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SMALL MANUFACTURING FIRMS SUSTAINABLE GREEN 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 risks, and environmental concern become threats to business expansion. However, in recent years, this conflict has progressively been side-lined with the development and implementation of sustainable green practices. The aim of this study is to identify what steps small manufacturing firms can take to successfully implement sustainable green practices into their operations. In order to achieve this, the study proposes the Sustainable Value Framework which is a generic framework through which firms are able to convert their sustainable undertakings into sustainable value. The data of this study was gathered from semi-structured interviews with five small manufacturing firm's owners/managers. The findings shows that small manufacturing firms are challenged to strike a balance between the components of the SVF and status quo concerning firm's current sustainable green practices. The findings also reveal that creating long term sustainable value from the implementation of sustainable green practices challenges small manufacturing firms to successfully operationalize considerations relative to each of the four quadrants of the Sustainable Value Framework. The imperial findings and practical implications offer an indicator encouraging other manufacturing firms to hop on the Go-green bandwagon, particularly those without any green practice in place.

Keywords: Sustainable Value Framework, sustainable green practices, small manufacturing firm

1 Introduction

Malaysia is one of the developing countries whose economy mainly depends on the small business sector (Tehrani & Manap, 2014). In recent years, sustainable green practices are among the vital management issues encountered by small businesses, specifically the manufacturing, due to the growing awareness in environmental issues among owners/managers, consumers, governments, social groups and employees. The green practices of small manufacturing firms in Malaysia warrant investigation because this sector is predicted to have a collective impact on the environment and could outweigh the combined environmental impact of large companies (Hillary, 2000). Broadly, environmental sustainability and their outcomes have been addressed from various perspectives, ranging from the application of green technologies as a mean to gain competitive advantage (Leonidou et al., 2013), to the perception of environmental regulation as a driver for innovation (Hillary, 2000) and improvement of the competitive position (Porter & Van der Linde, 1995; Marchi et al., 2013). In support, some studies on the development of green issues over time focused on specific industrial sectors (Lee & Rhee, 2007) or multi-sectorial large companies (Dahlmann & Brammer, 2011), addressing the advancement of environmental proactivity. Despite this, attention has normally been devoted to large firms and thus disregarding the development in small manufacturing firms, which, after all, constitute the backbones in many economies. On account of this, impact of small manufacturing firms on the natural environment remains significant and therefore this study was conducted.

1.1 Sustainable green practices in small manufacturing firms

By definition, there are very limited operations of small manufacturing firms individually, which have minimum impact on the environment as compared to large firms (Gadenne et al., 2009). On the contrary, there has been an increasing concern in relation to the impact of business on the environment and numerous reasons highlighted on why small manufacturing firms cause many environmental problems (Hillary, 2000). Despite of this, Gunasekaran and de Souza Jabbour (2017) stated that small manufacturing firms 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 location of businesses have led to shortening of regulation control and enforcement by the state authorities. Additionally, it is noted that environmental NGOs or concerned citizens have power in pressing larger industrial polluters into ecological transformation, but not on small businesses. Even so, there is a general agreement that precise data concerning small manufacturing firms environmental impact is very limited (Parker et al., 2009; Nason & Wiklund, 2018). However, there is still a considerable pressure on small manufacturing firms that individual business are immense polluters and there are undeniably significant impacts on ecological systems due to the infinite number of small manufacturing firms and their spread in term of location. On the other hand, studies on sustainable green practices of small manufacturing firms are still at an infancy level, although there have been vast literature in relation to how and to what extent the production processes and products in major industries of developed countries are being reoriented to include sustainability requirements and conditions. Pertaining to these statement, it can be concluded that small manufacturing firms may not fully understand about the environmental impact that they may have (Williams & Schaefer, 2012) and to date, there has been limited research that increase the current understanding of trends surrounding environmental sustainability and environmental performance (Battisti & Perry, 2011). Therefore, this paper aims to explore the two main issues related to these questions. Firstly, how are firms able to create stakeholder value by implementing sustainable green practices in their operations? Secondly, what potential hazards of going green must firms take into account when pursuing sustainable green practices undertakings?

