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# Integrated Strategic Supply Chain Positioning for SMEs: An Empirical Study

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# Integrated Strategic Supply Chain Positioning for SMEs: An Empirical Study


**ABSTRACT:**

**Purpose** – This paper reports on an investigation into the selection and evaluation of a suitable strategic positioning methodology for SMEs in Singapore.

**Design/methodology/approach** – The research methodology is based on critical review of the literature to identify the potentially most suitable strategic positioning methodology, evaluation and testing of the methodology within the context of SME's in Singapore, and analysis to determine the strengths and weaknesses of the methodology and opportunities for further research.

**Findings** – This paper illustrates a leading integrated strategic positioning decision making process, which has been found to be potentially suitable for SMEs in Singapore, and the process is then applied and evaluated in 2 industrial case studies. Results in the form of strengths, weaknesses and opportunities are evaluated and discussed in detail, and further research to improve the process has been identified.

**Practical implications** – A practical and integrated strategic supply chain positioning methodology for SMEs to define their own competitive space, among other companies in the manufacturing supply chain, so as to maximize business competitiveness.

**Originality/value** – This paper contributes to the knowledge of the strategic positioning decision process as well as identifies further research to adapt the process for SMEs in Singapore.



**Keywords**: Manufacturing systems, Supply chain management, Strategic positioning, Decision process, Competitive space, SME

**Paper type**: Research paper.

## 1. INTRODUCTION

Customers are becoming increasingly sophisticated in their demand for differentiated and better quality products [1] and, at the same time, the complexity of products and technologies are increasing and their functionalities expanding [2]. Given this environment, it is unusual for a single company to perform all activities from product design, production of components, and final assembly to delivery to the final user [3]. More often success depends on collaborating with other companies that have complementary competencies [4]. Hence individual companies no longer compete alone but rather as supply chains [5]. Here, it is crucial for a manufacturing company to reliably position itself in the supply chain in order to create the best possible competitive advantage. This strategic positioning decision is concerned with deciding those manufacturing activities that a company should carry out internally and those that should remain external [6]. It is associated with the firm's internal span of process, the degree and direction of vertical integration alternatives and its links and relationships with suppliers, distributors and customers [7].

The SMEs in Singapore face particular challenges from increasing competition from manufacturing in China, India and other East Asian countries. For these SMEs, their key challenges depend critically on defining their own competitive space [6] among other companies in the manufacturing supply chain, so as to maximize business competitiveness. Currently this decision has been formed in a rather fragmented manner, thus leading to sub-optimum overall performance. As a result, there is an urgent need to investigate existing methodologies and evaluate them in the context of Singapore SMEs. The research described

in this project has therefore set out to explore current processes and evaluate a leading method to see how it could be improved for use by SMEs in Singapore.

The research strategy has followed three distinct phases. First, to review the literature to identify existing methodologies related to strategic supply chain positioning for the purpose of selecting the most suitable. The second phase of the research then was to evaluate the methodology by applying and testing in two real case studies. The final phase of the research was to analyse the case study results and establish how the process can be further adapted for SMEs in Singapore.

This paper is structured to first provide a background to this topic, along with the concept of strategic supply chain positioning and an overview of previous research. The research aim and programme are then presented, and then the case studies, results and analysis are presented in turn.

## 2. BACKGROUND AND PREVIOUS RESEARCH

This section describes the background of the research starting with the industrial problem, the concept of strategic supply chain positioning is then described, and lastly followed by a review of previous research work on the strategic positioning decision making process.

