Chapter 26
Manufacturing SMEs Sustainable Practices: Operationalization of Sustainable Value Framework

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Abstract Traditionally, companies and the environment have continuously become two conflicting aspects, where business becomes an environmental risk and environmental concern becomes threats to business expansion. In view of the fact that sustainability research on green practices is still in its infancy in Malaysia, the aim of this study is to provide a stronger, more integrative, systematic and thorough knowledge of the environmental advantages as well as the operationalization of sustainable green practices among manufacturing SMEs. This study used an exploratory case study approach based on semi-structured expert interviews with five manufacturing SMEs owners/managers in Malaysia. The findings reveal that manufacturing SMEs are challenged to strike a balance between the components of sustainable value framework (SVF) and status quo concerning firm's current sustainable practices. In addition, creating a long-term sustainable value from the implementation of sustainable practices challenges manufacturing SMEs to successfully operationalize considerations relative to the four quadrants of the SVF. This study is expected to help both researchers and practitioners in manufacturing and other industries who are serious towards environmental sustainable practices implementation and are looking for an appropriate mechanism to implement. It offers a generalized environmental sustainability implementation linking manufacturing SMEs owners/managers, green practices, green technology policy and supply chain management.

Keywords Sustainable value framework · Manufacturing SME · Sustainable practices

26.1 Introduction

Malaysia is one of the developing countries whose economy mainly depends on the small–medium enterprises (SMEs) sector (Ho et al. 2016; Jomo 2019). In recent years, sustainable practices are among the vital management issues encountered by SMEs, specifically in the manufacturing sector, due to the growing awareness

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about environmental issues among primary and secondary stakeholders, such as owners/managers, employees, consumers, governments and social groups. Broadly, environmental sustainability and their outcomes have been addressed from various perspectives, ranging from the application of green technologies as a means to gain competitive advantage (Leonidou et al. 2013) to the perception of environmental regulation as a driver for innovation (Ball et al. 2018) and improvement of the competitive position (Porter and Van der Linde 1995; Mkrttchian et al. 2019). In support, some studies on the development of green issues over time focused on specific industrial sectors (Aldrich and Wiedenmayer 2019) or multi-sectorial large companies (Dahlmann and Brammer 2011), addressing the advancement of environmental proactivity. Despite this, attention has been devoted to large firms and disregarding the development in manufacturing SMEs, which, after all, constitute the backbone of many economies. On account of this, the impact of manufacturing SMEs on the natural environment remains significant, and therefore there is a gap that needs to be filled up to overcome the environmental issues. Therefore, the sustainable practices of manufacturing SMEs in Malaysia warrant investigation as this sector is predicted to have a collective impact on the environment and could outweigh the combined environmental impact of large companies (Yacob et al. 2019).

By definition, there are very limited operations of SMEs individually, which have minimum impact on the environment as compared to large businesses (Gadenne et al. 2009). On the contrary, there has been an increasing concern in relation to the impact of manufacturing SMEs on the environment, and numerous reasons are highlighted on why manufacturing SMEs cause many environmental problems (Hillary 2000; Yacob et al. 2019). Despite this, Crespi et al. (2018) stated that manufacturing SMEs are facing scarcity in resources, knowledge, technical capabilities and natural resource inefficiencies in dealing with environmental pollution and ecological modernization due to their smaller capacities. Another essential point is that the small-scale and spread in geographical location of manufacturing SMEs has led to the shortening of regulation control and enforcement by the state authorities. Additionally, it is noted that environmental NGOs or concerned citizens have power to pressurize larger industrial polluters on ecological transformation, but not manufacturing SMEs.

Even so, there is a general agreement that precise data concerning environmental impact by manufacturing SMEs are very limited (Parker et al. 2009). However, there is still considerable pressure on manufacturing SMEs that they are the immense polluters, and there are undeniably significant impacts on ecological systems due to infinite number of manufacturing SMEs and their spread in terms of geographical location. On the other hand, studies on environmental sustainability of manufacturing SMEs are still at an infancy level, although there has been vast literature in relation to how and to what extent the production processes and products in manufacturing industries of developed countries are being re-oriented to include sustainability requirements and conditions. Pertaining to the aforementioned statement, it can be concluded that manufacturing SMEs may not understand fully the environmental impact that they may face (Chowdhury et al. 2019), and to date, there has been very limited study on the current understanding of trends surrounding environmental

sustainability practices and performance (Battisti and Perry 2011). Therefore, this paper aims to explore the two main issues related to these questions. First, how manufacturing SMEs are able to create stakeholder value by implementing sustainable practices in their operations, and second, what potential hazards of going green must manufacturing SMEs take into account when pursuing sustainable practices undertakings?