2. Sustainable Value Framework

This paper proposes the Sustainable Value Framework (SVF) as presented by Hart (2009) which is a generic framework through which firms are able to convert their sustainable undertakings into sustainable value. This framework offers the basic considerations that businesses must take into account to successfully implement sustainable green practices and create sustainable value over time. Although the SVF was developed for firms looking to serve the four billion poorest people the bottom of the economic pyramid (4BP), this paper extends this knowledge by identifying the generic considerations which are applicable to firms in general in the process of successfully creating sustainable value. However, firms are challenged to translate the generic considerations of this framework into firm-specific actions in order to be successful.

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). Furthermore, 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. Place alongside these two dimensions produces a matrix with four distinct dimensions of firm performance crucial to generating shareholder value and understanding sustainability in terms relevant to the business (Hart, 2009). A graphical representation of the dimensions of the Sustainable Value Framework is presented in Figure 1.

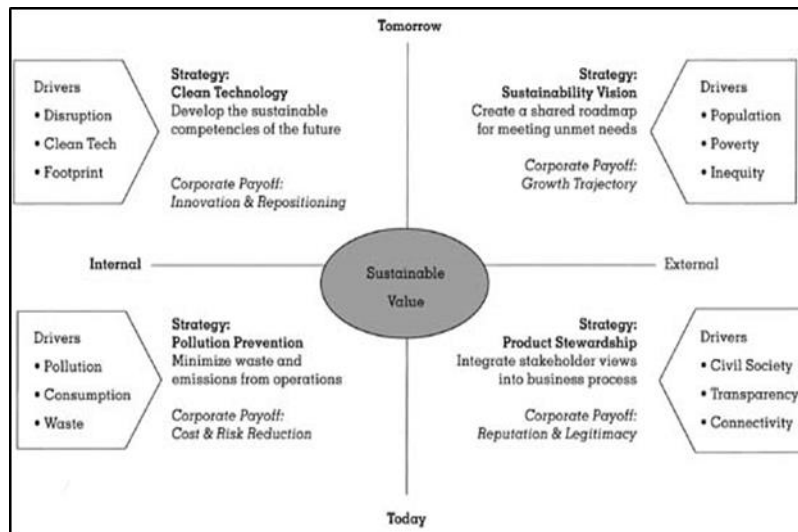


Figure 1. Sustainable Value Framework

2.1 Operationalizing the SVF

Putting theory into practice (operationalizing) the SVF challenges firms to pay special attention to the sequence of events that successfully planning and executing SVF activities entails. In planning their sustainable 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. In 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. Successfully integrating external stakeholders into sustainable business processes (Q3) requires firms to have first minimized waste from current operations (Q1) and developed the proper competencies for the future (Q2). Furthermore, crystallizing the firm's sustainable growth path and trajectory requires targets of internal achievements to have been properly communicated to stakeholders. Therefore, Q4 cannot preclude Q3 in execution. There is thus a certain pathology in the reasoning owners/managers must apply in operationalizing their sustainable undertakings.

3 Methodology/Materials

In this study, qualitative research methodology was used for two reasons. The first reason is linked to the objectives of this study. It intends to explore the under-researched area in small manufacturing firms specifically the green practices. Second reason for adopting qualitative research methodology is the type of information needed by this study. The depth and detail of qualitative data is required to understand the complex phenomenon investigated by this study (Carson et al. 2001). Therefore, face-to-face semi-structured interviews were conducted from September 2017 to December 2017. Purposive sampling was adopted to determine the respondents who are willing to provide their opinions, experience, and knowledge (Nair & Riege, 1995; Rao & Perry, 2003) about the company sustainable green activities and issue. The face-to-face semi-structured interview sessions were held between one to two hours with five owners or managers of the manufacturing firms. A series of questions relating to sustainable green practices in their operations and the potential hazards of going green were used as guides in the interview sessions and additional questions follow up and probing questions were asked to let the interviewees develop ideas and elaborate the points of interest. The interviewees are also allowed to explore various related issues as they saw fit (Edmondson & McManus, 2007). Additionally, observation and documentation methods were employed to aid triangulation for interpretations. All interviews were transcribed soon after the interview session and then analysed by using the content analysis technique with cross-case analysis (Cavanagh, 1997; Guthrie et al., 2004).

4 Results and Findings

This section presents the findings according to the key themes of the interviews. The five small manufacturing firms interviewed are labelled A till E and are 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 (Roulston, 2010). As a result, insight is granted into the current sustainability of these businesses' operations. Once a status quo concerning manufacturing firm's current practices has been established, the analysis provides an exploration of what steps manufacturing firms can undertake to successfully implement sustainable green practices. This is achieved by first rating manufacturing firm's capabilities in each quadrant of the SVF. The goal of this analysis to facilitate the establishment of next steps manufacturing firms can take in order to successfully go green. It is based on this analysis that an answer to the main research question is achieved.