### 2.1 Industrial Problem

Currently, there are about 100,000 SMEs in Singapore, both in the manufacturing and service sectors, and they are defined as companies with at least 30% local ownership, with Fixed

Assets Investment (FAI) of less than $12m, and an employment size of less than 100. These local SMEs are an important part of the Singapore economy comprising 92% of total establishments, employ 51% of the workforce, and generate 34% of the total value added. SMEs in Singapore are however not as dynamic as their foreign counterparts in other Asian countries such as Hong Kong or Taiwan, and they lag behind in productivity, management skills, marketing and technology [8]. With the opening of manufacturing and markets in China, India and other East Asian countries, the global economic landscape is rapidly changing. The SMEs are facing growing competitive pressures from low cost manufacturing locations in these countries whilst lagging behind developed nations in sophisticated high-tech manufacturing.

With both increasing competitive pressures from the low cost manufacturing countries on the one hand, and the high-tech manufacturing countries on the other, the challenge for SMEs in Singapore includes finding their most favourable strategic position in the global supply chain network. This is an important and urgent challenge for Singapore's future economic development as SMEs are a key component of the strategy to develop Singapore into a major node in global business and a total business centre [9]. Increasingly, these challenges cannot be effectively met by isolated change to specific organisational units of the SME, but instead depend critically on the dynamic relationships and interdependencies among different companies in the whole manufacturing supply chain in which they participate. Although this is a very important decision for a SME company to make, there are currently few formalized methodologies that managers can use as a guide, and as a result, this decision has been formed in a rather fragmented manner, thus leading to sub-optimum overall performance. A coordinated and holistic approach towards the decision making process is needed.

## 2.2 The Concept of Strategic Supply Chain Positioning

The concept of strategic positioning looks beyond traditional concepts, such as Make-versus-Buy and Outsourcing, by considering the interactions between manufacturing operations and the wider supply chain networks associated with the organisation. Baines et al. [6] define ‘strategic positioning’ as concerned with the process of choosing those production centred activities that an organisation should carry out internally, and those that should be external and under the ownership and control of suppliers, partners, distributors and even customers. Similarly they define ‘position’ as a statement of where a company sits within its supply chain networks and introduce a new concept of ‘competitive space’ to refer to this position. Baines et al see that the Competitive Space of a firm has four sets of interaction, namely; the upstream boundary with suppliers, the downstream boundary with customers, the infrastructure boundary, and the product range boundary. At each of these interfaces a company has choices, the outcomes of which will modify the strategic position.

There are other researchers who defined strategic positioning in supply chains and these include Hill [7], Valliespir and Kleinhans [10], and Johansen and Riis [11]. Hill [7], who is amongst the first group of researchers who defined strategic positioning, defined ‘position’ as a key strategic decision for manufacturers and is associated with the firm’s internal span of process, the degree and direction of vertical integration alternatives and its links and relationships with suppliers, distributors and customers. Valliespir and Kleinhans [10] also defined the concept of strategic positioning of a company, positioned between its suppliers and customers on its supply chain, as modifying its activity on the chain and deciding upon the

direction of the vertical integration (upstream or downstream) and limits of the extension. Johansen and Riis [11] developed a framework of three archetypal production firms and their production roles, each associated with its own unique position in the supply chain.

### 2.3 Strategic Positioning Decision Making Processes

This section reviews previous work that has contributed to the strategic positioning decision making process. This is achieved by first looking at research that takes a holistic view of all the four interfaces with the supply chain, as identified by Baines et al [6], and then also considering work that has looked at interfaces individually.

Vallespir and Kleinhans [10] developed a fuzzy logic model to support the decision-making process of a company, positioned in a supply chain, to decide and modify the scope of its activity on the chain. Johansen and Riis [11] explained the characteristics of the future industrial company and gave a framework for the strategic positioning for the future. Baines et al. [6] proposed an integrated strategic positioning decision process for guiding manufacturers to decide upon the strategic position of their manufacturing organisation. Here they provided a range of tools and techniques for forming this decision.

