

Sustainable Manufacturing Practices and Sustainability Performance: A Conceptual Framework for Manufacturing SMEs

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Abstract

In the Sustainable Development Goals Summit in September 2019, world leaders addressed current and future sustainability challenges faced by the world, including poverty, inequality, climate change, environmental degradation, peace, and justice. However, the Covid-19 pandemic has shocked and dampened global sustainable development efforts. Malaysian manufacturing small and medium enterprises (SMEs) are not exempt from this tragedy, as

they have suffered economically, socially, and environmentally. The goal of this paper is to establish sustainable manufacturing practices (SMPs) as a dynamic internal strategic action for manufacturing firms that transforms firm capabilities into sustainability performance. The authors conducted an extensive literature search to explore global sustainability issues and narrowed the scope to issues encountered by Malaysian manufacturing firms. The most commonly used terminologies of sustainability, sustainable practices, and sustainability performance were subsequently analyzed to conceptually develop a holistic framework for future studies. Specifically, the authors proposed an explanatory quantitative study to comprehend the link between firm capabilities and multidimensional sustainability performance with the integration of SMPs as a mediator. The results of the analysis would provide useful recommendations for the manufacturing sector and directions for future studies. Additionally, this paper enriches the theory of the Dynamic Capability View by bringing in the sustainability model to explain the development process of sustainability performance among Malaysian manufacturing SMEs. This article does not just inform firms and authorities on the importance of SMPs for superior performance but also guides firms 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.

Keywords: sustainable manufacturing practices, sustainability performance, firm capabilities, manufacturing SMEs, Covid-19

1. Introduction

In the Sustainable Development Goals Summit in September 2019, world leaders addressed current and future sustainability challenges faced by the world, including poverty, inequality, climate change, environmental degradation, peace, and justice (The United Nations, 2020). Worldwide, stakeholders have been urged to review sustainability issues from societal, economic, and environmental perspectives to develop holistic strategies to improve earlier deprivations (Salwa et al., 2017). Global partnership is thus required to jointly reduce global poverty, enhance health and education, minimize inequalities, drive economic growth, mitigate climate change, and safeguard natural resources.

The year 2020 was both tough and challenging, with the Covid-19 pandemic dampening global sustainable development efforts and affecting all economic sectors, organizations, and small and medium enterprises (SMEs). Due to the prolonged lockdown measures implemented worldwide, millions of enterprises in the hardest-hit sectors currently suffer from the high risks of winding down while countries struggle to manage an increased unemployment rate (The United Nations, 2020). Figure 1 demonstrates global working hours in the second quarter of 2020, which were estimated at 10.5% lower than the pre-Covid-19 period, equaling the loss of almost 305 million full-time jobs (International Labor Organization, 2020).