4.1 Proposition 1: Manufacturing firms currently have processes in place geared towards controlling their impact on the environment

Most manufacturing firms do have some practices in place specifically geared towards lowering consumption and waste from current operations (A/C/D); with the exception of some manufacturing firms that are yet to integrate any consumption curbing practices into operations (B/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 firms. Because of the small scale operations, it is ever much more important for these manufacturing firms to lower their current operating costs in order to raise their operating income. This means that most manufacturing firms, although not necessarily aiming to lower their impact on the environment, do have some means currently in place which can be used to streamline the implementation of environmental best practices.

4.1.1 Water management

The manufacturing firms interviewed in this study all document the cost of their firm's water consumption (A/B/C/D/E). The source of water used by these firms is the local public network. Furthermore, some manufacturing firms have implemented technologies into their operations which enable them to curb their water consumption (C/D). However, because these technologies require initial investments to acquire, not all manufacturing firms interviewed had these technologies in place (A/B/E).

4.1.2 Energy efficiency

Manufacturing firms interviewed all keep a record on how much their energy consumption is on a monthly basis (A/B/C/D/E). However, because manufacturing firms 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 per department within the firm, more targeted action can be taken to lower the energy consumption of the venture as a whole. Furthermore, none of the manufacturing firms interviewed currently planning to use renewable energy (A/B/C/D/E). The primary reason for not implementing renewable energy is the fact that this type of energy is more expensive than regular energy. Finally, manufacturing firms interviewed did not have a back-up generator installed in case of a general power failure (C/D).

4.1.3 Waste Management

Even though manufacturing firms interviewed have techniques in place to manage the waste from current operations, most of the waste generated by manufacturing firms is not sorted properly before being disposed of (A/C/D). Though there are arguably exceptions (B), the improper disposal of waste represents a weakness in the sustainability of manufacturing firm's current practices. Furthermore, manufacturing firms interviewed all dispose of their solid waste through authorised disposal networks (A/B/C/D/E). Finally, manufacturing firms interviewed also fail to document properly the amounts of waste generated and their respective volumes (A/B/C/D/E). It is by identifying the relevant quantities of waste emanating from current operations that the proper steps can be taken to properly sort and document their respective volumes be taken.

4.2 Proposition 2: Manufacturing firms possess sufficient complementary resources to successfully integrate environmental best practices into their operations

Successfully reaping the benefits associated with implementing sustainable green practices on the long run challenges manufacturing firms to identify the complementary resources which they currently possess. From the interviews it became apparent that manufacturing firms do have a number of these complementary resources already present in their ventures (A/B/C/D/E). These are discussed next in sequence of practical, structural, human and financial.

4.2.1 Practical

Manufacturing firms do have some practices in place which can be relatively easily adjusted to meet environmentally friendly benchmarks (e.g. water-saving measures, energy efficiency, and air quality management). Yet there are some practices (waste management) which merit special attention because most manufacturing firms interviewed fail to sort their waste properly and quantify

their respective volumes (B/C/D); with the exception of manufacturing firms where the small scale of operations facilitates the proper sorting and disposal of waste (B).

4.2.2 *Structural*

Manufacturing firms interviewed did have the basic installations (e.g. electricity and water infrastructure) already present which could facilitate the utilization of sustainable technologies (A/B/C/D/E). 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 (C).

4.2.3 *Human*

Most of the basic tasks behind running the firm's current operations are centralized and carried out by the operational managers in most of the manufacturing firms interviewed (A/B/D/E). The small scale of these firms operations thus often defeats the necessity for a large team to carry out tasks. The fact that a small staff is employed in these firms can be considered a complementary resource in the process of going green as adapting current practices would require minimal staff training.

4.2.4 *Financial*

The most noticeably absent complementary resource was the allocation of a portion of the yearly budget in order to develop sustainable competencies (A/B/D). There are small firms (C/E), however, that are currently phasing in sustainable technologies into their operations as funds to acquire these technologies become available.

