

## DEVELOPMENT AND EVALUATION OF A RESOURCE-BASED SUPPLY CHAIN POSITIONING METHODOLOGY FOR SMEs

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### ABSTRACT

Understanding the sources of sustained competitive advantage has become a major area of research in strategic management. For the long term success of a firm, it must not only pay attention to the rapid changes in the marketplace but also to its internal strength. This research develops the methodology for resource-based supply chain positioning and applies it to five industry case studies with five SMEs in Singapore. Based on their feedbacks on the feasibility, usability and usefulness of the methodology, refinement is then made to the methodology. The final refined methodology can help the decision makers of firm in the industry to formulate their strategy based on both critical resources and significant activities to cope with the dynamic market changes. This methodology is intended to help SMEs in Singapore, which have various resource constraints to consider in order to compete successfully in the marketplace.

### KEYWORDS

Supply Chain Positioning, SMEs, Singapore

## 1. Introduction

The resource-based view (RBV) of the firm is one of the latest strategic management concepts which is enthusiastically embraced by researchers. According to the resource-based theory, which has its roots in economic theory (e.g., Penrose, 1959) and early strategy theory (Selznick, 1957; Ansoff, 1965; Andrews, 1971), the long-term competitiveness of a company depends on its endowment of resources that differentiate it from its competitors, that are durable, difficult to imitate and substitute (e.g., Grant, 1991; Peteraf, 1993; Collis and Montgomery, 1995; Manoney and Pandian, 1992; Barney,

1991; Prahalad and Hamel, 1990 and 1994; Stalk et al., 1992, Amit and Shoemaker, 1993; Porter, 1991).

From the perspective of RBV, the firm is regarded as a unit; a single, organized group of heterogeneous assets that is created, developed, renewed, evolved and improved with the passage of time. The acceptance of the concept of the firm as a unit of resources and capabilities has prompted interest in identifying the nature of these varying resources and in evaluating their potentials for generating profits. This heterogeneity in the firm's assets appears as the central factor in explaining varying performance between one firm and another. For this reason, the RBV gives special attention to studying the factors that cause these differences to persist (Grant, 1991; Mahoney and Pandian, 1992; Amit and Schoemaker, 1993; Barney, 2001). The diverse nature of resource is an essential element in the development of firm competitive strategy and also plays a key role in the organizational structures.

### 1.1 Background

With the global manufacturing, most of the SMEs in Singapore face the challenge with increasing competition from manufacturing in China, India and other East Asian countries. For these companies, their key challenges depend critically on defining their own competitive space among companies in the manufacturing supply chain so as to maximize business competitiveness. But, 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 develop and provide a strategic supply chain positioning methodology for SMEs in Singapore to enable them to achieve higher profitability

to keep Singapore on the competitive edge in this ever-changing economy.

## 1.2 Objective

Much of the existing research work in strategic supply chain positioning methodologies are analysed and developed from the perspective of larger multinational players (MNCs) and specifically for the manufacturing industry. In addition, majority of these research works only address part of the supply chain and deals with the boundary interface to suppliers, customers, infrastructure, and produce range independently.

Therefore, the research objective of this project is to review the literature to identify existing methodologies related to strategic supply chain positioning for the purpose of developing the resource-based supply chain positioning methodology, evaluate and test the methodology with five case studies in Singapore, refine and develop the final methodology for SMEs in Singapore so that they can achieve sustainable competitive advantage in the global marketplace.

## 1.3 Scope

To realize this research objective, the following research scope of work comprising five phases has been defined:

### **Phase 1: Literature Review to identify existing methodologies related to Strategic Supply Chain Positioning Methodology**

This is not only the first part but also the foundation of the research. In this section, reviews on numerous papers written by well known authors in strategic supply chain positioning methodology are illustrated in detail. In addition, reviews on Resource-based View (RBV) are also carried out as these concepts and methodologies are very relevant to SMEs. These reviews cover the definition of resources, resource categories, resource evaluation, and resource based methodologies by various authors. Based on the literature review, the new resource-based supply chain positioning methodology was developed in the next phase.

### **Phase 2: Development of the Resource-based Supply Chain Positioning Methodology**

The development process of the new resource-based supply chain positioning methodology is based on the literature review. During this phase, the complete

methodology is constructed and then applied in five practical case studies in the next phase.

### **Phase 3: Evaluation and Testing of the Methodology in Industrial Case Study**

In order to show the robustness of the methodology for implementation in real industry environment, evaluation and testing are needed to put the methodology into practice. With regard to the main research aim, the methodology is applied to five case studies involving Singapore firms whose executive are willing to achieve improvement for their firms.

### **Phase 4: Analysis and Discussion**

During the testing of the methodology in the real industry firms, several analysis and discussion sessions with the managers and executives are held and their feedbacks are carefully collected. The strengths and weaknesses of the methodology are thoroughly analyzed. Furthermore, the feasibility, usability and usefulness of the methodology are examined with the panel members.

### **Phase 5: Refinement and development of the final Resource-based Supply Chain Positioning Methodology**

To improve the methodology further, the solutions to overcome the weakness are searched and action of refinement is taken. At the end of this phase, a New Resource Based Supply chain Positioning Methodology is successfully and completely developed which can be used in the real industries.

## 2. Literature Review

The field of strategy has taken shape around a framework firstly conceived by Kenneth Andrews in the now-classic book - "The Concept of Corporate Strategy". Andrews characterized the role of a strategy as one of directions for which a firm can do within the universe of what it might do.