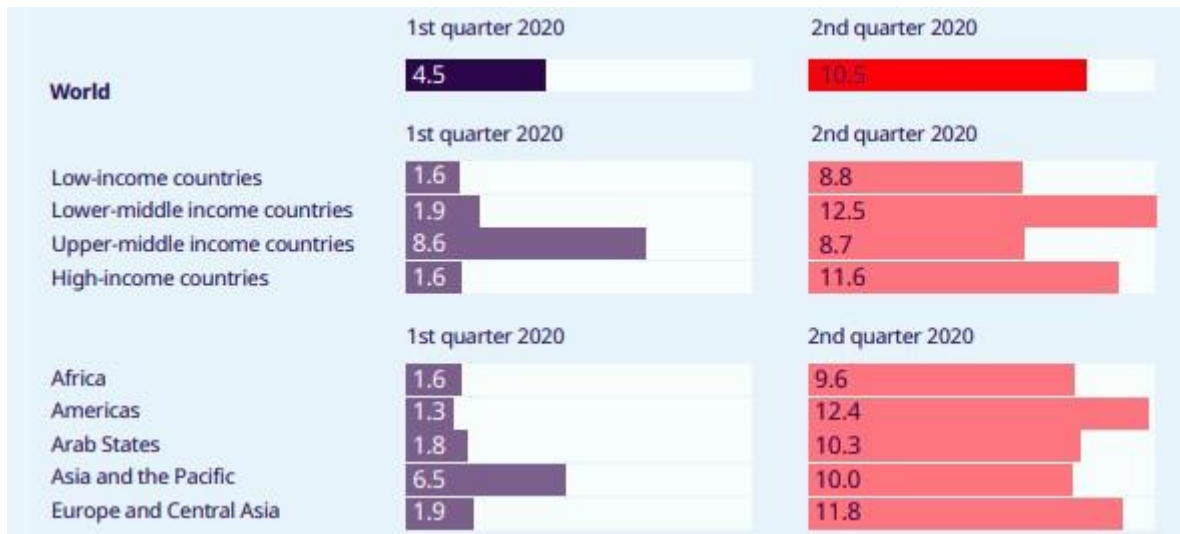


Figure 1. Estimated drop in aggregate working hours, globally and by region

Inequalities related to income, forced labor, and human rights have always existed in regions across the world. Vulnerable communities suffer under a poor health management system while natives, refugees, and migrants survive in an atmosphere rife with discrimination and hatred (The United Nations, 2020). Furthermore, as a consequence of urbanization and industrialization, the world is experiencing climate change, global warming issues, and a deficiency of fossil fuel sources. As illustrated in Figure 2, climate change, represented by the global mean temperature difference, has reached new peaks in the past five years; this trend is forecasted to continue until the year 2025 (The United Nations, 2020).

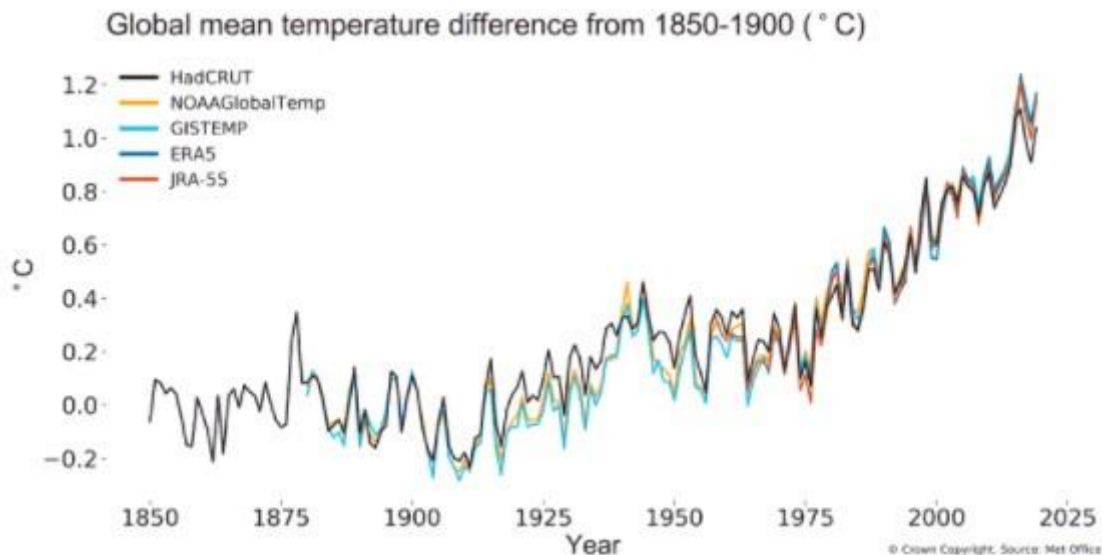


Figure 2. Global mean temperature difference from 1850 to 2020 and its forecast in 2025

Sustainability issues occurring worldwide have triggered concerns from stakeholders, socialists, and environmentalists. In Malaysia, studies show that the current progress of sustainable initiatives is limited to the "6R approach", with firms generally unprepared to

thoroughly consolidate sustainability requirements when dealing with externally focused sustainable manufacturing practices (SMPs) (Hami et al., 2019; Shakeel et al., 2019). However, sustainable strategic actions are necessary to form the basis of nations' and businesses' sustainability, dynamism, and competitiveness in the long run. Research evidence also suggests that firm performance is heavily dependent on its ability to generate strategic actions that address sustainability concerns (Liboni et al., 2016). As such, the objective of this paper is to establish SMPs as a dynamic internal strategic action for manufacturing SMEs that transforms firm capabilities into multidimensional sustainability performance, namely environmental, economic, and social performance. SMPs support sustainable development goals (Goal 11: Sustainability), under which the United Nations 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.