4.3 **Proposition 3: Manufacturing firms have sufficient access to technological innovations available on the market**

4.3.1 *Clean Technology*

Successfully reaping the benefits associated with implementing environmental best practices on the long run requires manufacturing firms to reposition their internal competencies around more sustainable technologies. Innovation poses a threat solely to firms unable to adapt to a changing industrial environment. Therefore it is crucial for manufacturing firms to continuously keep an eye out for technologies available on the market which could potentially advance their sustainable capabilities. However, from the interviews it became apparent that not all manufacturing firms are at the same level when it comes to the level of technological sophistication in their respective ventures. Though there are some basic technological innovations available on the market (e.g. LED light and water-efficiency technologies) and some manufacturing firms do already make use of these technologies (C/E), other manufacturing firms lack the resources needed to acquire and maintain these innovations on the long run (A/B/D).

4.3.2 *Competency Development*

Furthermore, adopting clean technologies can only lead to long term success for manufacturing firms if the employees responsible for carrying out tasks receive the proper training to develop the right competencies. Because of the relatively small-scale operations of the manufacturing firms interviewed, a limited staff was employed by these ventures to carry out tasks. Therefore, manufacturing firms require less investment in ensuring their staff gets proper training when implementing sustainable measures (A/B/C/D/E). Also, manufacturing firms interviewed implemented generally flat organizational structures; with the owner/managers or operation manager functioning as an integral part of daily tasks (A/B/C/D/E). As a result, these managers are constantly in contact with their employees, which ultimately facilitate the transfer of information necessary to successfully transform current practices. Furthermore, it is not the innovation itself but rather the firm's ability to create opportunities in which to engage the key stakeholders of their green undertakings which ultimately determines its successful implementation.

4.4 **The Sustainable Value Creation Process**

A cornerstone of this analysis is the supposition that manufacturing firm are able to create sustainable value from the implementation of sustainable green practices by operationalizing considerations relative to each of the four quadrants of the SVF successively. Successfully operationalizing these considerations further challenges manufacturing firms to find the right balance between the many elements of each quadrant. This in order to avoid the pitfalls of inaccurately going green. However, manufacturing firm are only able to establish concrete next steps in the process of going green 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 firm 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 firms' sustainable capabilities. The ultimate goal of this analysis is to help manufacturing firms to identify the next steps they can take to successfully go green. Once the manufacturing firms' current capabilities has been discussed, the next steps of manufacturing firm can be undertaken relative to each quadrant of the SVF are discussed.

4.4.1 *Quadrant 1 - Pollution Prevention*

Status Quo: The goal in Q1 is to adapt manufacturing firm's practices in order to lower the emission streams from current operations. Manufacturing firms' current pollution prevention capabilities can be rated as emerging at best. Even though firms do have some practices in place aimed at lowering the waste generated from current operations, these practices are not specifically geared towards limiting these operations' environmental impact. Transforming current practices requires a commitment to the environment in which manufacturing firms operations are embedded. Furthermore, manufacturing firms 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 firms sustainable endeavours go, they still have a long way to go in developing their pollution prevention capabilities.

Next Steps: There are a number of environmental best practices manufacturing firms can use in order to make their operations more sustainable. 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 firms. More important than which sustainable strategies firms choose to pursue, it is the manner in which they tackle this challenge which will ultimately determine their success. Thus successfully implementing sustainable green practices into their operations requires manufacturing firms to first establish a commitment to the natural environment in which they operate and the preservation of its resources.

Furthermore, environmental best practices serve the purpose of helping firms reduce the waste and cost resulting from current operations. Because each firm represents a unique entity facing unique challenges when going green, completing a checklist for environmental is a concrete next step each manufacturing firms can take in order to successfully implement environmental best practices. By the insight generated from this firm-specific analysis, the complementary resources firms currently possess in the process of going green are also revealed.

Finally, the importance of properly documenting sustainable endeavours must be emphasized. Properly quantifying the impact that current operations have on the environment and the influence that implementing green practices has on these operations is a means through which firms can monitor the success or failure of their green undertakings.

4.4.2 *Quadrant 2 - Clean Technologies*

Status Quo: The focus of Q2 is on acquiring clean technologies and developing the proper competencies which facilitate their use on the long run. Manufacturing firms current capabilities regarding the adoption of clean technologies can be rated emerging at best. Though some firms have integrated sustainable technologies into their operations to a certain extent, other manufacturing firms are yet to invest in basic technologies which could help them streamline the execution of environmental best practices on the long run. This highlights a gap in resources available to manufacturing firms in the process of going green and represents a major weakness in their ability to achieve long term success.

