

Internal and External Barriers to Effective Supply Chain Management Implementation in Malaysian Manufacturing Companies: A Priority List Based on Varying Demographic Perspectives

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Abstract— Successful implementation of supply-chain management in a developing country such as Malaysia is considered a major challenge due to lack of awareness and unclear missions and goals. Focusing on this idea, this article compares the ranking of various demographic groups in relation to the internal and external barriers experienced by Malaysian manufacturing companies. In a Malaysian context, very limited studies have been conducted in prioritising the barriers based on different demographics perspectives. The identified lists of internal and external barriers are prioritised using the Analytic Hierarchy Process (AHP). Ten respondents with wide ranging experience in SCM provided the necessary information in the prioritisation exercise. The ranking of the respondents from different races, age groups, education levels, employment types, work experience and designations suggests significant variations between these groups in the ranking of the internal and external barriers. The findings of this research provide important information to company managers who desire to implement SCM in a multi-cultural setting such as Malaysia. The onus is on these managers to be cautious in developing a strategic plan for its effective implementation and also in designing programs to overcome SCM obstacles.

Keywords— internal barriers, external barriers, supply chain management, Analytic Hierarchy Process, demographic perspectives

1. Introduction

The concept of Supply Chain Management (SCM) combines the forward flow of materials and backward flow of information [1], and is typified by such activities as the flow of materials,

information, products and funds from supplier to manufacturer, to distributor, to retailer and ultimately to the end users [2-3]. Good SCM is required to ensure that the production process is effective, and this has provided the impetus for organisations to invest more in their Supply Chain (SC) [4-5]. The many benefits of SCM include reduction in inventory, improved sharing of information, increased mutual trust among supply chain partners, reduction of product life cycle and increased customer satisfaction [6-7].

Yet SCM implementation can be challenging and costly [8-9], [1], [4], [10]. To fully achieve the benefits of SCM, organisations have to address these challenges and overcome both intra and inter-organisational barriers that are often encountered [9]. Intra organisational SCM barriers are internal challenges such as lack of top management support, employee empowerment and training, financial resources, information technology infrastructure. Conversely, inter organisational are external barriers ranging from unwillingness to share critical information, lack of collaboration between SC partners, lack of information sharing and mistrust among SC partners [11-13]. Most of the SCM literature to date has identified and provided useful explications of SCM barriers, but currently, limited studies has carried out to rank or prioritised the barriers [14]. Specifically, very little is known about prioritising the barriers based on different demographic perspectives in a Malaysian context and, identifying the most urgent barriers to be addressed.

This paper studies Malaysian manufacturing companies and specifically attempts to rank and prioritise the barriers to SCM implementation according to different demographic perspectives.

The well-known decision making tool, the Analytic Hierarchy Process (AHP) is used for this purpose.

2. Supply Chain Management

The concept of SCM is based on the core idea that the finished product that is successfully delivered to the end user is a result of the cumulative efforts of multiple organisations [15]. Essentially, the supply chain (SC) comprises five main partners: 1) supplier, 2) manufacturer, 3) distributor, 4) retailer, and 5) customer as illustrated in Figure 1 [16]. Producing products with shorter product life cycles, tight competition among companies and an increased level of customer satisfaction in today's market have compelled organisations to upscale their SC [4].

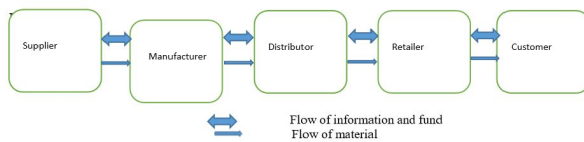


Figure 1: Five stages of Supply Chain [15]

Ferguson describes supply chain management (SCM) as the connected network of individuals or parties, who use different approaches, to implement, design and manage a value-added process to fulfil customer demands. It is a collaborative effort from the initial creation of the product to the final sale and oversees various touch points from the supplier to manufacturer, to distributor to retailer and to customer. The development of faster communications via advanced communication technology and transport, such as the internet and overnight delivery, has positively impacted supply chain management and development [17].

In order to allow a detailed analysis of SCM implementation, [18] developed a comprehensive framework for SCM implementation that breaks down the process into four stages, as illustrated in Figure 2. SCM implementation comprises strategic management initiatives, the factors that drive its implementation such as customer demand, competition, economics and technology, the performance outcomes and lastly, the barriers disrupting the implementation of SCM. These barriers include lack of top management support, unwillingness to share information and reluctance to share risks among SC partners.