The Covid-19 outbreak has seriously hampered the sustainable development of Malaysian manufacturing SMEs, leaving manufacturers struggling to figure out sustainable strategic actions and survival strategies for business continuity. In the wake of the virus outbreak, SME manufacturers have adopted flexible business strategies to strengthen their financial position and search for new resources and opportunities to develop new business lines, products, and offerings (Syed, 2019). In fact, firms are currently embracing innovative marketing platforms and online channels to cater to the change in consumer purchasing behaviors (Marketing Insight, 2020). Moving forward, manufacturers are also required to adopt Industrial 4.0 approaches to minimize dependency on the unskilled foreign workforce (Che Omar et al., 2020). Taking these changes into consideration, 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). However, 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, practices, and firm performance, largely neglecting to integrate all relevant variables in a complete framework. Moreover, though earlier studies have demonstrated the direct relationship between firm capabilities and performance, limited research has concurrently examined the interrelationships between firm capabilities, SMPs, and sustainability performance, especially in the context of manufacturing SMEs. Considering that firms are dealing with unexpected sustainability issues, Hahn et al. (2015) suggested that firms look into the sustainability paradigm to adapt to changes in the business environment.

To address these issues, we critically analyze extant the research and terminologies pertaining to sustainability, sustainable development, and sustainability performance, with the aim to conceptually develop a holistic framework for future studies. Particularly, this paper attempts

to answer the following research questions: (1) What is the relationship between firm capabilities and sustainability performance? and (2) What is the relationship between firm capabilities and sustainability performance when mediated by SMPs? Guided by these questions, our thought process and resulting research questions are visualized in Figure 3. This study is both timely and important in enriching the Dynamic Capability View (DCV) by bringing in the sustainability model to explain the development of sustainability performance in the Malaysian manufacturing sector. This article will not just inform firms and authorities on the importance of SMPs for superior performance but will also guide firms towards understanding and improving their current implementation strategies. This paper also aids managers from the manufacturing sector in introducing effective sustainable strategies in their firms' operations management to improve sustainability-related outcomes.