26.1.1 Sustainable Value Framework

This paper proposes sustainable value framework (SVF) presented by Hart (1997) which is a generic framework through which firms are able to convert their sustainable undertakings into sustainable value. SVF offers the basic considerations that businesses must take into account to successfully implement sustainable practices and create sustainable value over time. Although the SVF was developed for firms looking to serve the four billion poorest people who are at the bottom of the economic pyramid (Si et al. 2019), this paper extends this knowledge by identifying the generic considerations which are applicable to manufacturing SMEs in general and in the process of successfully creating sustainable value. By the same token, manufacturing SMEs are challenged to translate the generic considerations of SVF into firm-specific actions in order to be sustainable and successful. The SVF presents short-term and long-term considerations of organizational planning when it comes to booking short-term results in light of future growth. Placed alongside, these two dimensions produce a matrix with four distinct dimensions of firm performance crucial to generating shareholder value and understanding sustainability in terms relevant to the business (Hart 1997). The elements of this framework include an analysis of the underlying processes which determine firm performance internally (directly) and considerations related to the key stakeholders which influence firm performance externally (indirectly). A graphical representation of the dimensions of (Hart 1997) SVF is presented in Fig. 26.1, followed by the elaboration of each axis.

26.1.2 Initial Considerations

The vertical axis (Today/Tomorrow) regards striking a balance between adapting the firm's current practices in the short term whilst developing competencies to solve social and environmental problems in the future. Firms need to manage today's business whilst simultaneously creating tomorrow's technology and markets. This dimension captures the tension created by the need to realize short-term results whilst simultaneously fulfilling the expectations for future growth (Hart 1997). On the other hand, the horizontal axis (Internal/External) entails properly integrating stakeholders views through the products' entire life cycle and communicating these undertakings effectively (product stewardship) whilst creating a shared roadmap for meeting unmet

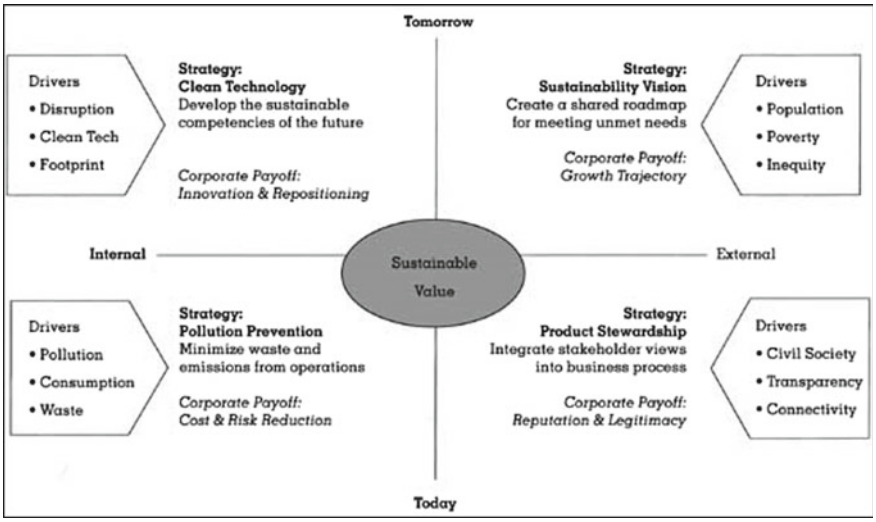

Fig. 26.1 Sustainable value framework (adapted from Hart 1997)

needs and developing new markets on the long run (crystallizing growth). Indeed, this dimension reflects the tension created by the need to buffer the technical core so that it can operate without distraction whilst at the same time remaining open to fresh perspectives and new disruptive models and technologies (Hart 1997). Each of the four dimensions or quadrants of the SVF is discussed in detail in the next sub-sections.

26.1.2.1 Quadrant 1—Internal/Short-Term: Pollution Prevention

Preventing pollution by process or product redesign can save the firm's valuable financial resources, lower on-the-job risk and improve firm's overall performance (Hart 1997). Thus, the focus of Quadrant 1 is on developing practices that lower pollution, consumption and waste from current operations. Comparatively, this end can be achieved by means of implementing environmental best practices.

26.1.2.2 Quadrant 2—Internal/Long-Term: Clean Technology

Today, the goal of Quadrant 2 is on acquiring and/or developing proper competencies that facilitate the firm's adoption of clean technologies in the long run. Clean technologies include renewable energy (wind power, solar power, hydropower and biofuels), information technology, green transportation, electric motors, green chemistry, lighting and many other appliances that are now more energy-efficient. It is a means to create electricity and fuels with a smaller environmental footprint. Clean

technologies go beyond the incremental improvements associated with pollution prevention and end-of-the-pipe approaches which only enable a firm to do 'less bad' as opposed to 'more good'. Harvesting the competencies necessary to adopt sustainable technologies is a long-term process which challenges firms to reconsider the distribution of their internal resources in order to reposition their internal competencies around more sustainable technologies (Hart 1997).

26.1.2.3 Quadrant 3—External/Short-Term: Product Stewardship

Once the internal balance has been achieved, only then the firms are able to communicate their sustainable undertakings to the external audience. The focus in Quadrant 3 is on building legitimacy and reputation by engaging key external constituents throughout the products' entire life cycle. Product stewardship integrates the voice of the stakeholder into business processes by allowing the firm to interact with external parties across the firm's value chain (Hart 1997). In doing so, firms were able to reap the benefits of more efficient operations across the value chain whilst increasing perceptions of legitimacy and overall loyalty from stakeholders. The perspectives of these constituents can mean the difference between failure and success in a firm's undertakings. Therefore, it is important for firms to carefully consider the communication of sustainable practices undertakings to stakeholders.