Research on supplier interface covers a wide range of relationship types possible with suppliers to the in-bound material supply chain. This is addressed directly under the umbrella of make-versus-buy, strategic sourcing and suppliers selection. Authors who have proposed frameworks and models in make-or-buy decisions include Jauch and Wilson [12], Buchowicz [13], Welch and Nayak [14], Bruck [15], Probert [16], McIvor et al. [17], Padillo and Diaby

[18], Humpreys et al. [19], Humphreys et al. [20], and Platts [21]. Probert [16] reported that the make-or-buy issue is of major concern within manufacturing businesses, being directly linked to the basis on which a firm chooses to compete. Probert described the development and use of a systematic approach to formulating a make or buy strategy. Research on strategic sourcing covered by writers includes Greaver [22], Quinn and Hilmer [23], Lonsdale and Cox [24], Tayles and Drury [25], Jennings [26], Barragan et al. [27], Freytag and Kirk [28], Jin [29], and Talluri and Narasimhan [30]; partnerships and relationships by Lamming [31] and Macbeth and Ferguson [32]; global sourcing by Narasimhan and Carter [33], Cavusgil et al. [34], Fraering and Prasad [35], Nellore et. al [36], Kotabe and Murray [37]; manufacturing sourcing practices by Narashimhan and Das [38], and Baines and Kay [39]. Various researchers proposed the supplier selection methods in several ways including Nydick and Ronald [40], Weber and Ellram [41], Chao et al. [42], Masella and Rangone [43], Sarkis and Talluri [44], Barla [45], Dulmin and Mininno [46], and Humphreys et al. [47].

The customer interface is covered in marketing literature by such authors as Jones and Clark [48], Christopher [49 & 50]. Another aspect of customer interface is physical distribution management channels and authors concerned include Stevens [51], Ballou [52], and Jeffries [53]; comprehensive review of major physical distribution channels by Bowersox [54] and Gattorna [55]; distribution for international market by Stock and Lambert [56]; cooperation in distribution channels by Gill and Allerheiligen [57]. The infrastructure interface deals with the capabilities, services and facilities associated with manufacture; and may for example include machinery, IT and people. The support/technology supply decision area within manufacturing companies has been investigated by such researchers as Baines et al [58] writing on technology

sourcing and generally within business by work on facilities management such as Henderson [59]. Chiesa and Manzini [60] have developed their work based upon what they see as the traditional technology management model of Hax and No [61]. Some of the processes have an alternative emphasis. For example, Frohlich [62] examines the levels of acceptance that advanced manufacturing technology faces as it passes through the various phases of implementation. Durrani et al. [63] developed a model which provides a formalised approach to technology acquisition. Li et al. [64] developed a stochastic programming model to aid manufacturing firms in making strategic decisions in technology acquisition. Baines [65] explored a wide variety of US companies to understand manufacturing technology sourcing policies. Tracey et al. [66] investigated the formulation of strategic plans that are consistent with investment in and use of manufacturing technology. Moller et al. [67] developed a framework to guide companies in developing and handling competence-based relationships with technology suppliers. Other authors who have focused their attention on the management of the technology boundary include Swamidass [68], Gerwin and Kolodny [69], Goodman and Lawless [70], Gregory et al [71], Anderson et al [72], Twiss and Goodridge [73] and Farrukh et al [74].

In summary, much of the existing research work only addresses part of the supply chain and deals with the boundary interface to suppliers, customers, infrastructure and product range independently. There are few research works on strategic supply chain positioning taking a holistic view of all the four interfaces. Furthermore, the current methodology is developed from the perspective of larger multinational companies (MNCs) and specifically for the manufacturing industry. SMEs in Singapore comprise not only the manufacturing industry but

also other industry sectors, such as the logistics industry, and they are very different in company size with more typical levels of comparative advantage. The challenge therefore remains to explore current processes, select a suitable leading strategic positioning decision process, evaluate the process in depth with SMEs in Singapore, and identify future research needed. This has then led naturally to the research described in the remainder of this paper.