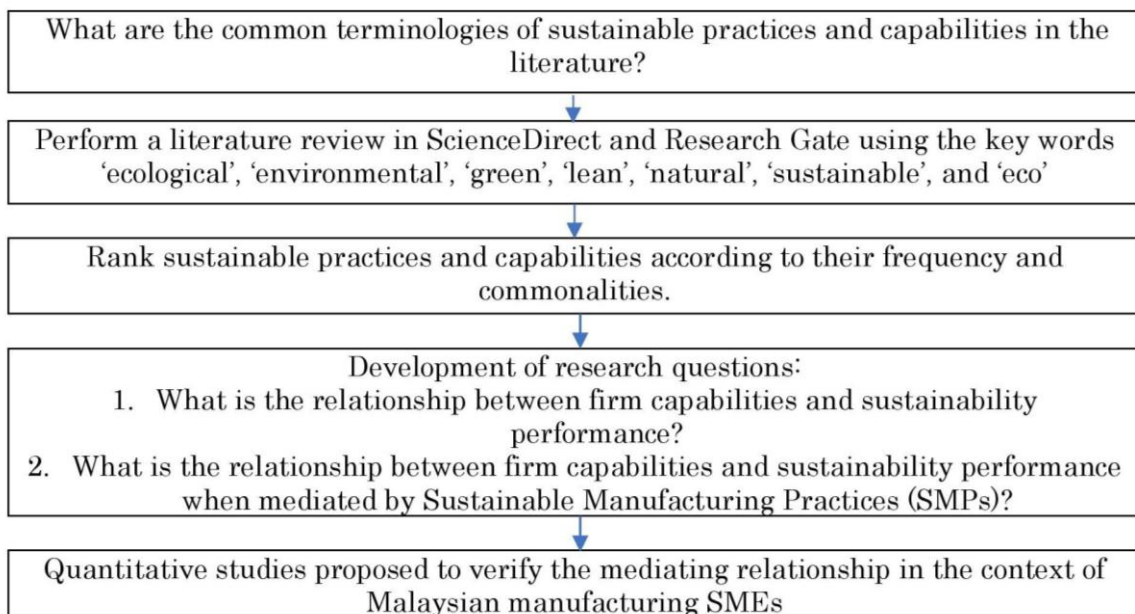


Figure 3. Development of research questions

2. Literature Review

2.1 Background of Study

SMEs can be defined as firms with a sales turnover not exceeding RM50 million or employment not exceeding 200 workers. In Malaysia, SMEs comprise 98.5% of total business establishments (SMECorp, 2019), meaning that any business or economic turmoil will unavoidably impact various SME sectors and national economic progress (Svatošová, 2019). SMEs are thus the backbone of the economy and the second largest sector contributing to national gross domestic product (GDP) growth after the services sector. In particular, the manufacturing SME segment 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.

Recent research in Malaysia demonstrated that manufacturing activities have caused the depletion of natural resources, overutilization of energy, and generation of significant amounts of municipal solid waste. The current waste management system in Malaysia is incapable of digesting the huge disposal rate of municipal solid waste due to the infancy of its incineration process. Thus, the disposal of unwanted waste substances has led to hazardous sustainability issues, including environmental pollution, public and worker health damage, economic growth stagnation, and production competence loss (Chua & Bashir, 2019). Moreover, in the past, the treatment of foreign workers in the industry, non-compliance to social practices, and forced labor have always been topics of controversy raised by stakeholders, implying that manufacturers face difficulties achieving social goals (Kumar, 2019). The Covid-19 pandemic crisis has only exacerbated these issues, as Malaysia has suffered economically, socially, and environmentally from its effects. The series of movement control orders entailed supply chain interruptions, business closures, and hiring freezes. As illustrated in Figure 4, GDP recorded a sharp plunge of -17.1% and -2.7% in the second and third quarters of 2020, respectively, with an estimated economic loss of RM67 billion (Bank Negara Malaysia, 2020).

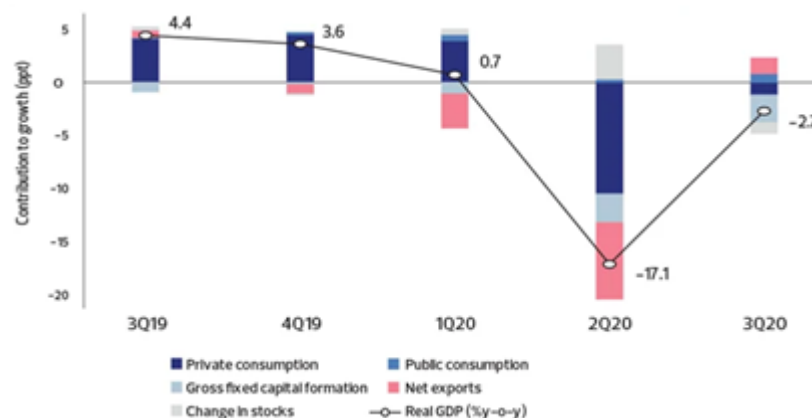


Figure 4. Real gross domestic product growth (%) in Malaysia from Q3 2019 to Q3 2020

The recent resurgence of the pandemic has further worsened domestic sentiments and economic activities. Workplace Covid-19 clusters among migrant workers worried communities as the virus outbreak possibly spread across manufacturing sectors, such as electrical and electronics, chemical industry, and food and beverage. This exerted severe consequences on the Industrial Production Index due to the closure of factory operations to screen workers and sanitize facilities. Thus far, manufacturers impacted by Covid-19 include Ipoh-based electronics manufacturer Salutica Bhd, Senawang-based glove maker Careplus Group Bhd, Top Glove Corporation, and automotive leather seat manufacturer Pecca Group Bhd (Surendran, 2020). The virus outbreak in these manufacturers' premises triggered the authorities to conduct surprise spot checks at several foreign workers' hostels. It was then revealed that some companies had been breaching the law as the accommodation areas were found to be overcrowded, poorly ventilated, and insufficiently sanitized (The Star, 2020). Such incompliance of social practices could lead to major impacts on the industry, including

the ceasing of operations, heavy fines, ruined brand image, and threats to business survival.