26.1.2.4 Quadrant 4—External/Long-Term: Sustainability Vision

Having established pollution prevention measures in operations by harvesting the complementary resources necessary to adopt clean technologies, firms were granted with the ability to communicate their sustainable undertakings to external stakeholders confidently. Under this circumstance, firms must avoid potential pitfalls of erroneous implementation as sustainable practices are a prerequisite of achieving long-term success. Therefore, this quadrant can only be considered if answers to the questions relative to the other three quadrants have been stated. Reaping long-term benefits from this development challenges the firms to identify the needs that will define the growth markets of the future. In order to grow successfully, a firm can either offer new products to existing customers or venture into previously untapped markets (Hart 1997). Incremental improvements to production systems and processes only slow the rate of environmental damage, and they enable a firm to do less bad. However, capitalizing on the opportunities of tomorrow's markets and establishing a firm's sustainable growth trajectory challenge a firm to set a corporate vision, with a focus on coherence between a firm's financial aspirations, social influence and environmental impact, and they need to do more good. Therefore, to succeed, it is crucial to develop a vision not only for what needs the company is trying to address and how they relate to sustainability, but also where the most appropriate markets can be found (Hart 1997).

26.1.3 Practical Implications of the SVF

Firms are challenged to strike a balance between the components of the SVF, or risk succumbing to the woes of erroneously carrying out sustainable practices. For example, a strong focus on reaping the short-term benefits of going green without proper long-term planning by firms can lead to missed opportunities and vulnerability in the future. On the other hand, a strong focus on tomorrow without proper short-term planning can lead to plans of action lacking the operational and analytical skills needed for implementation (Hart 1997). The same is true for dilemmas associated with managing the internal/external aspects of sustainability vision formulation. A strong internal focus might mean firms are ignoring the perspectives of key external constituencies, whilst a portfolio with a strong external focus can lead to transparent public campaigns labelled as "greenwashing" because the firms' internal operations still cause significant harm (Hart 1997). In order to achieve this balance, an assessment of the firms' capabilities in each of the four quadrants is due. In fact, the capabilities in each quadrant can be rated on a scale ranging from non-existent, emerging, established to institutionalized.

26.1.4 Operationalizing the SVF

Putting theory into practice (operationalizing), the SVF challenges firms to pay special attention to the sequence of events that lead to successful planning and executing SVF activities entailed. Whilst planning their sustainable practices undertakings, firms must first consider their internal capabilities (Q1 & Q2), before being able to communicate and integrate the external audience (Q3 & Q4) in these undertakings. Adherence to this pathology in planning SVF activities is crucial to avoid mistakes in executing activities. Whilst executing sustainable undertakings, activities from different quadrants can overlap in the process. For example, efforts to minimize waste from current operations by agents within a firm goes hand-in-hand with the competence development of said agent. Also, technological innovations conjured up in Q2 during planning are used for the execution of environmental best practices in Q1. Therefore, activities identified during the planning phase can be executed simultaneously. Successful integration of external stakeholders into sustainable business processes (Q3) requires firms to have first minimized waste from current operations (Q1) and then develop proper competencies for the future (Q2). Furthermore, crystallizing the firm's sustainable growth path and trajectory requires targets of internal achievements to be properly communicated to stakeholders. Therefore, Q4 cannot preclude Q3 in execution. Thus there is a certain pathology in the reasoning which the owners/managers must apply in operationalizing their sustainable practices undertakings.

26.2 Materials and Methods

In view of the fact that sustainability research on sustainable practices is still in its infancy stage in Malaysia, the basic aim of this study is to provide a stronger, more integrative, systematic and thorough knowledge of the most common environmental advantages, as well as the difficulties of sustainable practices. Therefore, this study uses a case study approach allowing manufacturing SMEs to investigate and interpret the subject in its context and obtain a fuller and holistic view of the consequences of sustainable practices from a sustainability perspective (Abdul-Rashid et al. 2017). More importantly, this study relies on numerous instances instead of one case, improving the findings robustness and generalizability (Eisenhardt and Graebner 2007) and comparatively new, developing and modern phenomenon in its real, social and organizational context (Yin 2017).

Since qualitative research is mostly based on interviews (Crouch and McKenzie 2006), this study chose semi-structured specialist interviews with skilled and experienced owners/managers as the primary source of empirical information. Additionally, they promote a structured information collection and offer the necessary level of openness to allow unexpected and novel information to arise (Yin 2017), which corresponds to this study's exploratory nature. Between September and December 2018, the interview was performed with five manufacturing SMEs from the Electrical and Electronics (E&E) industry. The E&E industry was selected as it contributes most to the Malaysian gross domestic product. The interviews lasted 45–60 min, and all discussions were performed in English language. Detailed case study information is confidential and anonymized. Table 26.1 illustrated the sample data of the study, and all chosen manufacturing SMEs have over 150 staff. The manufacturing SMEs examined are usually known to be extremely innovative and lead to a multitude of mature and emerging E&E industry. The interviewees are in the top leadership place and are best able to report on the most appropriate sustainable practices-related advantages and difficulties and ensure their understanding of incorporating environmental aspect for sustainability purposes. The design of the interview guide was adopted from the literature, and it followed the principle of openness and flexibility to allow unexpected and different subjects to arise (Kasabov 2015). In the interview sessions, a series of questions related to sustainable practices in operations and the