## 3. RESEARCH AIM AND PROGRAMME

The aim of the research is therefore to evaluate a leading strategic positioning decision process for application to SMEs in Singapore, and from this to establish what modifications are needed to this process. In order to realise the research aim for this research project, the following research objectives have been defined:

1. Review the literature to identify the potentially most suited strategic positioning methodology.
2. Evaluation and testing of the methodology within the context of SMEs in Singapore.
3. Analysis to determine the strengths and weaknesses of the methodology and opportunities for further research.

The research aim and objectives have naturally led to a three-phase structured research programme, which is outlined as follows.

*Phase 1: review of literature and selection of methodology*

A thorough review of the literature was carried out with the purpose of identifying a suitable methodology for further evaluation and testing. To do this, this research used the

characteristics of the SMEs to select the methodology that closely matched the specific characteristics of their business. Through interviews with a few companies and information gathered, some of the guiding characteristics of SMEs for selecting the suitable methodology are: 1. SMEs need to be part of the supply chain revolution to remain competitive; 2. SMEs need guidance in the formal process of strategic planning and those that are incapable of preparing strategic plans are unlikely to be successful in the supply chain; 3. SMEs need to focus on a small number of activities and excel in one carefully defined capability and retain merely adequate capabilities in other requirements; 4. SMEs have fewer resources and can afford fewer mistakes - Decision-making capabilities are therefore more critical in SMEs than in large companies; 5. SMEs must reassess their competitive positions and those of their supply chains on a regular basis and position themselves to respond rapidly to changing conditions.

Based on these characteristics of SMEs, the integrated strategic positioning decision process provided by Baines et al. [6] was found to be potentially the most suitable for SMEs in Singapore. The strategic positioning decision process is comprised of 5 Stages that take the practitioner through a review of competitive market strategy; identifying key decision criteria; mapping the activity landscape; assessing the impact of making a change; and then consolidation of outcome. A brief outline of each of these 5 stages is described below.

*Stage 1: Scope Issues*

The first stage is about understanding how a company is competing in the market. Its purpose is to confirm a company's competitive strategy, check that any issues being raised are

consistent with this strategy, and explore any gaps that may exist between current and desired position. An issues statement is then produced.

*Stage 2: Identify Key Decision Criteria*

This stage sets out to identify a balanced and weighted set of key decision criteria that the host company usually uses to evaluate project initiatives. These criteria are termed FACTS (Financial, Attitude/Acceptability, Competence/Capability, Technological and Strategic fit), and will ensure that any proposals generated are consistent with the form that business cases take in the company. The output is a set of five balanced key decision criteria.

*Stage 3: Identify Activity Landscape*

This stage identifies all the activities (internal and external, current and emerging) that are related to the delivery of the product and services to the customer, and from these selects the activities that are most significant to the problem being addressed. On completion of this stage, all significant activities will be identified that sit within the company, along with those in the wider supply chain relevant to the 'issue statement' generated in the first stage.

*Stage 4: Assess Impact*

This stage takes the selected significant activities from Stage 3, and assesses the impact of where a change in state would improve/sustain business performance against Key Decision Criteria. The final output from this stage is a ranked list of proposed activities identified for change, in order of potential effectiveness to the business performance.

*Stage 5: Consolidate Outcomes*

The final stage is used to prepare a summary of the key outcomes from earlier stages. This provides an opportunity for a company to combine all the decisions agreed upon during the process and then provides a basis for validation and implementation.

*Phase 2: evaluation and testing of the methodology*

This phase of the research was to assess and evaluate the effectiveness of the strategic supply chain positioning methodology for SMEs in industry, through testing of the methodology in industrial applications. The overall goal of the testing was to observe the application of the methodology in practice in order to evaluate whether it is workable, to determine whether the methodology provides a practical, procedural step, and to establish future research needed to refine and adapt the methodology for SMEs in Singapore catering for different industry sectors in the real world. In order to achieve this testing in a real industry setting, case study based research design was chosen.