This section reviews previous work that has contributed to strategic supply chain positioning decision making process as well as resource-based view. This is achieved by looking at research on strategic supply chain positioning that takes a holistic view of all the four interfaces with the supply chain, as identified by Baines et al (2005), and well known research on Resource-based view.

## Phase 1: Objective and Method

The objective of this section is to explore and review some of the well-known research on strategic supply chain positioning and resource-based theory for sustainable competitive advantages. This section starts with the review on strategic supply chain positioning. This is then followed by review on resource-based view (RBV) with a brief introduction of the RBV and shows the definition of the resources and its categories. Capabilities of firm are introduced before evaluation criteria are explained and then followed by previous methodologies by different researchers in the last section.

### Strategic Supply Chain Positioning

The concept of strategic supply chain 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. (2005) define 'strategic positioning' in the supply chain 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.

Hill (1993), who is amongst the first group of researchers who defined strategic positioning, define 'positioning' 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 (2001) define 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. They stated that during any strategic development, a company has to assess whether

the position of the company inside the supply chain is best, as the position of the company is not perpetual.

Johansen and Riis (2005) define a framework that comprises of three inter-related levels, three archetypal production firms and their production roles, each associated with its own unique position in the supply chain. At level one, the interactive firm is characterised by three distinctive attributes: knowledge and learning, cross-functional relationships and networks. Level two serves to cement the company's role and position in the supply chain. More specifically, this level posits three archetypal production types, each associated with its own, unique position in the supply chain, and consequently highlights the use and relevance of different interactive elements. Finally, the last level is back to the designation of five different strategic production roles an industrial firm should consider.

Clearly, from the definitions given by various authors, strategic supply chain positioning focuses on production activities and includes not only the company itself but also the interactions to other operations in the supply chain networks. Whilst the other authors considered only certain aspects of the interactions to the supply chain networks like suppliers, customers and pre-defined types of position for a company, Baines et al. (2005)'s strategic supply chain positioning take a more complete and holistic view of the organization and the supply chain with four sets of interaction with the supply chain, namely suppliers, customers, infrastructure and produce range. Hence, this research adapted Baines et al. (2005)'s work on strategic supply chain positioning to develop the resource-based supply chain positioning methodology

### Resource-Based View

According to the resource-based theory, the long-term competitiveness of a company depends on its quality of resources that differentiate from its competitors. Those resources must be superior, durable and difficult to imitate or substitute by its competitors. The following survey describes methods for identifying and assessing resources and competences and devises refinements which will be used in the methodology. The next few sections will present the Resource definition, Resource Classification, Resource Identification, Capability Identification, Resource Evaluation and Resource-Base View Methodology.

## Resources Definition

Different researchers proposed different definitions of resources from their own point of view, and these definitions vary from the very broad to the very specific. Grant, Robert M (1991) defined resources as the basis for corporate profitability; they are inputs into the production process and the basic unit of analysis, as few resources on their own is productive.

David J. Collis and Montgomery (1991) defined resources as different collections of physical and intangible assets and capabilities. These assets and capabilities determine how a company performs its functional activities.

Mill J. and Ken Platts (2003) stated in "Competence and resource architectures" and "Applying resource-based theory" that a firm's resources at a given time could be defined as those tangible and intangible assets which are tied semi-permanently to the firm.

Cliff Bowman mentioned that resources are entry assets that are common to all. Strategic assets are specific to the firm, and they either help the firm win business, or they assist in the delivery of products or services at lower costs than competing firms.

Barney (1991) defined resources as a bundle of assets, capabilities, organisational processes, firm attributes, information and knowledge. Resources are firm-specific assets which are difficult, if not impossible, to imitate. Patents, trademarks, certain specialized production facilities and experienced engineers are examples. Such assets are difficult to transfer among firms because of transaction costs and because the assets may contain tacit knowledge (Teece, Pisano and Shuen, 1992).

Black, Janice A (1994) defined resources as those that are theoretically characterized as valuable, rare, neither imitable and/or substitutable. But Amit and Raphael (1993) have a different view and defined the firm's resources as stocks of available factors that are owned or controlled by the firm. Fahy and Smithee (1999) see resources as strategic assets in three categories such as tangible, intangible and capabilities.

Therefore, we can make a conclusion that resources are primary infrastructures for the value creation of a firm. It consists of a bundle of potential services, for the most part, that can be defined independently of their use.

## Resource Classification

Resources come in many forms, from common factor inputs that are widely available and easily purchased in arm-length transactions, to highly differentiated resources; like brand name, that is developed over many years and is very difficult to replicate. Several resource level categorizations recently have been presented in the literature. Barney (1991) proposed that resources include all assets, capabilities, organizational processes, firm attributes, information, knowledge and etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness. He then grouped all firm resources into three categories: physical capital resources, human capital resources and organisational capital resources. Grant (1991) lists six categories of firm resources: financial, physical, human, technological, reputation and organizational.

Hofer and Schendel (1978) classified the resources as follow: focus of financial deployments, physical resources, human resources, organisational systems and technological capabilities. Cliff Bowman suggested five categories of strategic assets which are tangible assets, system assets, cultural assets, knowledge assets and relational assets. John Mills and Ken Platts go even further - tangible, knowledge, skill and experience, system and procedural resources, cultural resources, network resources and resources with potential dynamic capability.

Graham Hooley and Amanda Brokerick proposed assets instead of resources as physical, financial, operations, human, marketing, legal, and systems assets. Collis & Montgomery categorized simply as physical, intangible and organizational capability while Rangone mentioned financial, physical human, organizational, skills, know-how and competencies and reputation.