Table 26.1 Detailed list of sample characteristics

Expert interview	Company years	Management position	Tenure in years	No. of employees	Sales (EUR)
SME-A	>10 years	Owner/manager	12	230	10–50 K
SME-B	>10 years	Manager	15	245	10–50 K
SME-C	5–10 years	Owner/manager	6	210	5–10 K
SME-D	5–10 years	Owner/manager	8	237	10–50 K
SME-E	>10 years	Manager	16	242	10–50 K

potential hazards of environment were used as guides, and follow-up questions were asked to allow interviewees to develop ideas and elaborate points of interest.

The transcription of the five audio-recorded interviews was directed in almost 60 pages of texts. Palinkas et al. (2015) suggest a qualitative content analysis to define and interpret prevalent trends, topics and categories. Since sustainable practices research is still in its infancy stage in Malaysia, this study introduced an inductive coding procedure (Gioia et al. 2013) to promote the development of new information rather than limited to particular hypotheses testing (Graebner and Eisenhardt 2004). To further boost methodological rigour, this study followed Gioia et al.'s widely and academically valued procedure and created first-order (informant-centric) ideas. Secondly, these ideas were synthesized into second-order topics inspired by past experiences from the scarce body of present studies on sustainable practices. Finally, and wherever necessary, this study distilled them into SVF dimensions. The entire coding method was performed to obtain a well-off interpretation and deep comprehension as possible (Aagaard 2019). After coding all interviews, Holsti's implementation of frequency analysis (as cited in Mustapha and Ebomoyi 2019) facilitated the identification of the most common possibilities and difficulties associated with sustainable activities. To account for routine criticism of qualitative research based on specialist interviews (Schüßler et al. 2014), this study improved the validity and robustness of the results by scientifically defined triangulation of secondary information from business websites to check the statements of the interviewees (Eisenhardt and Graebner 2007; Yin 2017).

26.3 Results

This section presents the findings according to the key themes of the interviews. In Table 26.1, the five manufacturing SMEs interviewed are labelled as SME-A to SME-E and referred to throughout the text to provide additional insight into the source from which the findings discussed are extracted. For the purpose of this study, the interviews were examined based on related research propositions. These assertions serve to facilitate the acquisition of insight from the interviews; therefore, the findings of the interviews are discussed in light of each research proposition stated successively. As a result, insight is granted into the current sustainability of the manufacturing SMEs businesses' operations. Once a status quo concerning manufacturing SME's current practices has been established, the analysis provides an exploration of what steps manufacturing SMEs can undertake to successfully implement sustainable practices. This is achieved by first rating the manufacturing SME's capabilities in each quadrant of the SVF. Importantly, the goal of this analysis is to facilitate the establishment of the next steps that manufacturing SMEs can take in order to successfully implement sustainable practices.

Proposition 1 Manufacturing SMEs currently have processes in place geared towards controlling their impact on the environment.

Most manufacturing SMEs do have some practices in place specifically geared towards lowering consumption of waste from current operations (SME-A, SME-C and SME-D) with the exception of some manufacturing SMEs that are yet to integrate any consumption restriction practices into operations (SME-B and SME-E). However, the focus of these practices is not necessarily as much on lowering the pollution streaming from operations as it is on keeping operating costs low amongst manufacturing SMEs. Due to small-scale operations, it is much more important for these manufacturing SMEs to lower their current operating costs in order to raise their overall revenue. This means that most of the manufacturing SMEs are not necessarily aimed at lowering their impact on the environment but to have some alternatives in place which can be used to streamline the implementation of environmental sustainable practices.

26.3.1 Water Management

All the manufacturing firms interviewed in this study documented the cost of their firm's water consumption (SME-A to SME-E). The source of water used by these SMEs is from the local public network. Furthermore, two manufacturing SMEs have implemented technologies into their operations which enable them to control their water consumption (SME-C and SME-D). As these technologies require initial investments to attain, the other three manufacturing SMEs (SME-A, SME-B and SME-E) are yet to plan or implement these technologies in place for their operation processes.

26.3.2 Energy Efficiency

Overall, all five manufacturing SMEs (SME-A, SME-B, SME-C, SME-D and SME-E) keep record on how much their energy consumption is on a monthly basis. However, as manufacturing SME's operations are relatively small, no record is kept on how much energy is consumed by each specific area of operations (production, warehouse, maintenance department tasks, etc.). By measuring and documenting the energy consumption of each specific area of operations within the SME, more targeted action can be taken to lower the energy consumption as a whole. Furthermore, none of the manufacturing SMEs interviewed are currently planning to use renewable energy (SME-A, SME-B, SME-C, SME-D and SME-E). The primary reason for not implementing renewable energy is the fact that this type of energy is more expensive than regular energy usage even though the owners/managers know the cost saving in long terms of operations.