The case study design was based on the work of Eisenhardt [75] and the techniques outlined by Yin [76]. An important consideration in designing the study in this phase was the choice and number of companies at which to apply the process. To align with the research objective, one company from each of the 2 industry sectors of manufacturing and logistics were chosen. The data collection protocol was then based on the work of Pettigrew [77] as this helped to capture the relationship between context (different industry sectors) and process (methodology). The preference was also for high-level studies, where the decision process would be applied from start to finish by senior executives (e.g. managing director, manufacturing director, marketing

director, etc.). During this time, the three person research team would adopt the role of facilitators following the model demonstrated by Platts and Gregory [78].

To meet the objective to determine whether the methodology provides a practical, procedural step during the workshop, three sets of criteria were used to assess the prescribed methodology against the objective. These performance criteria were adopted from the work of Platts [79], and were feasibility (could the process be followed?), usability (how easily could the process be applied and followed?), and utility (did the process provide a useful output?). A short questionnaire was developed to ask a series of questions based on these criteria. This was then completed by both the senior executives and also the facilitators, at each stage of the process and on final completion. This questionnaire therefore formed the basis of the data collection protocol for each company, and the basis for reporting the outcomes of the research. In each case, the senior management were required to fully commit to a series of three workshops spread over approximately four weeks, and agree to carry out any additional data collection or analysis required between these. Section 4 of this paper describes each of these cases in detail.

*Phase 3: analysis and discussion of the results*

The case studies of phase 2 were intended to provide detailed study and evaluation of the application of the methodology and demonstrate its feasibility, usability and utility. This final phase 3 of the research was to analyse the strength, weaknesses, and opportunities of the methodology. This analysis and discussion is presented in Section 5 of this paper.

## 4. EXECUTION OF THE CASE STUDY AND RESULTS OF APPLYING THE METHODOLOGY IN SINGAPORE

### Case 1: Manufacturing Process and Measurement Equipment Solution Provider

The first study was at a company that specialises in electronics and automation and positions itself as a manufacturing process and measurement equipment solution provider. Established in 1989, this organization started with manufacturing of equipment to support the CRT industry. It has no standard product but provides services of electro-mechanical design solution for manufacturing processes and measurements, custom-build process and measurement equipment and post-sales support serving the hard disk drive media manufacturing market in Singapore. The key business of the company is in providing solutions for manufacturing process & measurement equipment. The company agreed to a series of three full day workshops, lasting over three weeks, and commencing in June 2005. These workshops were structured around the methodology provided by Baines et al [6] (2005), and were executed as follows.

*Workshop 1- Stage 1:Scope Issues*

The application of the strategic supply chain positioning methodology began with a workshop targeted solely at stage 1, where the panel was guided to review their company's competitive strategy, and identify gaps between company performance and both customer expectations and competitor performance. This initial stage was completed in two and half hours, with all members of the panel participating throughout. Here, the five steps in stage 1 provided an

overarching structure, and as the panel followed these, the key competitive issue was identified as product (equipment) price and quality conformance.

*Workshop 2 - Stage 2: Identify Key Decision Criteria and Stage 3: Identify Activity Landscape*

The second workshop focused on stages 2 and 3 of the methodology. The respective objectives of these stages are to establish a set of five balanced and weighted key decision criteria that are consistent with the company's competitive strategy and usual approach to building business cases; and then mapping the landscape of manufacturing related activities both internal and external to the company. The workshop took place over one full day, with stage 2 taking two hours and stage 3 taking three and a half hours to complete. The analysis within stage 2 led the panel to identify that the company principally assessed new initiatives and projects in terms of criteria of internal rate of return, management capability, resource capability, technical capability and impact on competitiveness.

Within stage 3, the panel carried out the analysis specified by the methodology and this was a lengthy exercise, as many manufacturing related activities were identified, and in many cases the panel decomposed these to a considerable level of detail. Nevertheless, on completion of the analysis the panel had successfully identified ten significant activities within manufacture to carry forward to the final workshop.