Overall, sustainability issues persist in Malaysia, made worse by the Covid-19 outbreak that has hindered sustainable development. Despite the proven importance of sustainable management systems, the enforcement of regulations on environmental and social protection remains rather poor. Thus, firms should prioritize their focus on natural environment conservation, sustainable end-of-life management, and sustainable practices. It is time for Malaysian firms to revamp, transform, and adapt to a more sustainable business model that utilizes natural resources wisely so as to accomplish social, economic, and environmental sustainability while ensuring manufactured products are safe for societies and end users.

2.2 Evolution of Sustainable Development and Sustainability

To resolve the issues of limited resources and environmental degradation, firms have been urged to move towards sustainability. The concept of sustainability is proposed to strike a balance between the utilization and restoration of resources within firms. 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. To better understand this phenomenon, it is important to first differentiate between "sustainable development" and "sustainability".

The term "sustainable development" was first introduced by the United Nations in 1987 as "development that meets the needs of the present without compromising the ability of future generations to meet their needs." This concept did not progress much initially as most firms lacked exposure on how to inculcate environmental awareness into their business structure. 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 et al., 2016). A number of scholars defined sustainability by focusing on dimensions related to the triple bottom line. 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." Therefore, the concepts of "sustainable development" and "sustainability" cannot be used interchangeably as they comprise unique qualitative factors.

Scholars have generally considered sustainability and sustainable development as two distinct yet critical concepts that create a platform for discussion. Although both concepts are interrelated, differences do exist between them. As far as sustainable development is concerned, the ethical standard of achieving equity between present and future generations is the priority. This consists of economic and social development that safeguards environmental, societal, and human well-being. 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. On the other hand, 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.

The notion of sustainable development in manufacturing was developed in the 20th century. Mihelcic et al. (2003) described sustainable manufacturing as "the design of human and industrial systems to ensure that humankind's use of natural resources and cycles do not lead to diminished quality of life due either to losses in future economic opportunities or to adverse impacts on social conditions, human health, and the environment." Later, Allwood et al. (2008) defined green manufacturing as "developing technologies to transform materials without emission of greenhouse gases, use of non-renewable or toxic materials, or generation of waste." On the other hand, the United States Department of Commerce (2010) explained sustainable manufacturing as "the creation of manufacturing products that use materials and processes that minimize negative environmental impacts, conserve energy and natural resources, are safe for employees, communities, and consumers and are economically sound." Overall, 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 et al., 2017). 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 et al., 2019).

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 et al., 2019). Meanwhile, 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 et al., 2019). Thus, manufacturers should now take aggressive actions by incorporating sustainability concepts into their strategic actions not just to attain better financial achievement, but also to safeguard the environment and improve social welfare.

2.3 Firm Capabilities, Sustainable Manufacturing Practices, and Sustainability Performance

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, 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 et al., 2016). Jabbour (2015) concluded that many firms are converting to the green phase on account of consumer demands, green consumerism, and sustainability requirements.

Previous studies have demonstrated mixed results between firm capabilities 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). Given this inconsistency, strategic action could fill the gap between capabilities and performance. Firm capabilities must be integrated with adequate strategic actions to be competent (Shuen et al., 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 and sustainability performance would provide insight into how valuable capabilities can be utilized to positively contribute to sustainability performance (Kauppila, 2015).

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). SMPs refer to “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). It is thus crucial for firms to incorporate the environmental, economic, and social aspects of sustainability into their daily operations to improve sustainability performance. For example, 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. Schrette et al. (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.

In the past, 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 (Leonidou et al., 2015). A new sustainability model should integrate sustainability into firms’ core strategy to create significant social and environmental value on top of economic returns. Such a model would address current issues and provide solutions that embed environmental and social considerations for a better and brighter future. This is

because within the sustainability context, economic value creation cannot be taken as the sole contributor to firm performance. The effect of manufacturing activities on environmental and social aspects is also incorporated into the evaluation of firm performance, which is called sustainability performance (Salwa et al., 2017). Sustainability performance 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. To shift into this new paradigm, McCormick et al. (2016) urged that a thorough and thoughtful change is required not only in firms' present production systems, but also in their ways of managing issues related to society and the consumption of natural resources essential to human life.

In this paper, sustainability performance refers to 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).