26.3.3 Waste Management

Even though manufacturing SMEs have techniques in place to manage the waste from current operations, most of the waste generated is not sorted properly before being disposed of (SME-A, SME-C and SME-D). Though there are arguably exceptions (SME-B), the improper disposal of waste represents a weakness in the sustainable practices of manufacturing SME's current practices. Even though all five manufacturing SMEs' solid waste disposal system is in place (dispose through authorized disposal contractors), SME-C and SME-E failed to document properly the amounts of waste generated on-site and their respective volumes off-site. It is important to record the on-site and off-site quantities of solid waste from current operations as this control step can reduce the disposal cost.

Proposition 2 Manufacturing SMEs possess sufficient complementary resources to successfully integrate sustainable practices into their operations.

Successful reaping of the benefits associated with implementing sustainable practices in the long run challenges the manufacturing firms to identify complementary resources which they currently possess. From the interviews, it became apparent that all manufacturing SMEs do have a number of these complementary resources at present. The following sub-sections discuss in sequence the practical, structural, human and financial complementary resources.

26.3.4 Practical

Manufacturing SME-A, SME-B, SME-D and SME-E do have some practices in place which can be relatively easy to adjust to meet sustainable practices benchmarks (e.g. water-saving measures, energy efficiency and air quality management). Yet, there are some practices (waste management and sewage treatment) which merit special attention because most manufacturing SMEs interviewed fail to sort their waste properly and quantify their on-site and off-site volumes (SME-C and SME-E) with the exception that small scale of operations facilitates proper sorting and disposal of waste (SME-B).

26.3.5 Structural

All five manufacturing SMEs (SME-A, SME-B, SME-C, SME-D and SME-E) did have the basic installations of electricity and water infrastructure which could facilitate the utilization of sustainable technologies. However, integrating sustainable technologies into operations is a further challenge for some manufacturing firms as these modern innovations could actually clash with the traditional atmosphere

these manufacturing firms are trying to create. According to SME-C, another factor in structural initiatives that need to be considered is the initial cost and routine maintenance cost.

26.3.6 Human

Most of the basic tasks behind running the manufacturing SME's current operations are centralized and carried out by the operational managers (SME-A, SME-B, SME-D and SME-E). Small-scale operations of these SMEs thus often defeat the necessity for a larger team to carry out the tasks. The fact that a minimum level of employees is employed in these SMEs can be considered as the complementary resource in the process of going sustainable, as adapting current practices would require minimal employee training.

26.3.7 Financial

The most noticeable absence of complementary resource was the allocation of a portion of the yearly budget in order to develop sustainable competencies (SME-A, SME-B and SME-D). SME-C and SME-E currently phase in sustainable technologies into their operations as funds to acquire these technologies are necessarily based on customers' requirement.

Proposition 3 Manufacturing SMEs have sufficient access to technological innovations available in the market.

Successful reaping of the benefits associated with implementing sustainable practices in the long run challenges the manufacturing firms to identify the sufficient access to technological innovations which they currently possess. From the interviews, it became apparent that all five manufacturing SMEs (SME-A, SME-B, SME-C, SME-D and SME-E) do have a number of access to technological innovations in their ventures. These are discussed next in the sequence of clean technology and competency development.

26.3.8 Clean Technology

Successful reaping of the benefits associated with implementing sustainable practices in the long run requires manufacturing firms to reposition their internal competencies around more sustainable technologies. Innovation poses a threat solely to SMEs unable to adapt to a changing industrial environment. Therefore, it is crucial for

manufacturing SMEs to continuously keep an eye out for technologies available in the market which could potentially advance their sustainable practices capabilities. However, from the interviews, it became apparent that not all manufacturing SMEs are at the same level when it comes to the technological sophistication in their respective ventures. Though there are some basic technological innovations available in the market (e.g. LED light, centralized air-condition and water-efficiency technologies), SME-C and SME-E do already make use of these technologies compared to SME-A, SEM-B and SME-D as these SMEs lack the resources and budget allocation to acquire and maintain these innovations in the long run.

26.3.9 Competency Development

Adopting clean technologies can only lead to long-term success for manufacturing SMEs if the employees responsible for carrying out tasks received proper training to develop the right competencies. However, as the SMEs' operations are relatively small scale, limited employees were employed to carry out the tasks. Therefore, manufacturing SMEs require less investment in ensuring that their employees get proper training when implementing sustainable practices. In addition, all five manufacturing SMEs interviewed implemented flat organizational structures (top to bottom) with the owner/managers or the operation manager functioning as an integral part of daily tasks. As a result, these owners/managers are constantly in contact with their employees, which ultimately facilitates the transfer of information necessary to successfully transform current practices. Furthermore, it is not the innovation itself but rather the SME's ability to create opportunities in which to engage the key stakeholders of their sustainable practices undertakings which ultimately determines its successful implementation.