*Workshop 3 - Stage 4: Assess Impact and Stage 5: Consolidate Outcomes*

The third workshop focused on stages 4 and 5, and here the panel was first guided to assess the impact of change, and then to confirm and summarise the key outcomes from the complete methodology. This final workshop took four hours to complete. Stage 4 required the majority

of this time (three-and-a-half hours), as the analysis required the panel to judge how each significant activity (from stage 3), and then related activities (stage 3) would be affected if the state of ownership is changed, and to make this judgement in terms of the key decision criteria (from stage 2). The outcome of this analysis was very significant. Five key initiatives were identified, with the most critical of these being “develop technology and competency”. Currently, the company did not have significant technology and competency capability to design and develop high quality and cost effective equipment, and the outcome from this analysis was that if this infrastructure activity was strengthened, then competitiveness should be significantly enhanced. Stage 5 then led the panel to agree that the company needed to verify this decision by confirming the accuracy of the data used, and then to adopt as a priority a series of initiatives to create the develop technology and competency capability.

In terms of the overall results from this case, as corresponding with the research design outlined earlier, on completion of each stage of the decision process, each member of the panel was asked to complete a short questionnaire. This set out to assess their level of understanding, participation, and the value that individual members placed on the analysis. In addition, the research team (who had acted as facilitators throughout the workshops), gathered similar data about the panel and themselves. On completion of the final workshop, the panel was also asked directly about feasibility (could the process be followed?), usability (how easily could the process be applied and followed?), utility (did the process provide a useful output?). In this case the result was that the methodology could be applied within the anticipated timescales; that the analysis in each stage did not overly depend on facilitation and so was sufficiently easy

to apply; and that in altering the company's current sourcing initiatives it had been successful in producing a good output.

**Case 2: Third Party Logistics Service Provider**

The second study was with a third party logistics service provider. This company has clearly established itself as Singapore's premier logistics operator, specializing in a variety of logistics functions including transportation, warehousing, freight forwarding, bonded services as well as logistics management consultancy services. The company has a strong "Partner in Total Logistics" philosophy and this is reflected clearly in the development of their logistics physical infrastructure that are designed specifically to fit the needs and requirements of their customers.

The company was approached in a similar manner to the first case, and the study commenced in early August 2005. In this case, the managing director perceived the complete outsourcing of the IT system as a threat to the company and was keen for this to be explored. He wanted to drive the company to be the best and to grow and continue to develop on other inhouse capabilities, such as IT, so as to offer complete professionalism directly matching the needs of the customers.

*Workshop 1- Stage 1:Scope Issues*

The application of the strategic supply chain positioning methodology followed an identical format to case 1. The first workshop focused on stage 1, and the analysis led the panel to specify that their desired competitive strategy was greater customer intimacy. This workshop took two and a half hours to complete, and there was unanimous agreement that the desired

competitive strategy should be customer intimacy to enable the company to compete in the market. The analysis led the panel to agree on the issue statement being to develop in-house capabilities to further achieve greater service customisation.

*Workshop 2 - Stage 2: Identify Key Decision Criteria and Stage 3: Identify Activity Landscape*

The second workshop again focused on stages 2 and 3, and required three and four hours respectively to complete. Here, the key decision criteria were principally return on investment, management capability, core competences, technology capability, and strategic fit. Stage 3 led to the identification of logistics related activities, and these included, for example: “developing in-house IT capability”; “developing in-house manpower capability”; “enhancing logistics research & development”; and “providing state-of-the-art logistics solutions”. This last initiative would mean the company developing a capability to provide complete logistics solutions to compete more on service customization supported by their IT, logistics infrastructure and manpower capabilities.