Later, participants, usually in a facilitated group (Lewis, 1995; Marino 1996; Mills and Lewis, 1997), brainstormed the resources underpinning the activities within the unit of analysis chosen. Most researchers used a set of resource categories to help prompt participants to think of different resource types and so improve the comprehensiveness of the resources identified. Lewis (1995) used the categories "tangible resources", "skills, knowledge and experience" and "systems". Marino (1996) used the categories "physical" (e.g. plant, equipment and finance), "human" (e.g. skills and experience), and "organizational" (e.g. reputation and internal systems).

## Resource Identification

Resource identification can be approached from two generic perspectives (Coates, 1996): Top-down and Bottom-up. The unit size of analysis also affects the level of the detail resources; more detail can be addressed in smaller units of analysis. The larger unit of analysis will be carried out by a small group of senior managers taking a top-down perspective. Top-down approach is applied in this research.

## Capabilities Identification

Besides resources, some authors identified another important value of the firms that they called "Capability" or "Activity". Grant and Robert M. (1991) supposed that "Productive activity requires the cooperation and coordination of teams of resources. Capabilities of a firm are what it can do as a result of teams of resources working together. Capability is, in essence, a routine or a number of interacting routines. Organization itself is a huge network of routines. Routines are to the organization what skills are to the individual. Winter (2000) assumed that organizational capability is a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type.

John Fahy & Alan Smithee proposed that capabilities encompass the skills of individuals or groups as well as the organizational routines and interactions through which all the firm's resources are coordinated. John Mill & Ken Platts defined capabilities in more detail than others in that capabilities were superior business processes like supplier management, or new product introduction, rather than principally related to product technologies. They include:

- Corporate level
- Business level
- Group and Individual level
- Resources + Coordination = Services
- Services + Coordination = competence(s)
- Competence(s) + coordination = higher level competence(s)

However, apart from the above authors, David J. Collis and Cynthia A. Montgomery considered organizational capability as a resource. Amit and Raphael identified that capabilities refer to a firm's capacity to deploy resources, usually in combination, using organizational processes, to affect a desired end. On the other hand, Rangone (1999) classified capabilities into three basic groups, such as

innovation, production and market management capability. Firm can get sustainable competitive advantage based on these capabilities.

## Resource Evaluation

Besides categorizing the resources, it is also important to evaluate the resources. How do we know the resources are valuable? By what kind of criteria should we measure the value of the resources more efficiently?

One of the principal insights with the resource-based view is that not all resources are of equal importance, in fact, there is no need to consider all resources possessed by a company, but only focus on the critical (or strategic) resources, i.e. those that are the basis of the company's sustainable competitive advantage relative to those of competitors. To determine such resources, different researchers have proposed their own evaluations.

Grant, Robert M, 1991 suggested that the resources must have sustainability and appropriability. Sustainability can be determined by the Durability (Is it durable?), Transparency (Is it difficult to identify and understand by other competitors?), Transferability (Is it difficult to transfer to other competitor?), Replicability (Is it difficult to copy?) of those resources. And the Appropriability is the clear ownership and control upon that resource.

Rangone, Andrea, 1999 introduced the tests. According to his method, there are a number of tests to determine the critical resources as following:

- Competitive superiority test
- Imitability test
- Duration test
- Appropriability test
- Substitutability test

John Mill & Ken Platts (Competence and resource architectures) mentioned the performance of any competence at any hierarchic level depends on the following six factors:

- The health of its resources (e.g. a machine's state of repair, or a human's motivation);
- The appropriateness of its resources to the services required (e.g. how a human's skill, experience and training matches the particular service required);
- The co-ordination of the resources (which result in much of the details of the competence outputs and much of the performance of those outputs);
- The performance of sub competences which act to develop co-ordination aspects or resource health and/or appropriateness;

- The priority given to the activity, particularly where shared resources are involved;
- How often the competence is exercised (practice helps).
- Appropriability
- Durability
- Overlap with strategic industrial factors

Amit, Raphael considered eight factors to consider in resource evaluation processes.

- Complimentary
- Scarcity
- Low tradability
- Inimitability
- Limited sustainability

Collis and Montgomery mentioned that resources cannot be evaluated by isolation, because their values are determined in the interplay with market forces. For a resource to qualify as the basis for an effective strategy, it must pass a number of external market tests of its value. He mentioned the tests of inimitability, durability, appropriability, substitutability and competitive superiority for resource evaluation process.

Lewis evaluates resources with three main groups which are value, control and mobility and each group has three sub criteria; importance, tradability and scarcity for value, maintenance, durability and imitability for control and versatility, complementarity and codification for mobility, respectively.

Cliff Bowman said the critical resources should be Valuable, Rare, Inimitable and Non- substitutable. The critical resources that we differentiate from ordinary ones must be significantly valuable and rare. And also, if it is imitable and substitutable by other competitors, our strategic “values” will not be long-lasting and we will not be ahead of others in the race. The view of Barney is the same as Cliff Bowman, Amit; Raphael evaluated the resources by the facts: “Complimentary”, “Scarcity”, “Low tradability”, “Inimitability”, “Limited sustainability”, “Appropriability”, “Durability”, “Overlap with strategic industry factors”.

### Resource-Base View Methodology

Resource-based view has become a significant approach for strategy management since Wernerfelt highlighted how a department using unique and idiosyncratic organizational resources to sustain superior performance. Different kinds of strategy formulations from the point of resource-based view were proposed by different researchers since that time.

Grant (1991) implemented the methodology which includes five stage procedures for practical applying resource-based theory as shown in figure 1.

