firms to higher levels of SP.

Also, the results demonstrated that SMPs fully mediate the relationship between GIC and SP. This finding reckons that to effectively implement green innovation processes and eco technologies, the advantages of GIC must be delivered widely through the SMPs. That is, firms practising green innovation can achieve superior SP through the implementation of SMPs. In sum, the present findings suggest a consistent, positive relationship between the antecedent (GIC), SMPs, and SP. SMPs exhibited a significant relationship with SP ($\beta=0.686$, $p<0.05$). This indicates that SMPs appeared to be a stronger predictor of SP than the other antecedents and acts as a mediating mechanism that explains the influence of GIC on SP. These results imply that local Malaysian manufacturing SMEs possess a high potential to achieve greater SP by implementing SMPs that pave the way for firms.

To recap, most of local manufacturing SMEs perceive slim chances of survival moving forward and are unable to remodel their business direction to new product lines due to the rigidness of their resources (Azmi et al., 2020). The integration and implementation of SMPs as an internal dynamic strategic action would assist manufacturing SMEs to outline detailed strategic plans, particularly focusing on sustainable product design and development, sustainable manufacturing, sustainable supply chain management and sustainable end-of-life management, to face challenges in this highly turbulent business environment. SMPs equip firms with the ability to take necessary actions to review and regulate unfavorable conditions. They allow firms to adopt flexible business strategies to strengthen their financial position and take fast actions to search for new sources and opportunities for the re-development of new business lines, products, and offerings (Syed, 2019; Svatošovă, 2019). Lastly, SMPs encourage manufacturing SMEs to move towards R&D and innovation to improve productivity.

5.5 Final Framework

The final framework is shown in Figure 2. Concerns have been raised as the model applied cross-sectional data for mediation analysis. Examining the mediating relationship among the variables can be considered as pervasive process in the social sciences literature; although cross-sectional data may misinterpret the mediation of longitudinal processes, cross-sectional data is appropriate and has been continued to be applied in mediation analysis (O'Laughlin, Martin, & Ferrer, 2018). However, researchers are advised to be vigilant while trying to replace longitudinal data with cross-sectional data for mediation analyses. Thus, future research may explore alternative longitudinal mediation models grounded in the SEM framework to enhance the mediation processes (O'Laughlin et al., 2018).

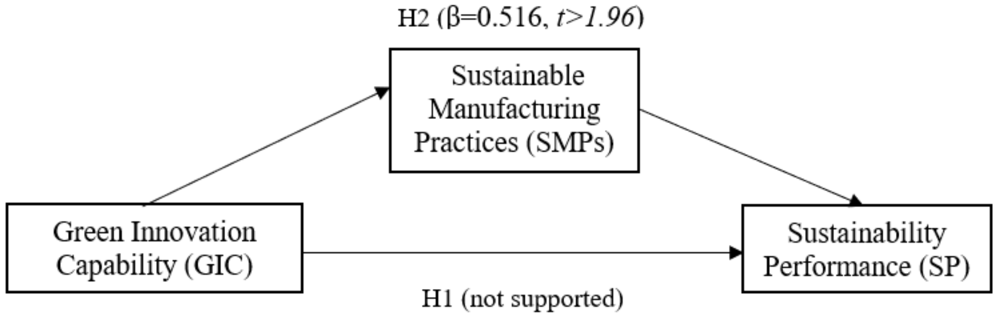

Figure 2. Final research framework

This study employs the DCV as underpinning theory to explain the relationship between GIC, SMPs, and SP. Concerns have been raised as dynamic capability might be short term and conditional while SP could be long term. However, based on literature evidence, dynamic capability is a long term, continuous and sustainable resources (Teece et al., 1997). Dynamic capabilities are non-tradable and firm specific. This is because dynamic capability approach creates intangible assets such as collective knowledge, capabilities, and technical knowhow which are scarce and hard to be imitated by competitors. These intangible assets may be built over decades and are deemed priceless in manufacturing firms. Dynamic capabilities are the determinant of firms' capacity and willingness to improve their processes in order to shift into sustainable paradigm (Darmani et al., 2017).

Furthermore, dynamic capabilities exist along with the board to detect and exploit opportunities available in business environment by constantly modifying on extant resources to develop improved versions of resources and competencies (Teece, 2014; Teece et al., 1997). Specifically, dynamic capabilities are designed firm-wide activities that "systematically solve problems and change organization's resource base" (Barreto, 2010). In this manner, new knowledge, products, and processes can be established by dynamic capabilities in order to provide competitive edges which in turns improve firms' performance (Teece, 2017, 2014).

5.6 Implications of the Study

This study enriches the theory of dynamic capability by extending the sustainability model to explain the sustainable development process of SP among manufacturing SMEs. This research does not just inform firms on the importance of SMPs for performance but also guides firm managers towards understanding and improving their current SMPs. The findings of this study serve as a guideline for Malaysian manufacturing SMEs towards understanding their current implementation levels and effectiveness of SMPs. By understanding the current implementation of SMPs, Malaysian policy makers and the government would understand the challenges encountered by manufacturing SMEs, namely operational and financial challenges (Che Omar et al., 2020). Various kinds of assistance can be provided, for instance, in the form of strategic planning, governance, facilities, financing, and technology, which support SMEs manufacturers in achieving greater SP. In turn, the Malaysian government can benefit from the advancement of manufacturing SMEs, which contribute increasingly to GDP growth and employment in Malaysia.

6. Conclusions, Limitations and Suggestions for Future Studies

Several limitations of this study can be outlined, one of them being the generalizability of the results. The sample was restricted to ISO14000-certified manufacturing SMEs from various subsectors. Therefore, the results of the study may not be generalizable to other groups of SMEs, e.g., service SMEs. Future studies may extend the research into services and others sectors like agriculture, construction, and mining and quarrying. However, despite this limitation, the study offers valuable insight into the influence of the studied antecedents on SMPs and SP in Malaysian manufacturing SMEs. Second, even though the results of this study provided a good estimation of the proposed model, the study was correlational; thus, causality could not be inferred from the study. Hence, it is worthy to conduct a comparative analysis of SMPs in future work to identify the direction of causality of the interrelated variables. Lastly, this study examined the relationship between GIC, SMPs and SP. The indicators of these variables can change dynamically. Other variables could account for the variance in SMPs while SMPs dimensions could predict other outcomes. Thus, future researchers may consider investigating other variables, such as the type of industry, turbulences in the business environment, company ownership, and technological dimensions to understand how these factors influence firm SP.

This study filled the research gaps by examining the mediating role of SMPs as firms' internal dynamic strategic action which transforms and capitalizes on GIC for SP. A growing number of manufacturers are recognizing the need to take proactive steps to improve their SP by incorporating sustainability concepts into their firm’s strategy. The results revealed that SMPs are an essential factor, whether as a predictor or mediator, which dynamically support firms’ achievement of superior SP. The 150 SMEs manufacturers surveyed in this study offered their perspective of the SMPs currently implemented in Malaysia and their relationship with SP. In general, the results indicate that manufacturing SMEs in Malaysia perceive that two dimensions of SMPs, namely sustainable supply chain management and sustainable manufacturing process, are the key factors to significantly improve SP.

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