Next Steps: Adopting clean technologies enable firms to play a pro-active role in managing their environmental impact, yet each firm has unique technological needs when it comes to their current levels of technological sophistication. Therefore, manufacturing firms need to first identify which technological innovations meet their current sustainable needs. Second, reaping long term benefits associated with clean technologies requires firms 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 how to ensure these competency-development needs can best be met.

Finally, shifting manufacturing firms 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 is 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 firms should only invest in clean technologies they can feasibly maintain on the long run.

4.4.3 *Quadrant 3 - Product Stewardship*

Status Quo: The focus of Q3 is on integrating stakeholder views into business processes. Manufacturing firms currently do not engage their key stakeholders in their sustainable endeavours as they are yet to institutionalize green practices. Therefore their capabilities of engaging suppliers in their green practices can currently be rated non-existent. However, even before manufacturing firms actually institutionalize green practices, there a number of opportunities in which to engage their suppliers across their procurement cycle.

Next Steps: Even though manufacturing firms are only able to engage suppliers once green practices have been institutionalized, manufacturing firms are able to communicate their sustainable intentions to suppliers beforehand. Besides reaping good will from supplier through these efforts, manufacturing firms are able to engage these supplier by inquiring their creative solutions for sourcing more sustainable materials. Informing suppliers in 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 green practices institutionalized, e.g. providing supplier with customers material data.

4.4.4 Quadrant 4 - Sustainability Vision

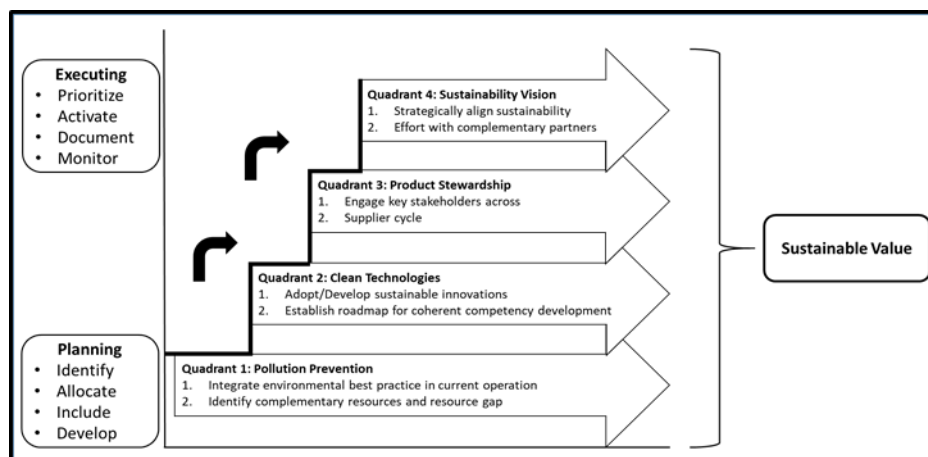
Status Quo: The goal of Q4 is to enable manufacturing firms to capitalize on future markets by strategically aligning with incumbent industry operators and the government. Manufacturing firms are only able to positively contribute to a strategic alliance with incumbent industry operators and the government if and when they have successfully integrated sustainable green practices into their own operations. Given that manufacturing firms 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 firms interviewed realize the growing importance of going green in the development of future markets, therefore 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 firms 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 undertakings with those of large manufacturing firms, manufacturing firms are also empowered through the technological resources and social legitimacy that large manufacturing firms contribute to such a strategic alliance. Also, the cost benefits manufacturing firms can reap by developing sustainable competencies at group level with complementary partners can play a key role in their long term success.

Furthermore, the government is able to pro-actively meet their societal obligations by providing tax incentives for manufacturing firms willing to go green, freeing up funds to invest in clean technologies. Therefore, it is important for manufacturing firms to establish communication channels today with incumbent industry operators about the many benefits all parties can reap by strategically aligning their sustainable efforts. These efforts could foster the reciprocal behavior necessary for the formation of a partnership in the future. The concrete next steps manufacturing firms can undertake to create sustainable value over time, along with the practical implications that operationalizing considerations relative to each of the four quadrants has for manufacturing firms.