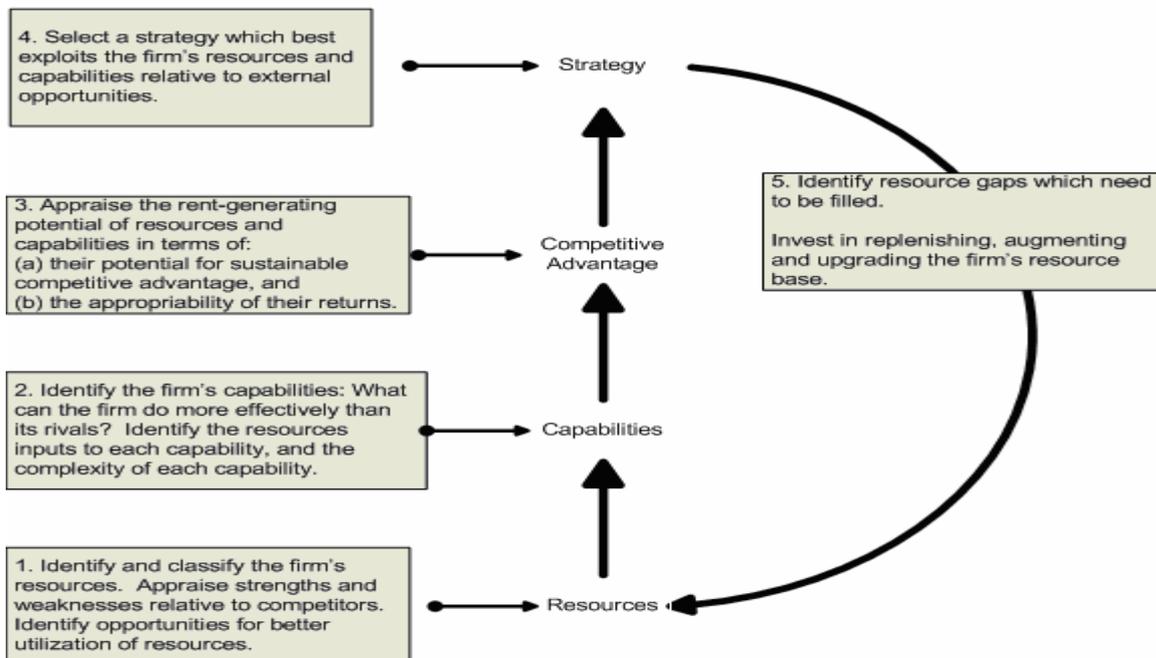


Figure 1: Resource-Based Approach Framework by Grant

Rangone proposed that approach to strategy analysis for small and medium enterprises (SME) involving the following major steps:

- Define the company's key performance(one or two)
- Identifying resources influencing key performances, major activities and relevant resources for each key performance
- Assessing the strategic value of resources
- Assess the strategic consistency of resources
- Generating strategic options.

John Mill & ken Platts (2003) proposed the following five steps for the resource analysis:

- Choose a strategically important unit of analysis and the analysis direction
- Educate participants in RBV ideas, using a slide presentation and discussion with interviewees.
- Create a pictorial history of the past events, changes and assumptions relevant to the unit of analysis.
- Use the history and resource category prompts to brain storm a list of resources underpinning activities in the unit of analysis.
- Evaluate the resources.

Cliff Bowman proposed the method with the first step is "Consolidation" and the second step is as "Leveraging existing assets" that includes:

- Extending operating systems
- Extending financial control systems
- Extending cultural assets
- Leveraging know-how
- Extending strategic insight

The third step is "Developing new assets" and includes: "Experiments and pilot tests", "Acquiring assets", and "Augmenting assets".

### 3. Development of the Methodology

The development process of the new resource-based supply chain positioning methodology is based on the literature review. In this section, the complete methodology is constructed.

#### Phase 2: Objective and Method

The objective of this section is to describe the development of the resource-based supply chain positioning methodology. After reviewing many methodologies from different researchers, the new resource-based supply chain positioning methodology is developed. The various stages of the methodology are illustrated in this section, and are mainly based on Baines et al. (2005)'s strategic supply

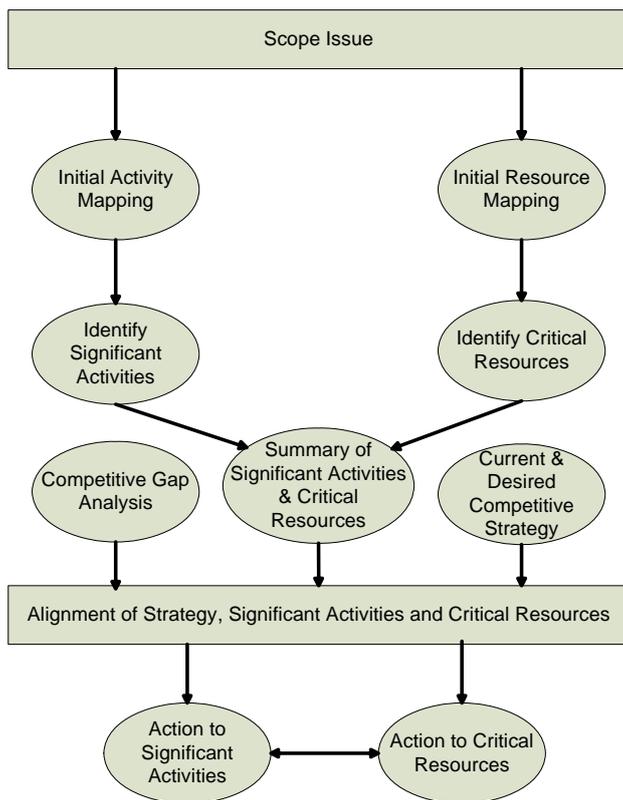
chain methodology as well as the various points of view of RBV to identify and evaluate the critical resources, and making strategic decisions.