26.4 Discussion

26.4.1 The Sustainable Value Creation Process

A cornerstone of this analysis is the supposition that the manufacturing SMEs are able to create sustainable value from the implementation of sustainable practices by operationalizing considerations relative to each of the four quadrants of the SVF successively. Successfully operationalizing these considerations further challenges manufacturing SMEs to find the right balance between the many elements of each quadrant. This is in order to avoid the pitfalls of inaccurately going sustainable practices. In contrast, the manufacturing SMEs are only able to establish tangible steps in the process of going sustainable practices once a rating regarding their current sustainable capabilities has been completed. Therefore, the primary focus

of this analysis is to rate the current capabilities of manufacturing SMEs in each successive quadrant of the SVF. Capabilities in each quadrant are rated on a scale ranging from non-existent, emerging, established to institutionalized. This rating is important to get a better understanding of the status quo regarding manufacturing SMEs' sustainable practices capabilities. In fact, the ultimate goal of this analysis is to help manufacturing firms to identify the next steps they can take to successfully undergo sustainable practices. As the manufacturing SMEs' current capabilities have been discussed, the next course of action can be undertaken relative to each quadrant of the SVF.

26.4.1.1 Quadrant 1—Pollution Prevention

Status Quo: The goal in Quadrant 1 is to adapt the manufacturing SMEs' practices in order to lower the emission streams from current operations. Manufacturing SMEs' current pollution prevention capabilities can be rated as emerging at best. Even though firms do have some practices in place and aimed at lowering the waste generated from current operations, these practices are not specifically geared towards limiting their operations' environmental and sustainable impact. Transforming current practices requires a commitment to the environment in which manufacturing SMEs' operations are embedded. Furthermore, manufacturing SMEs do have some complementary resources in place which can greatly aid in the process of streamlining environmental best practices. Even though their current practices represent a starting point as far as manufacturing SMEs' sustainable endeavours are concerned, they still have a long way to go in developing their pollution prevention capabilities.

Next Steps: There are a number of sustainable best practices that manufacturing SMEs can use in order to make their operations more sustainable (e.g. Zein et al. 2008). Yet even the longest of journeys begin with a first step, thus choosing to embark on any sustainable journey is better than idly standing by for some manufacturing SMEs. More important than which sustainable strategies firms choose to pursue is the manner in which they tackle these challenges, which will ultimately determine their success and sustainability. Thus, successfully implementing sustainable practices into their operations requires manufacturing SMEs to first establish a commitment to the natural environment in which they operate and the preservation of its resources. Furthermore, sustainable practices serve the purpose of helping manufacturing SMEs reduce their waste and cost resulting from current operations. As each SME represents a unique entity facing unique challenges when moving to sustainability agenda, completing a checklist for sustainable practices is a solid next step each manufacturing SME can take in order to successfully implement sustainable practices. By the insight generated from this firm-specific analysis, the complementary resources firms currently possess in the process of going sustainable are also revealed. Finally, the importance of properly documenting sustainable endeavours must be emphasized thoroughly. Properly quantifying the impact that current operations have on the environment and the influence that implementing sustainable

practices has on these operations is a means through which the manufacturing SMEs can monitor the success or failure of their sustainable practices undertakings.

26.4.1.2 Quadrant 2—Clean Technologies

Status Quo: The focus of Quadrant 2 is on acquiring clean technologies and developing the proper competencies which facilitate manufacturing SMEs use in the long run. Manufacturing SMEs' current capabilities regarding the adoption of clean technologies can be rated emerging at best. Though some manufacturing SMEs have integrated sustainable technologies into their operations to a certain extent, other manufacturing SMEs are yet to invest in basic technologies which could help them streamline the execution of sustainable practices in the long run. This highlights a gap in resources available to manufacturing SMEs in the process of going sustainable practices and represents a major weakness in their ability to achieve long-term growth and sustainability.

Next Steps: Adopting clean technologies enable manufacturing SMEs to play a pro-active role in managing their environmental impact, yet each SME has unique technological needs when it comes to their current levels of technological sophistication. Therefore, manufacturing SMEs need to first identify which technological innovations meet their current sustainable needs. Second, reaping long-term benefits associated with clean technologies requires SMEs to manage the competencies developed by their employees as well. This can be achieved by establishing a roadmap today for which competencies need to be developed in order to sustain clean technologies and successively to ensure that these competency development needs can best be met in the sustainable practices endeavour. Finally, shifting manufacturing SMEs' technological capabilities towards more sustainable technologies can only be considered if and when the current gap in their access to sustainable technologies is bridged. Fact remains that the resources needed to acquire sustainable innovations are only half the story. Maintaining them can lead to future costs which are currently unforeseen, potentially hindering the entire sustainable value creation process if inadequately planned. Therefore, manufacturing SMEs should only invest in clean technologies they can feasibly maintain in the long run.

26.4.1.3 Quadrant 3—Product Stewardship

Status Quo: The focus of Quadrant 3 is on integrating stakeholders' views into business processes. Manufacturing SMEs currently do not engage their key stakeholders in their sustainable endeavours as they are yet to institutionalize sustainable practices. Therefore, their capabilities of engaging suppliers in their sustainable practices can currently be rated non-existent.