*Workshop 3 - Stage 4: Assess Impact and Stage 5: Consolidate Outcomes*

The third and final workshop took just two hours to complete stage 4 and a half-hour to complete stage 5. From the analysis in stage 4, it became apparent that the strongest initiative was “developing in-house IT capability”. Stage 5 then captured the subsequent actions and responsibilities for further validation and implementation of the four strongest initiatives.

The overall results from this second case matched closely to those gained from the first study. The assessment process was identical, with responses of the panel and facilitators being gathered after each stage and on completion. Again the result was that the decision process

could be applied within the anticipated timescales; that the analysis in each stage did not overly depend on facilitation and so was sufficiently easy to apply; and that in altering the company's current sourcing initiatives it had been successful in producing a good output.

## 5. ANALYSIS AND DISCUSSION

This section describes objective 3 of the research programme. The purpose here was to analyse the case study results in a structured form. First the strengths of the methodology are considered, followed by the analysis of the weaknesses, and finally opportunities for new research will be described.

### 5.1 Strengths of the Methodology

From the case studies, we can observe that there are quite a number of strengths in the methodology provided by Baines et al [6]. First, as a whole, the methodology is very comprehensive and systematic comprising of five stages; stage 1 - scope issues; stage 2 – identify key decision criteria; stage 3 – identify activity landscape; stage 4 – assess impact; and finally stage 5: consolidate outcomes. With these five stages, it is structured to consider holistically and simultaneously the strategic supply chain positioning decision from the view of the manufacturing operation and the four interfaces with the wider supply chain networks. The methodology also considers that the activities in a company and its supply chain are dynamic in nature and have emerging, mature or declining capabilities that will change as time goes by. Finally, the methodology provides a link from the decision about the activity ownership to the competitive strategy of the company to identify its competitive space.

Second, each of the stages also has their own unique strength. Stage 1 provides a useful set of key criteria to help companies identify their competitive strategy, be it operational excellence, product leadership or customer intimacy. For stage 2, the process provides a balanced and weighted set of quantitative and qualitative decision criteria that will be used for the evaluation of proposed changes generated by the strategic positioning analysis. Similar to stage 1, stage 2 also provides some initial suggested factors in each of the decision criteria to guide a company in their decision process. In stage 3, it provides a generic approach in identifying significant activities from all aspects of a company's possible competitiveness. In addition, the methodology goes further to identify their key enabling related activities. And finally, the methodology is also designed so that it takes a dynamic view of the activity landscape and captures not only mature activities but also emergent and declining activities. This is very important as it would otherwise be possible to miss out growing influences in the market place or to waste time considering activities that will not be prevalent in the future. In stage 4, the process provides a ranked listing of those where a change in ownership (such as outsource, insource) or change of state (such as grow, strengthen or eliminate need for) would have a positive benefit to the business performance, as detailed in the stage 1, by defining the condition of the SAs using a form of SWOT analysis and then deciding the most appropriate action that could be taken to improve the issue scoped. This stage also provides a detailed qualitative impact analysis using the Key Decision Criteria (and their relative weightings).

### 5.2 Weaknesses of the Methodology

In the application of the methodology, we have also noted a number of weaknesses of the decision process. First, on the whole, the methodology is developed mainly for the manufacturing companies and not for companies in other industries such as logistics. During

our case study with the logistics company, changes and close discussion and guidance featured heavily during stages 1, 2 and 3. In addition, the methodology is developed from the perspective of larger multinational companies (MNCs) and not specifically for the SMEs. Unlike the MNCs, the organization of the SMEs are quite different and are comparatively small and flat in structure, which means that they require the methodology to cater for the company as a whole instead of individual SBU or product type. Another weakness is that the methodology is dependent on the skills and experience of the facilitators as well as the panel members. This is especially so during stage 3, to guide the practitioners to map the organisation to an appropriate level of detail, and during stage 4 where the facilitators guided practitioners to judge impact assessments carefully.