According to Beske et al. (2014), the application of dynamic capabilities for sustainable supply chain management is able to improve sustainability performance along the supply chain. This is because dynamic capabilities allow firms to explore the opportunities available in the business environment and actively establish their supply chains in sustainable manners. 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 et al., 2016). Process innovation, in turn, helps firms improve sustainability performance by minimizing raw material inputs and maximizing productivity (Piercy & Rich, 2015). Huo (2019) further showed that green practices and lean manufacturing perform various roles in accomplishing sustainability performance. From a customer point of view, lean manufacturing is the main enabler of superior sustainability performance, 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 sustainability performance by facilitating societal and economic performance. Despite these previous studies, detailed research on dynamic capabilities for sustainability performance is inadequate in the literature. There is a need for future research to assess the link between dynamic capabilities and sustainability in-depth so firms can establish required

practices and modify their strategies to face sustainability issues (Leonidou et al., 2015). In addition, limited studies have examined triple bottom line dimensions when evaluating the effect of sustainable development on manufacturing firms' sustainability performance. 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 sustainability performance (Kuo & Smith, 2018).

3. Conceptual Framework and Rationale

To empirically verify our research questions, our proposed research methodology process is depicted in Figure 5. First, we conducted an extensive literature search to explore current sustainability concepts and research issues. We then narrowed our scope to issues encountered by Malaysian manufacturing SMEs. The most commonly used terminologies of sustainable practices and capabilities were subsequently identified and compared. Based on this, we proposed an explanatory quantitative study to comprehend the link between firm capabilities and multidimensional sustainability performance with the integration of SMPs. Following the quantitative approach, questionnaires should be designed with valid instruments and distributed to target respondents from Malaysian manufacturing SMEs who have experience and knowledge in sustainable practices. Content validity and reliability of the questionnaire should be assessed as well before data analysis is performed. The results of the analysis would establish the link between firm capabilities, SMPs, and sustainability performance, thereby providing useful recommendations for the manufacturing sector and directions for future studies.

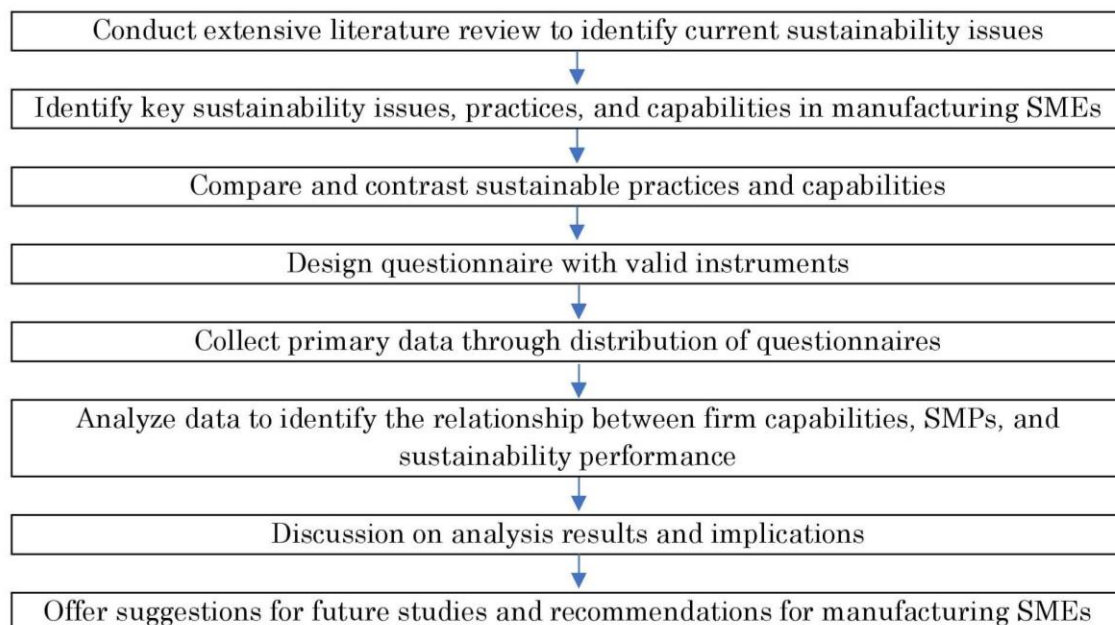


Figure 5. Proposed research methodology

Scholars have adopted and applied different sustainable concepts and terminologies in the past literature. The term ‘eco’ has been used interchangeably with the term ‘green’. Both carry a similar meaning as ‘ecological’, ‘environmental’, ‘green’, ‘lean’, ‘natural’, and ‘sustainable’. Accordingly, despite their various names, most sustainable practices and capabilities are interrelated, with the overall intention of minimizing environmental and social impacts. Table 1 presents 26 key sustainable practices and capabilities extracted from 32 research articles in the last decade, whose respective authors are shown in Table 2.