Next Steps: Even though manufacturing SMEs are only able to engage suppliers once sustainable practices have been institutionalized, manufacturing SMEs are able

to communicate their sustainable intentions to suppliers beforehand. Besides reaping goodwill from supplier through these efforts, manufacturing SMEs are able to engage this supplier by inquiring their creative solutions for sourcing more sustainable materials. Informing suppliers the sustainable intentions of the firms can also be done online through the firm's website. Furthermore, there are other simple measures that manufacturing firms can integrate across the suppliers' cycle to engage supplier without having sustainable practices institutionalized, e.g. providing the supplier with customers material data and include suppliers' participation in R&D process and value engineering process.

26.4.1.4 Quadrant 4—Sustainability Vision

Status Quo: The goal of Quadrant 4 is to enable manufacturing SMEs to capitalize on future markets by strategically aligning with incumbent industry operators and the government. Manufacturing SMEs are only able to positively contribute to a strategic alliance with incumbent industry operators and the government if and when they have successfully integrated sustainable practices into their own operations. Given that manufacturing SMEs are yet to institutionalize these practices, their capabilities for aligning with complementary partners in pursuit of sustainable value are currently also non-existent. However, most manufacturing SMEs interviewed realize the growing importance of going sustainable practices in the development of future markets, and they are challenged to prepare today for these future developments.

Next Steps: Crystallizing the sustainable growth of the entire industry challenges incumbent industry operators and the government to unite in an effort to empower the most fragile elements operating within the industry. Because manufacturing SMEs share a common customer base with large manufacturing firms and their operations ultimately impact the society for which the local government is responsible. These three parties are able to translate their current shortcomings into sustainable value for the entire industry. By aligning their sustainable practices undertakings with those of large manufacturing firms, manufacturing SMEs are also empowered through the technological resources and social legitimacy that large manufacturing firms contribute to such a strategic alliance. In the same token, the cost–benefit manufacturing SMEs can reap by developing sustainable practices competencies at the group level with complementary partners can play a key role in their long-term growth. Furthermore, the government is able to pro-actively meet their societal obligations by providing tax incentives for manufacturing firms willing to go sustainable practices, freeing up funds to invest in clean technologies. Therefore, it is important for manufacturing SMEs to establish communication channels today with incumbent industry operators about the many benefits all parties can reap by strategically aligning their sustainable practices efforts. These efforts could foster the reciprocal behaviour necessary for the formation of a partnership in the future. The next concrete steps manufacturing SMEs can undertake to create sustainable value over time, along with the practical implications that operationalizing considerations relative to each of the four quadrants, are discussed in the following sub-section.

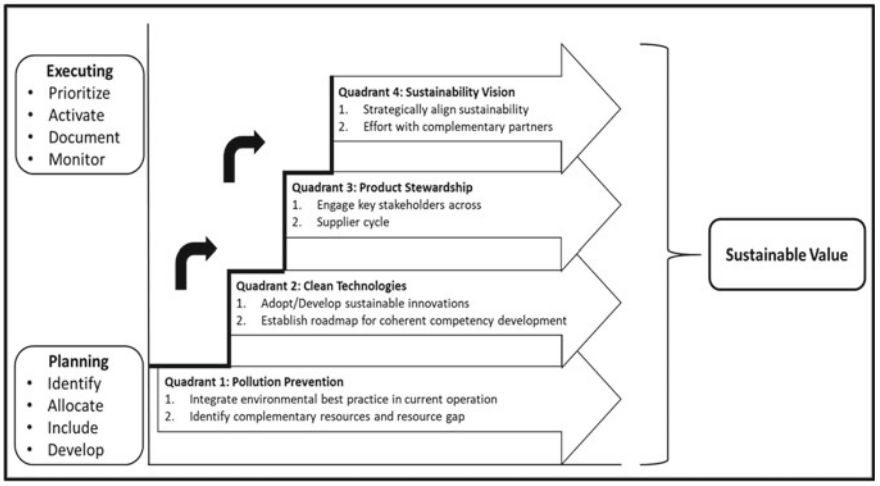

Fig. 26.2 Perpetual path manufacturing firms

26.4.2 Creation of Sustainable Value

The bold line in Fig. 26.2 represents that the perpetual path manufacturing firms must travel in order to successfully implement sustainable practices into their operations over time. The horizontal axis represents the time that manufacturing firms should dedicate to correctly plan sustainable activities and the vertical axis represents the actual execution of planned activities.

Creating long-term sustainable value from the implementation of sustainable practices challenges manufacturing SMEs to successfully operationalize considerations relative to each of the four quadrants of the SVF. Successfully operationalizing activities over time enables manufacturing SMEs to generate sustainable value in their operations. However, successfully operationalizing these four quadrants challenges manufacturing SMEs to take into consideration not only what actions they can undertake, but also how these practices are undertaken. More specifically, manufacturing SMEs are challenged to find a balance between the operationalization of the four quadrants, and this is achieved by taking a number of considerations regarding first planning and successively executing each quadrant into account. In order to achieve the SVF perpetual path, manufacturing SMEs must plan (identify, allocate, include and develop) sustainable activities. Table 26.2 describes the planning stages of sustainable activities to optimize the contents of SVF.