Second, for the various stages within the process itself, there are also weaknesses. In stage 1, as explained previously, the key criteria for identification of competitive strategy largely cater for the manufacturing companies. Several key criteria need to be modified to suit companies in other industry sectors. This is also the case with stage 2 where the quantitative and qualitative decision criteria need to be modified, although to a lesser extend.

For stage 3, the main weakness is the overly time consuming task required to map the manufacturing related activities, both inside and outside the organisation, that may in some way be relevant to the issues being addressed. Considerable time is needed to conduct this analysis, and strong facilitation appears very important if the panel is to avoid becoming overwhelmed by detail. Again, the suggested activities in the methodology are all manufacturing activities and efforts are needed to change those activities for other industries.

For activity mapping, the guideline provided to map according to internal and external activities for the 4KBAs of suppliers, customers, infrastructure and product range may not be directly obvious to the people from industry. Also there is no structured multi-level method to guide the panel members to look at activities in the company systematically one level at a time and to link significant activities to related activities. Within the decision aid, the infrastructure boundary is open to misinterpretation and is difficult to map, it is not clear what should be included under this banner (e.g.: technology, human resources, information, knowledge) and how it should be dealt with. Other weaknesses for stage 3 include mapping the product range and the down stream boundary and, in particular, distinguishing between products and services.

### 5.3 Opportunities to Improve Methodology

The opportunities to improve the methodology can be derived from the analysis of the strengths and weaknesses outlined in the previous sections. There are a number of opportunities that exist to improve the efficiency and effectiveness of the strategic supply chain methodology. First, overall, the structure of the methodology can be simplified to cater for the SMEs and for different industry sectors, other than just for manufacturing. Second, for changes to the individual stages, as discussed earlier, stages 1, 2 and 3 require some modifications as they are not generic in terms of industry sectors and maybe could be streamlined if some form of generic key criteria, decision criteria and activity map could be proposed. A generic map would contain the common criteria and activities and more unusual criteria and activities could be added specific to a particular company or industry sector. Perhaps the generic map could exist in the form of SCOR models to assist in systematically

looking at activities one level at a time. Finally, there are also opportunities to further integrate the methodology with other alternative operations strategy or analysis techniques.

## 6. CONCLUSIONS AND FUTURE RESEARCH

*Concluding remarks*

This paper has illustrated the challenges facing SMEs in Singapore and the critical need for a coordinated and holistic approach towards the decision making process in the form of an integrated strategic supply chain positioning methodology to help them define their competitive space so as to maximise business and survive the global competition. From the literature review, the integrated decision process provided by Baines et al. [6] was found to be potentially the most suitable for SMEs in Singapore, but the challenge was to evaluate and test the process with SMEs and to identify future research to fit the methodology more closely for use by SMEs in Singapore. To do this, the process was then applied and evaluated in 2 industrial case studies. Results of the case studies were analysed and the strengths, weaknesses and opportunities were evaluated and discussed in detail. Further research to improve the effectiveness of the strategic supply chain positioning methodology to suit the SMEs in Singapore will be discussed in the next section.

*Future research initiatives*

As evident from the analysis of the results from the case studies, a few of the weaknesses of the current methodology have been identified which have opportunities for future research initiatives. These can be summarized into two main sets of research. Firstly, further research is needed to simplify the overall structure of the methodology to cater for the SMEs as well as

make it applicable for different industry sectors, like the logistics industry. In addition, the methodology needs to be made more generic and undergo further testing to confirm generic reliability so that it does not depend on the skills and experience of the facilitators. Secondly, at the individual stage level, further research is needed to explore some form of generic key criteria, decision criteria and activity map for stages 1, 2 and 3 respectively in terms of catering for different industry sectors. For a generic activity map, some form of modelling methods, like a SCOR model, also need to be studied and suitable models selected to assist in the systematic mapping of activities at different levels. Other research initiatives would include integrating the methodology with other alternative operational analysis techniques. With these future research initiatives identified, there will be further refinement of this work and look forward to reporting on progress.

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