#### Synthesis to Create New Resource-based Supply Chain Positioning Methodology

For developing the new methodology, first of all, it is necessary to define the scope issue for a particular company and its main customers, suppliers, products and competitors. Secondly, identify current resources and activities of the company and then select the critical resources and significant activities. Next, examine current strategy and vision for future. Then, we can analyze the customer gaps as well as the gap with competitors. So, we can find out the actions to be taken to meet the customer requirements or beyond their requirements. Finally, based on the previous facts, actions can be taken based on critical resources and activities. The detail methodology is described step by step in the following section.

#### Description of New Resource-based Supply Chain Positioning Methodology

As shown in figure 2, the main framework of the methodology starts from the scope issue of company and two concurrent mapping processes: Initial activity mapping and initial resource mapping. After mapping, the significant activities and critical resources are identified, and then summarize the significant activities and critical resources. At the same time, competitive gap analysis and current & desired competitive strategy tables are filled by the company panel members and all are aligned in a table to get a clear view for strategy positioning. Lastly, required actions are taken for the critical resources and significant activities for the benefit of the company.



**Figure 2:** Framework of Resource-Based Supply Chain Positioning Methodology

### Stage 1: Scope Issues

The first step of the methodology is to identify which part of the organization will be analyzed for the project. There are many parts in the firm that need to be reviewed, but the management team sometimes want to focus on only certain particular activity or department more related to competitive strategic decision.

The output of the first stage is to come up with an Issues Statement that specifies which areas of the organization are being analyzed and any alterations that need to be carried out within an organization's operations. Then, the managers should define their products and customers; hence a clear business area can be identified. Moreover they should reflect some over-riding issues and current challenges.

The purpose of Stage 1:

- Specify which products/services/parts of the organization will be analyzed.
- Understand current organization situation and desire situation in the future.
- Ensure that an Issues Statement for the review of competitive position is agreed that aligns with the

gap between the current and desired competitive positions.

### Stage 2: Identify Activity and Resource Landscape

After describing the scope issues, an unfiltered landscape of activities and resources are required to be outlined to get a clear vision of the supply chain system of the firm. Activity landscape can be easily mapped including processes from the suppliers to the customers, but several meetings with management team may be required to get the resource landscape especially in intangible resource because of its invisible nature.

The output tables explain the firm's process flow and related resources which are utilized in each activity. There are 2 sections in Stage 2:

- Section 2.1: Identify Initial Activity Map
- Section 2.2: Identify Initial Resource Map

### Stage 3: Identify Significant Activities and Critical Resources

Stage 3 aims to provide a landscape of Significant Activities and Critical Resources by evaluating Stage 2. Firm may have plenty of activities which makes it difficult to analyze in detail respectively. Hence, not more than 10 activities are taken out as significant activities which are more important than others recommended by the panel members. Similar to significant activities, critical resources which are the core of the firm, are also evaluated by them.

There are 2 sections included in Stage 3:

- Section 3.1: Identify Significant Activities
- Section 3.2: Identify Critical Resources

### Stage 4: Competitive Strategy Review

The objective of stage 4 is to understand, firstly, what the firm's current strategy is and the desired strategy in the future. By analyzing current and desired strategy trends, panel members can easily distinguish common ideas of required actions to meet the strategy. The competitive gaps analysis is made to understand where any gaps exist between what you achieve and what your customers want and your performances compare with competitors. Stage 4 comprises of the following 2 sections:

- Section 4.1 - Identify Current and Desired Competitive Strategy
- Section 4.2 - Competitive gap analysis

### **Stage 5: Alignment Check between Performance and Strategy**

In stage 5, the alignment check is then carried out considering the strategy, significant activities, critical resources and competitive gaps. From these worksheets, the managers can easily notice whether the firm's distinctive resources and activities enhance the strategy in order to get sustainable competitive advantage. Moreover, the required changes can be implemented to minimize the gaps compared to competitors and customers' requirements.

The following 2 sections are included in Stage 5:

- Section 5.1- Alignment of Strategy and Significant Activities and Critical Resources
- Section 5.2- Alignment of Competitive Gaps and Strategy

### **Stage 6: Formulate Strategy**

At this stage 6, all of the analyses would have been completed and the panel members would have obvious idea about the actions to be taken regarding the resources and activities. Here, for long term success of the firm, actions will be reflected on significant activities and critical resources. (In performing this stage, it is important to remember that new decisions and issues from previous stages may have arisen which may not have been noted.)

The following 3 sections are included in Stage 6:

- Section 6.1- Action Analysis for Competitive Gap from Significant Activities View
- Section 6.2- Action Analysis for Competitive Gap from Critical Resources View
- Section 6.3- Summary of Action Analysis

## **4. Evaluation and Testing of the Methodology**

The previous section developed the new resource-based supply chain positioning methodology. The focus of this section is to evaluate and test the methodology in the five real industry cases. The structure of this section is presented as follow: section 4.1 describes the objective and method for realising this stage; an overview of the evaluation and testing of the methodology in five companies is presented in section 4.2. The results of the case analysis are discussed in section 4.3.

### **Stage 3: Objective and Method**

The objective of this part of the testing stage is to test the resource-based supply chain positioning methodology in five real case studies from various industries, to gain an in-depth understanding of how well the methodology works,

and how it carries out the decisions and actions of senior executives in the company, so as to test the feasibility, usability and usefulness of the methodology for SMEs in Singapore. To achieve a rigorous testing, a direct involvement of the researcher is required. To ensure that the methodology is practical, useful and relevant to the practitioners, the two research methods of case study and participant intervention research are adopted.