Table 26.2 Planning sustainable activities

Planning	Descriptions
Identify	Complementary resources and resource gaps. It is essential for manufacturing SMEs to develop an understanding of where they currently reside on the path towards sustainability before deciding to embark on sustainable practices. This can be achieved by identifying the resources they dispose of and those they are lacking in this process
Allocate	Resources available based on resource mobilization necessary to adjust current methods. The best practices ultimately are those which firms are able to tailor specifically to their operating needs and require minimal resource mobilization in order to adapt from the status quo
Include	The costs of maintaining sustainable innovations in the long term. Assuring that manufacturing SMEs take into account not only the current investment costs but also future maintenance costs of going sustainable is essential to achieving long-term success
Develop	Coherent trajectories in achieving sustainable milestones and establish feasible definitions of what achieving success actually means. This further challenges the manufacturing SMEs to establish feasible ways in which to measure their sustainable achievements like the bridging of resource gaps and the development of employees' competencies in the long run

26.4.2.1 Planning

Once the sustainable activities are planned, the next stage is to execute (Prioritize, activate, document and monitor) the sustainable practices at the firm level first. Table 26.3 illustrates executing the sustainable activities to optimize the contents of SVF.

26.4.2.2 Executing

See Table 26.3.

26.5 Implications for Theory and Practice

Even though the data gathered in this study was from the manufacturing SMEs, the sample taken is not representative of the industry as a whole. To gather a better understanding of how incumbent industry operators are able to successfully implement sustainable practices, additional insight regarding the undertakings of more manufacturing SMEs is necessary. In addition, manufacturing SMEs' abilities to conduct sustainable operations are partly determined by the input of other ventures within the same industry (e.g. suppliers). Therefore, investigating further how manufacturing SMEs can cooperate with operators across their value chain can also provide valuable insight into the critical success factors of manufacturing SMEs sustainable

Table 26.3 Executing sustainable activities

Executing	Descriptions
Prioritize	Execution of activities based on paths established in the planning phase. Manufacturing SMEs' ability to follow planned paths is a direct determinant of their ability to achieve milestones of planned success
Activate	The actual execution of planned activities based on milestones achieved in previous quadrants. Manufacturing SMEs should only start executing considerations relative to successive quadrants if and when planned measures of success have been accomplished in previous quadrants. It is the degree to which success has been booked in previous quadrants which provides successive ones with substance; starting with Quadrant 1
Document	The results of sustainable practices undertakings as established during the planning phase. This body of knowledge gathered from successes and mistakes can facilitate the learning process in manufacturing SMEs. Monitor progress periodically in order to ensure that manufacturing SMEs' progress is on track. Practices should continuously be adjusted to reflect the changing needs and wants of the market. Therefore, manufacturing SMEs should also continuously reconsider the complementary resources they possess and identify new resource gaps as they become relevant
Monitor	Progress periodically in order to ensure the manufacturing SMEs' progress is on track. Sustainable practices should continuously be adjusted to reflect the changing needs and wants of the market. Therefore, manufacturing SMEs should also continuously reconsider the complementary resources they possess and identify new resource gaps as they become relevant

practices undertakings. Even though the focus of this study has been on empowering the manufacturing SMEs, perspectives are assumed in establishing the next steps that can be taken in order to successfully institutionalize sustainable practices through SVF. Henceforth, the perspectives of large manufacturing firm operating in the E&E manufacturing industry are not inquired and thus serve as a potential avenue for future research. Also, the creative ways in which governments are able to play a proactive role in fostering the mutual behaviour necessary to successfully implement sustainable practices need further attention. The applicability of operationalizing considerations relative to the four quadrants in the manufacturing industry is tested in this research. However, another potential avenue for future research is testing out the applicability of this framework in other industries. Gaining insight into the challenges that translating these considerations in terms relative to other industries will in turn contribute additional insight into the generic considerations which are true for all industries.

26.6 Conclusion

This study presents the analysis leading up to answering the main research question. The goal is to identify what steps manufacturing firms can take to successfully implement sustainable practices in their operations. In order to achieve this, the insight gathered from interviews with the owners/managers of five manufacturing SMEs are presented in light of each of the three research propositions stated. Manufacturing SMEs' capabilities in each quadrant are then rated on a scale ranging from non-existent, emerging, established to institutionalize. As a result, the considerations that manufacturing SMEs must take into account in each quadrant to successfully implement sustainable practices are identified. By integrating sustainable practices into their current operations, manufacturing SMEs are able to save costs whilst reducing the impact of their operations have on the environment. Finally, successfully streamlining sustainable practices into current operations challenges manufacturing SMEs to identify the complementary resources they currently have to their disposition which could aid them in the process of implementing sustainable practices through sustainable value. In doing so, the resource gaps in manufacturing SMEs' access to clean technologies also become apparent. On the long term, however, it is the manufacturing SMEs' ability to bridge these resource gaps and develop the proper competencies which moderate their capability to reap the benefits associated with adopting clean technologies. Therefore, it is important for manufacturing SMEs to establish coherent roadmaps to ensure that the proper competencies are developed to sustain adopted technologies. Finally, it is not only about what actions manufacturing SMEs undertake but how they go about sustainable endeavours which ultimately determines their long-term growth and sustainability.

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