4.5. Creation of Sustainable Value

The horizontal axis represents the time manufacturing firms should dedicate to correctly planning sustainable activities. The vertical axis represents the actual execution of planned activities. The bold line in Figure 2 represents the perpetual path manufacturing firms must travel in order to successfully implement sustainable green practices into their operations over time. Creating long term sustainable value from the implementation of sustainable green practices challenges manufacturing firms to successfully operationalize considerations relative to each of the four quadrants of the Sustainable Value Framework (Bertoni, 2017). Successfully operationalizing activities over time enables firms to generate sustainable value in the process. However, successfully operationalizing these four quadrants challenges firms to take into consideration not only what actions they can undertake, but also how these practices are undertaken. More specifically, manufacturing firms are challenged to find a balance between the operationalization of the four quadrants; this is achieved by taking a number of considerations regarding first planning and successively executing each quadrant into account.



4.5.1 Planning

Table 1: Planning Sustainable Activities

Planning	Descriptions
Identify	Complementary resources and resource gaps. It is essential for manufacturing firms to develop an understanding of where they currently reside on the path towards sustainability before deciding to embark on sustainable activities. 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 on the long term. Assuring that manufacturing firms take into account not only the current investment costs but also future maintenance costs of going green 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 manufacturing firm to establish feasible ways in which to measure their sustainable achievements like the bridging of resource gaps and the development of staff competencies on the long run.

4.5.2 Executing

Table 1: Executing Sustainable Activities

Executing	Descriptions
Prioritize	Execution of activities based on paths established in planning phase. Manufacturing firm's ability to follow planned paths is a direct determinant of their ability to achieve milestones of planned success.
Activate	Actual execution of planned activities based on milestones achieved in previous quadrants. Firms 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 Q1.
Document	The results of green undertakings as established during the planning phase. This body of knowledge gathered from successes and mistakes can facilitate the learning process in manufacturing firms. Monitor progress periodically in order to ensure manufacturing firms progress are on track. Practices should continuously be adjusted as to reflect the changing needs and wants of the market. Therefore, manufacturing firms 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 manufacturing firm's progress are on track. Practices should continuously be adjusted as to reflect the changing needs and wants of the market. Therefore, manufacturing firms should also continuously reconsider the complementary resources they possess and identify new resource gaps as they become relevant.

4.6. Implications for Theory and Practice

Even though the data gathered in this research was from the manufacturing firms, 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 go green, additional insight regarding the undertakings of more manufacturing firms is necessary (Martin, 2009). Also, manufacturing firms' abilities to conduct operations is partly determined by the input of other ventures within the same industry (e.g. suppliers). Therefore, investigating further how manufacturing firms can cooperate with operators across their value chain can also provide valuable insight into the critical success factors of manufacturing firms green undertakings.

Moreover, the focus of this research has been on empowering the manufacturing firms perspectives are assumed in establishing the next steps that can be taken in order to successfully institutionalize sustainable green practices. However, the perspectives of large manufacturing firm operating in the manufacturing industry are not inquired and thus serve as a potential avenue for future research (Lager, 2017). Also, the creative ways in which governments are able to play a pro-active role in fostering the mutual behavior necessary to successfully go green needs further attention.

Furthermore, the applicability of operationalizing considerations relative to the four quadrants in the manufacturing industry are 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 for other industries will in turn contribution additional insight into the generic considerations which are true for all industries (Weaver et al., 2017).

5 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 green practices into their operations. In order to achieve this, the insights gathered from interviews with the operational managers of five manufacturing firms are presented in light of each of the three research propositions stated. Manufacturing firm's capabilities in each quadrant are then rated on scale ranging from non-existent; emerging; established to institutionalized. As a result, the considerations that manufacturing firms must take into account in each quadrant to successfully go green are identified. By integrating environmental best practices into their current operations manufacturing firms are able to cut costs whilst curbing the impact their operations have on the environment. Successfully streamlining environmental best practices into current operations challenges small manufacturing firms to identify the complementary resources they currently have to their disposition which could aid them in the process of going green. In doing so, the resource gaps in small manufacturing firms access to clean technologies also become apparent.

On the long term, however, it is their ability to bridge these resource gaps and develop the proper competencies which moderates their capability to reap the benefits associated with adopting clean technologies in manufacturing firms. Therefore, it is important for small manufacturing firms to establish coherent roadmaps to ensure the proper competencies are developed to sustain adopted technologies. Finally, it's not only about what actions small manufacturing firms undertake, but also how they go about sustainable endeavors which ultimately determines their long term success.