### **Research Method and Evaluation Criteria**

The type of research method for this stage of the research is discussed in this section. A case study method with the researcher intervention was employed for this part of the programme. This section will evaluate the test the methodology in five case study companies belonging to various industries, and with different firm's resources.

The goal of the evaluation and testing is to test the use of the methodology, and to establish whether it is feasible, usable and useful in the participant companies. The evaluation research design includes the method for the assessment framework and the evaluation with the companies, case analysis and action to be taken. The process is the application of the six-stage resource-based supply chain positioning methodology in a series of case domains. The output/outcome from the process is two-fold: a desired future strategy and action taken for the critical resources and significant activities.

To enable a valid evaluation, the methodology assessment framework is applied to test feasibility, usability and usefulness in individual case study company.

### **Data Collection Structure**

This section set out the objective of this part of the research and discussed the methods used to realise the objective. The application of the methodology in five case study companies will be presented in the next section.

The methods used to collect data are described in this section. To meet the objective to determine whether the methodology provides a practical, procedural step during the evaluation and testing period, three sets of criteria were used to assess the prescribed methodology against the objective. These performance criteria were adopted from the work of Platts (1993), and were feasibility (could the process be followed?), usability (how easily could the methodology be applied and followed?), and usefulness (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. Observations were made through various research instruments, namely: discussions with the panel members by face to face meetings, responses from questionnaires, observation checklist notes, personal diary and debrief session notes. The benefit of these multiple sources of evidence is to enable triangulation (Denzin, 1970).

### Overview of Case Study Companies

An overview of the five case studies is presented in this section. Each case study provided a useful and different perspective of the business and strategic positioning in the supply chain.

Case 1 is a machine tool maker SME, having regional support network and serving the regional markets. By producing machines close to the market, Case 1 company understands what the customers want and provide the best after sales services and support to the customers in the regions, now and in the future.

Case 2 is a SME contract manufacturer in the metal machining industry, supplying various kinds of metal accessories to different customers. The company is manufacturing various kinds of sheet metals by drilling, milling, grinding, shaping, coating and etc., to fulfil customer requirements. They provide its customer with hundred percent satisfactions by applying on-time delivery with the introduction of full quality and reliable products. Currently, its main target market is metal accessories mainly for oil and gas industry both in Singapore and overseas.

Case 3 is another SME contract manufacturer with several subsidiaries strategically located in 3 countries: Singapore, China, and Malaysia, with the headquarter in Singapore. Its strong commitment to research and development has enabled the company to advance as one of the region Burn-In system builders with very impressive results. Through its subsidiary companies, the company offers many types of services including Traditional Burn-in Testing, Electrical Testing, Programming, Stabilization Bake and Finished Goods Distribution.

Case 4 is a SME distributor company established in 1987, and is today one of the region's leading distributors of high quality mobile and industrial hydraulic components. The company is mainly a distributor for products which are used

in a wide range of industries including construction, manufacturing and marine, and currently has branches in Malaysia and Thailand.

Case 5 is a SME tankage engineering company in Singapore based company and it provides the full spectrum of maintenance, procurement, construction and engineering services to oil and gas, petrochemical and pharmaceutical industries. The company has established a strong presence throughout the Asia Pacific region. Tankage Engineering is its key product and service area and the company wants to increase its growth in tankage engineering solutions and services in the petrochemical and oil field industries.

Having given an overview of the applications, the results of the evaluation and testing are presented and analysed in the next section.

### Results of the Evaluation and Testing of the Methodology

After the evaluation and testing of the methodology in five case study companies, the next stage is to verify whether the results meet what is expected: feasibility, usability and usefulness. In this section, the results from case 2, case 3 and case 4 are selected as participant companies for presented instead of all the five participant companies. The methodology and assessment procedure yielded rich data, which is structured around all the steps of the new methodology. In this section we only discuss the post reactions of the new methodology.

### Reactions to the Methodology Assessment

The purpose of the assessment was to provide a way of recording the overall performance of the methodology on all the criteria established for the assessment of the methodology. Quantitative questions were rated on a 5 point scale (5 being very, 1 being not at all and 3 being don't know). Where zero is shown, this indicates no response was given. The total percentage for each criterion is calculated as follows: the sum of average for each criterion is divided by the total number of questions and respondents. The following presents the results and comments made.

**Feasibility:** The three participant companies can follow the methodology and this demonstrates that it is feasible. Three participants in Case 2 responded to the four questions on feasibility and rated the methodology as 78.33%, five participants in Case 3 scored 47% whilst six participants in Case 4 rated 64.17%. The facilitators' perceptions of the methodology were very good in Cases 2 and 4, but average in Case 3.

**Usability:** The measure of usability was also tested here, and the research sought both quantitative and description statements from both facilitators and process users. Based on the eight quantitative questions, three participants rated the usability of the methodology as 71.67% in Case 2, 53% in Case 3 and 63.33% in Case 4. The rating from facilitators was also positive. These findings were further supported by descriptive comments made by companies.

**Usefulness** – Success of the methodology and outcome of the process: The measure of the usefulness of the methodology took two forms, first the perceived success of the methodology and the outcome of the process improvement. All indications pointed to the fact that the methodology was perceived very good by the facilitator in Case 2, average in Case 3 and very good in the last company. From the participants' perspective, the following feedback was received. Of the six questions asked, three users scored 70% in Case 2, five users rated it 54.67% in Case 3, and six respondents in Case 4 scored 66.67%. In measuring the success of the methodology, process participants scored "4" in Case 2, average of "2.8" in Case 3 and average of "4" was recorded in Case 4. The facilitators rated the methodology success as "4" "3" and "4" respectively. The test results have proved that the methodology can work, and useful changes can be achieved.