Table 1. Sustainable practices and capabilities extracted from articles

No.	Sustainable practices and capabilities	No.	Sustainable practices and capabilities
1	Green production innovation	14	Green practices
2	Green approaches and sustainable initiatives	15	Lean manufacturing process
3	Sustainable manufacturing process	16	Green supply chain management practices
4	Environment-friendly purchase and sustainable packaging	17	Environmental orientation and resource commitment
5	Environmental, technological, cultural, and risk management practices	18	Innovative capabilities
6	Sustainability-oriented dynamic capabilities	19	Sustainable capabilities
7	Natural resource-based view capabilities	20	Eco innovation culture
8	Supplier environmental management capabilities	21	Environmental management practices
9	Green management and mass customization	22	Manufacturing technology
10	Innovation process	23	Pollution prevention, product stewardship, process stewardship, clean technology
11	Environmental management system	24	Firm environmental management capabilities
12	Eco capabilities	25	Sustainable supply chain management practices
13	Green innovation adoption	26	Green sustainable product development

Table 2. Sustainable practices and capabilities by respective authors

Articles	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Zailani et al. (2012)	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ramayah et al. (2013)	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tontiset (2015)	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norazlan (2014)	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iles and Martin (2013)	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kumar et al. (2017)	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wong et al. (2012)	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trentin et al. (2015)	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zhang and Yang (2016)	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Huo et al. (2019)	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Henao et al. (2018)	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vijayvargy (2017)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zhang and Sara (2015)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bhupendra and Sangle (2015)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Aboelmaged and Hashem (2019)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
Schrettle et al. (2014)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
Maryam et al. (2015)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-
Rashid et al. (2015)	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
Liang and Liu (2016)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
Roxas and Chadee (2016)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	X	-	-	-	-	-	-	-	-	-	-
Das (2018)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
Kuo and Smith (2018)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X
Gabler et al. (2015)	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beske et al. (2014)	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dangelico et al. (2016)	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roscoe et al. (2015)	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Masoumik (2015)	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Graham and McAdam (2016)	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zaid et al. (2018)	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lidija and Robert (2014)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Giniunienea and Jurksiene (2015)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-

Note. X denotes key sustainable practices and capabilities highlighted by authors in their

respective article.

In the past, research on sustainable concepts and practices mostly revolved around improvement in economic and environmental aspects. The main areas of focus were business risk, waste generation, material and energy efficiency, environmentally friendly products and services, green manufacturing, environmental pollution, and consumption of raw materials (Habidin et al., 2015). In comparison, current studies on SMPs have evolved as an adaptation to the changing business environment. Emphasis is now given to the pursuit of better operational and business performance without neglecting environmental and social wellbeing. Indeed, numerous sustainable practices covering environment, social, and economic dimensions have been found in the manufacturing industry, namely cleaner production, eco-efficiency, employee relations, supplier relations, customer relations, community relations, closed-loop production, and industrial relations (Hami et al., 2019).

Recent studies have demonstrated that SMEs' financial and operational challenges have led to limited financial resources and operational disruptions (Che Omar, 2020). Manufacturing SMEs thus tend to prioritize financial returns rather than cleaner technologies or sustainable operations. Accordingly, the implementation of SMPs in SMEs is limited to "3R" activities under close-loop production. These firms also neither proactively involve in activities to improve corporate social responsibility nor take efforts to collaborate with neighborhood organizations to improve industrial relations. Unsurprisingly, earlier studies have reported that sustainable strategies in the Malaysian manufacturing industry are mostly production- and process-oriented, neglecting the importance of the product life cycle and sustainable end-of-life management (Salwa et al., 2017).