References (APA)

- Battisti, M., & Perry, M. (2011). Walking the talk? Environmental responsibility from the perspective of small-business owners. *Corporate Social Responsibility and Environmental Management*, 18(3), 172-185.
- Bertoni, M. (2017). Introducing Sustainability in Value Models to Support Design Decision Making: A Systematic Review. *Sustainability*, 9(6), 994.
- Carson, D., Gilmore, A., Perry, C., and Gronhaug, K. (2001). Qualitative marketing research. London, UK: Sage Publications.
- Cavanagh, S. (1997). Content analysis: concepts, methods and applications. *Nurse Researcher*, 4, 5-16.
- Dahlmann, F. & Brammer, S. (2011). Exploring and explaining patterns of adaptation and selection in corporate environmental strategy in the USA. *Organization Studies*, 32 (4), 527-553.
- Edmondson, A. C., & McManus, S. E. (2007). Methodological fit in management field research. *Academy of management review*, 32(4), 1246-1264.
- Gadenne, D. L., Kennedy, J., & McKeiver, C. (2009). An empirical study of environmental awareness and practices in SMEs. *Journal of Business Ethics*, 84(1), 45-63.
- Gunasekaran, A., & de Souza Jabbour, A. B. L. (Eds.). (2017). *Managing Organizations for Sustainable Development in Emerging Countries*. Routledge.
- Guthrie, J., Yongvanich, K., and Ricceri, F. (2004). Using content analysis as a research method to inquire into intellectual capital reporting. *Journal of Intellectual Capital*, 5, 282-293.
- Hart, S. L. (2009). *Capitalism at the cross-roads, aligning business, earth and humanity*, (2nd ed.). Philadelphia: Wharton School Publishing.
- Hillary, R. (Ed.). (2000). *Small and medium-sized enterprises and the environment: business imperatives*. London: Greenleaf Publishing.
- Hillary, R. (Ed.). (2000). *Small and medium-sized enterprises and the environment: business imperatives*. London: Greenleaf Publishing.
- Lager, T. (2017). A conceptual analysis of conditions for innovation in the process industries and a guiding framework for industry collaboration and further research. *International Journal of Technological Learning, Innovation and Development*, 9(3), 189-219.
- Lee, Y. S. & Rhee, S. K. (2007). The change in corporate environmental strategies: a longitudinal empirical study. *Management Decision*, 45(2), 196-216.
- Leonidou, L. C., Leonidou, C. N., Fotiadis, T. A. & Zeriti, A. (2013). Resources and capabilities as drivers of hotel environmental marketing strategy: Implications for competitive advantage and performance. *Tourism Management*, 35, 94-110.
- Marchi, V. D., Maria, E. D., & Micelli, S. (2013). Environmental strategies, upgrading and competitive advantage in global value chains. *Business Strategy and The Environment*, 22(1), 62-72.
- Martin, R. L. (2009). *The design of business: Why design thinking is the next competitive advantage*. Harvard Business Press.
- Nair, G.S., and Reige, A. (1995). Using convergent interviewing to develop the research problem of a postgraduate thesis. Proceedings in Marketing Educators and Researchers International Conference, Griffith University, Gold coast, Australia, 496-508.
- Nason, R. S., & Wiklund, J. (2018). An assessment of resource-based theorizing on firm growth and suggestions for the future. *Journal of Management*, 44(1), 32-60.
- Parker, C.M., Redmond, J. & Simpson, M. (2009). A review of interventions to encourage SMEs to make environmental improvements. *Environment and Planning C: Government and Policy*. 27(2), 279-301.
- Porter, M. E., & Van der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. *The Journal of Economic Perspectives*, 97-118.
- Rao, S., and Perry, C. (2003). Converging interviewing to build a theory in under-researched areas: principles and an example investigation of Internet usage in inter-firm relationships. *Qualitative Market Research: An International Journal*, 6(4), 236-247.
- Roulston, K. (2010). *Reflective interviewing: A guide to theory and practice*. London, UK: Sage.
- Tehrani, P. M. & Manap, N. A. (2014). Contractual issues of transformation technology in SME industry in Malaysia. *International Business Management*, 8(1), 39-48
- Weaver, P., Jansen, L., Van Grootveld, G., Van Spiegel, E., & Vergragt, P. (2017). *Sustainable technology development*. Routledge.
- Williams, S., & Schaefer, A. (2012). Small and medium-sized enterprises and sustainability: Managers' values and engagement with environmental and climate change issues. *Business Strategy and the Environment*, 22(3), 173-186.
- Zein, K., Wazner, M. S., Meylan, G. (2008). Best Environmental Practices for the hotel industry.