## 5. Analysis and Discussion

From the data collected from the previous stage on evaluation and testing of the methodology in the real industry firms, the strengths and weaknesses of the methodology are thoroughly analyzed in this section. Furthermore, the feasibility, usability and usefulness of the methodology are examined with the panel members.

### Phase 4: Objective and Method

The objective of this section is to use the results from the previous section on the evaluation and testing of the methodology, to analyse the strengths and weaknesses of the methodology and to find opportunities for refinement. As this research is one of actions research, so the feedbacks from the participant firms are most important to examine whether the methodology is feasible, usable and useful to the firms. To analyze the methodology, assessment questionnaire method is used.

### Strengths of the Methodology

After evaluation and testing of the methodology in the five participant case study firms, it is found that there are quite a

number of strengths in the decision process of the methodology.

Firstly, as a whole, the methodology is very comprehensive and systematic comprising of six stages which can be followed in its entirety in applying to the case studies. The sequence of the stages is uniquely consistent and makes sense in a way it carries out the final result. The methodology suits well for the organization in the end although it is inapplicable in finding some resource criteria and filling evaluation factors.

As discussed in the previous section, the overall process is very successful and well worth doing. It contributes exactly in the area of strategic positioning, pointing out both the strengths and weaknesses of the company. The result also provides a new strategic direction for the long-term plan of the organization to sustain competitive advantage by focusing on the firm's internal activities and resources. The methodology provides a window to enable management to see the different views of the company from existing strategy to future strategy, and from the resource view to activity view, which are not available in most other methodologies.

The methodology is able to conclude which actions are necessary to be taken, based on which resources of the firm to follow, to meet the market needs. It also provides the actions for the company to respond to the gaps and opportunities in the market, based on its critical resources. Secondly, each of the stages also has their own unique strength.

- Stage 1 provides the company's current overriding problems as raised by the management team so that several problems can be made visible.
- Stage 2 helps in the mapping of the company's activities and its resources in term of the 6 categories.
- Stage 3 enables the management to do lots of brainstorming in the process of evaluating the activities and resources.
- Stage 4 provides a useful set of key criteria to help companies identify their competitive strategy, be it operational excellence, product leadership or customer intimacy. Furthermore, it defines the gaps among the company, the customers and competitors.
- Stage 5 provides the alignment of competitive gap and the firm's competitive strategy.
- Stage 6 provides the actions to be taken by the company based on the critical resources and significant activities of the company.

## Weaknesses of the Methodology

In the previous section, we discussed the strengths of the methodology. Accordingly, in this section, we will discuss the weaknesses of the methodology. First of all, the outcomes of the methodology depend on the analytical skills and experiences of the facilitators and participants, who have to do a lot of brainstorming. So the willingness of the participants to participate in the session is one of the most important factors which make the methodology useful, as their feedback information were critical for the evaluation and testing stage. Next, it is a bit time consuming to follow all the steps of the methodology. From the view of each of the stages, the weaknesses are as follow:

- Stage 1: From the feedback obtained during application of the methodology, the problems scope/overriding issues are not taken into consideration while deciding the desired competitive strategy of the company in stage 4.
- Stage 2: In this stage, categorizing and filling the resource types for a process activity is a bit difficult and it needs some practical knowledge especially in intangible resources.
- Stage 3: This stage evaluates the importance of the company's activities and resources. In resource evaluation, it is difficult to understand the true meaning of categories comparing to competitors due to certain factors which are quite tedious to follow. And this is the most time consuming part of the methodology. It is also very hard to follow the way the evaluation factors count on the various resources. Moreover, there is some confusion encountered during this stage mainly concerning the understanding of the evaluation criteria. Although the notion that resources underpin the sustainability of competitive advantage is simple, companies often have a hard time identifying and evaluating their own resources.
- Stage 4: In this stage, the methodology provides some questionnaires to be filled regarding the current competitive strategy and desired competitive strategy. A few statements were not clear i.e. the meaning was not conveyed correctly to the panel members, and as a result, the outcomes of the types of strategy for the company were not accurate. And the desired competitive strategy is decided solely on the basis of how the company wants to do business in future. Thus the core problem currently faced by the company is ignored and remains unaddressed while selecting the desired strategy. The gap tables are also controversial because those kinds of measurement cannot lead to exact answers.

- Stage 5: In this stage calculating aggregate scores for current and desired competitive strategies is not precise but it depends on the point of view of the panel members.
- Stage 6: In this stage, the action to be taken for the resources is not clearly defined. It depends on the opinion and decision of the panel members. It is quite hard to adopt specific strategy to suit specific resources and activities. In action statement, it is easy to say to upgrade, invest for some resources and activities, whereas, in reality, it is the 'how' that counts most. Moreover, the consideration to do action on the resources and activities cannot cope with the market changes and outside conditions. On the other hand, it may need some reflections on the resources and activities which are not significant or critical unless it is very general.

## 6. Refinement and Development of the Final Methodology

To improve the methodology further, the solutions to overcome the weakness are searched and action of refinement is taken. At the end of this phase, a New Resource Based Supply chain Positioning Methodology is successfully and completely developed which can be used in the real industries.

### Phase 5: Objective and Method

In the previous stage, based on the results of the evaluation and testing stage for the five case study companies, the weaknesses of the methodology have been identified. The objective of this section is therefore to refine and develop the final resource-based supply chain positioning methodology.