On the basis of research evidence suggesting that SMPs can contribute to manufacturers' economic, environmental, and social performance, this paper complements previous studies by looking into different aspects of SMPs that can improve the sustainable performance of manufacturing SMEs, for example, continuous product improvement approaches and end-of-life system optimization. The essence of this paper targets the dimensions of the sustainable manufacturing process, sustainable production design and development, sustainable supply chain management, and sustainable end-of-life management. These strategies create value for manufacturing SMEs by developing opportunities and mitigating risks related to sustainability. By outlining the required activities in detail, SMPs complement firm capabilities by capitalizing on them and aiding the implementation of initiatives. Therefore, our proposed research framework, illustrated in Figure 6, considers the mediating effect of SMPs as a dynamic strategic action internal to firms that transforms firm capabilities into sustainability performance.

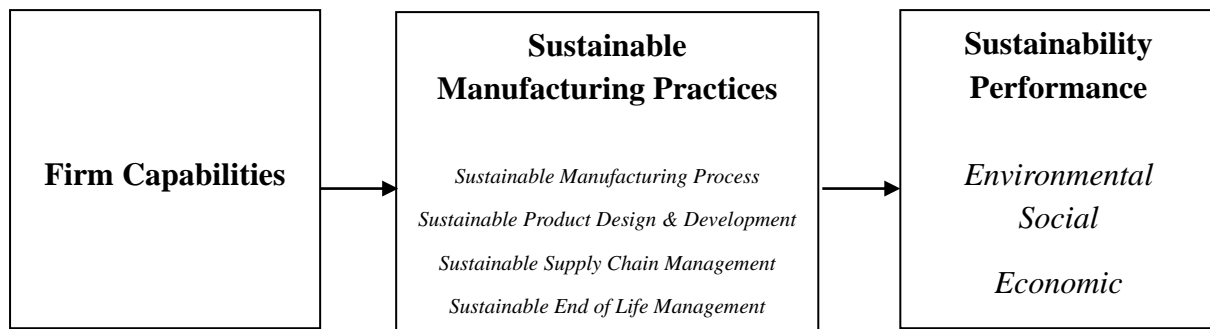


Figure 6. Proposed research framework

4. Final Thoughts and Conclusion

The objective of this paper was to establish SMPs as a dynamic internal strategic action of manufacturing SMEs that transforms firm capabilities into sustainability performance. In summary, environmental and health issues have arisen in Malaysia as a result of the poor implementation of its sustainable management systems and the inability of its current waste management system to handle substantial municipal solid waste disposals (Chua & Bashir, 2019). The Covid-19 outbreak further dampened sustainable development in Malaysia and brought devastating effects to firms' economic, environmental, and social performance. We hereby call for more research on SMPs in relation to the sustainability performance of Malaysian manufacturing SMEs. Sustainable practices and capabilities have been identified as significant factors across multiple academic works in developed and developing countries (Salwa et al., 2017). As previous studies exhibited mixed results on the firm capabilities–firm performance link, we put forth a strong rationale for research on SMPs as a mediating strategic action that fills this gap by explaining the relationship between firm capabilities and sustainability performance. Further research that provides insight on the different dimensions of SMPs is essential to ascertain how SMPs function as strategic actions to effectively support firms' achievement of sustainability performance.

This paper enriched the Dynamic Capability View by applying the sustainability model to explain the development of sustainability performance among Malaysian manufacturing SMEs. We also integrated the relevant variables into one framework to achieve triple bottom line sustainability performance, i.e. environmental, social, and economic performance. This article thus informs firms and authorities on the importance of SMPs for superior performance, in addition to guiding firms towards understanding and improving their current SMPs. At the firm level, manufacturing SMEs can conduct sustainability assessments to evaluate their current SMPs and select suitable ones to be adapted for better sustainability performance. Managers from the sector can also introduce effective sustainable strategies for their firms' operation management to improve sustainability-related outcomes. At the governmental level, policy makers can promote effective SMPs by providing various aids in the form of strategic planning, governance, facilities, financing, and technology to support manufacturing SMEs. With these efforts, SMPs can increase the competitiveness of the

Malaysian manufacturing sector and pave the way for Malaysia to become a developed nation.

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