### Discussion on the Weaknesses of Methodology

As shown in section 5, there are some weaknesses in each stage of the methodology. However, some of the common weaknesses encountered are the different interpretation of intangible resources and time consuming resource mapping in stage 2 and 3. Since these are common weaknesses, they will not be tackled for this research. The obvious and critical weaknesses lie in stage 6, and it is the most important part of the methodology for formulating the firm's strategy. There are three obvious weaknesses in stage 6 and they are:

- Simple action statements to be taken,
- Neglecting of non significant activities

- Excluding consideration for outside market conditions.

In fact these weaknesses of the methodology have also been highlighted since resource-based view had been introduced, and some of the more consistent criticisms are made by Priem and Butler (2001) as follow:

- The RBV is tautological
- Different resource configurations can generate the same value for firms and thus would not be competitive advantage
- The role of product markets is underdeveloped in the argument
- The theory has limited prescriptive implications
- It is perhaps difficult (if not impossible) to find a resource which satisfies Barney's entire VRIN criterion.
- There is the assumption that a firm can be profitable in a highly competitive market as long as it can exploit advantageous resources, but this may not necessarily be the case. It ignores external factors concerning the industry as a whole, and Porter's Industry Structure Analysis ought to be considered.

For this research, these weaknesses will therefore be tackled to improve on the resource-based supply chain positioning methodology. The weaknesses and criticism that resource-based view ignores external factors concerning the industry as a whole is true for the core theory concerning RBV. However these can be tackled in recent research work by authors on dynamic capabilities, which is one of the important research areas for strategic positioning. This dynamic capabilities theory stated that not only are the current critical resources crucial to the company, but also the dynamic capability are just as important to enable the company to adapt to the dynamic market conditions to achieve competitive advantage.

During the initial stage of the theoretical development of the methodology, this research also ignores the outside market conditions to emphasize more on the core theory of RBV, although there are considerations to compare the company with outside customers and competitors in stage 4. Subsequently it is realized that it is impossible for the methodology to meet the needs of companies if it only emphasizes on the internal critical resources and ignores outside conditions. Based on the discussion sessions with participants and managers of firms and their feedbacks, some refinements are made to stage 6 - formulating strategy, to make the methodology more practical. Refinement to overcome the weaknesses is proposed in the next section.

### Refinement of the Methodology

The practical application of the methodology to 5 SME companies is described in section 4 and the weaknesses of methodology are described in section 5. The obvious weaknesses of the methodology lie mainly in stage 6 - formulating strategy, where actions are taken on the significant activities and critical resources without consideration of the rapid market changes.

Although the actions on activities and resources are taken based on the competitive strategy review (stage 4) but it is very generic. Therefore, deeper analysis will need to be made in order to get a clearer vision to formulate the strategic plan to make the firm better. In the current methodology, there are separate competitive gaps between the company and customers, and company and competitors as identified in stage 4 by the experienced panel members. Actions are then taken based on these independent comparisons of gaps, which can result in very different actions recommended. Therefore in refining the methodology, a new table is created, as shown in Table 1, to ensure that actions taken do consider a combination of both these competitive gaps, since they are using the same criterions for comparison.

**Table 1:** Firm's Possible Conditions in Competitive gaps

Customer requirement	Competitor performance	Remark
Lag	lag	High threat
Exceed	Lag	Not good for long term
Lag	Exceed	Good opportunity
Exceed	Exceed	Best condition

In this new table above, there are 4 possible conditions that can happen. The first condition is where the firm is lagging in both competitive gaps – customers and competitors. This condition will pose a high threat for the firm and urgent actions need to be taken and should be given first priority, for otherwise the firm will be out of competition very soon.

The second condition is where the firm exceeds the expectation of the customers, but lags behind in performance to its competitor. This may result in the customers shifting to the competitors in a long run. This condition is not good for the firm in the long term.

The third condition is where the firm is performing better than its competitors but still lags behind customer expectation. This presents a good opportunity for the firm to take action to get sustainable competitive advantage. The fourth and last condition is the best condition where the firm exceeds its customer expectation and competitor performance. But for SMEs, this is rarely the case.

In order to close these competitive gaps, it is difficult to initially identify the critical resources as the criteria in the gap tables are too generic. Hence, the initial action taken is to identify suitable activity first and after that to match the firm's critical resources to determine whether the actions can be implemented by the firm's critical resources.

Thus, for stage 6, the entire worksheets have been totally changed to enable management to have more views and therefore able to make decision easier for formulating strategy. Instead of worksheets 6(a), (b) and (c), two new worksheets have been introduced; one for activities and the other for resources with consideration for all the activities, resources and competitive gaps.

## 7. Conclusion

Strategic supply chain positioning of the firm from resource based point of view is to formulate the firm's strategy and position the firm for a sustainable competitive advantage by focusing on the firm's internal activities and resources. This research explored the resource-based view for the firm's long term competitive advantages, demonstrated the critical resources and significant activities, current performance as compared to competitors, and customer requirement, and actions to be taken with the critical resources and significant activities to achieve sustainable competitive advantage.

The research provides managers with a methodology to guide them to identify, articulate and explore their company's internal strength - like critical resources and significant activities, to achieve competitiveness. Since the discussion sessions are held mainly with top management, the identification and evaluation of critical resources and significant activities are generally accurate, but lack the point of view from the middle and lower level staffs.

The methodology developed can provide a valuable input to the formation of strategic supply chain positioning in a business, and thus offer a useful balance to the external product/market analyses that dominate much strategic thinking. The case studies has highlighted that the methodology can be applied for the firm. Therefore, the research aim and objectives have been achieved successfully.

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