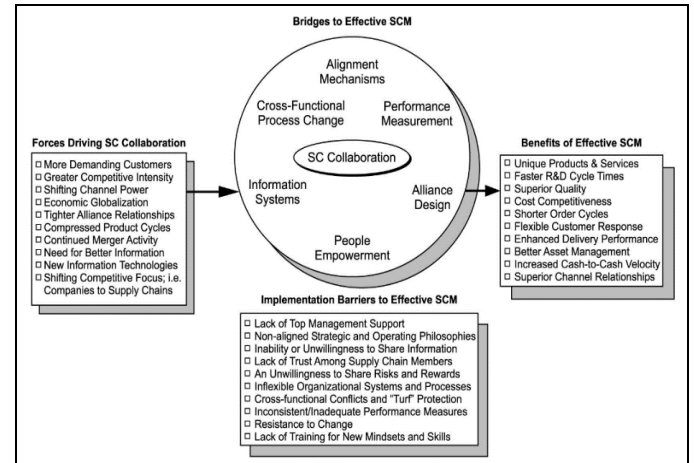


Figure 2: A framework for SCM implementation [16]

2.1. Barriers to SCM

The above discussion leads to the classification of the various internal and external barriers that prevents companies from implementing effective SCM [10]. According to [9], the barriers are managerial, technological, financial, organisational and collaborative. Parmer and Shah [16] categorised them as strategic, cultural, technological, individual and organisational while [19] classified the barriers as structural resistors, sociological resistors, organisational routines and individual skills. A key factor in successful SCM implementation in today's business environment concerns identifying and overcoming such barriers [20]. To achieve optimal benefits, managers and business owners must understand and manage them so that the obstacles can be accurately and timely resolved [21].

Internal SCM barriers stem from limited support from management, inadequate employee empowerment and training, insufficient funds and an inferior information technology base. Additionally, problems between organisations and partners related to their refusal to share vital information, lack of trust and non-collaboration represent the external barriers to SCM [11-13]. Tables 1 and 2 below list the internal and external organisational barriers to SCM implementation as identified and analysed by [9] as well as [16].

Table 1: Supply chain management barriers from prior literature

No.	Supply Chain Management Barriers
1.	Lack of top management commitment and support
2.	Unclear organisational objectives
3.	Resistance to change
4.	Lack of motivation and employee empowerment
5.	Poor corporate culture
6.	Mistrust among employees and SC partners
7.	Lack of education and training for employees and suppliers
8.	Poor information and communication technology (ICT) infrastructure
9.	Lack of financial resources
10.	Unwillingness to implement supply chain practices
11.	Lack of integration among SC partners
12.	Lack of collaboration among SC partners
13.	Unwillingness to share information among SC partners
14.	Lack of responsiveness
15.	Lack of customer satisfaction index

Source: [9]

Table 2: Categorisation of barriers in manufacturing organisations

No.	Category	Supply Chain Management Barriers
1	Strategic barriers	Unclear organisation objective
		Lack of top management commitment and support
		Low customer satisfaction index
		Lack of awareness about SCM
		Short term decision-making perspectives
		Political instability
2.	Cultural barriers	Unwillingness to implement supply chain practice
		Unwillingness to share information among supply chain partners
		Mistrust among employees and supply chain partners
3.	Technological barriers	Lack of information technology
		Poor ICT structure
4.	Individual barriers	Lack of education for employees and suppliers' employees
		Resistance to change
		Lack of motivation and employee involvement
		Unawareness among society about social practices
		Lack of awareness about environment and other sustainability issues
		Lack of necessary tools, management skills and knowledge
5.	Organisational barriers	Lack of financial gain
		Lack of framework
		Lack of measurement systems
		Lack of proper organisational structure to create and share knowledge
		Lack of inter-organisational cooperation and coordination

Source: [16]

Barriers to SCM implementation in the context of manufacturing companies have been conducted by [1], [4], alluding to previous studies that attributed the barriers to SCM discipline and nature [22]. In table 3, [1] explicates the barriers that occur in manufacturing companies that need to be addressed if competitive advantage is to be gained.

Table 3: Barriers among manufacturing companies

Barriers	Description of variables
Lack of information	This includes information quality (accuracy, adequacy, conciseness, credibility, and timeline) and information sharing (trust, deep and intensity)
Lack of new equipment	New equipment or new infrastructure for applying SCM such as IT infrastructure, production systems, inventory adjustment systems, distribution systems, and all other activities requirements.
Lack of expert employees	Employees should have accurate, specialist knowledge about SCM (strategy, planning, implementing, obstacles, problems, advantages, and etc.) to implement it.
Increased product stock time	The new method of inventory adjustment (arrangement methods, bar coding systems, and etc.) might take time to be established rather than old techniques.
Increased production time	Production strategy and planning might be changed during SCM application and takes time to set up.
Increased designing time	SCM implementation requires changes in the structure of product design and it takes time to be established.
Increased distribution time	Old methods of transportation such as scheduling and transportation systems should be changed according to new techniques and rules of transportation and distribution.
Increased tooling time	Many current systems of maintenance and tool making should be improved during SCM application.
Lack of time	SCM implementation demands changes to be made and as current projects take time to be completed, there is insufficient time for SCM implementation.
High costs	SCM implementation needs expert employees, new equipment, IT infrastructure, and many other requirements, thus incurring extra funds.

Source: [1]

In Malaysian context, the barriers to SCM implementation in manufacturing companies have been carried out by [14]. The barriers are shown in Table 4 in which the authors have categorised the barriers into internal and external.

Table 4: Internal and External Barriers in Malaysian manufacturing companies [14]

Internal Barriers	External Barriers
<ul style="list-style-type: none"> • Untrained workers • Poor communication between management and workers • Poor quality control • Machine breakdown • Wrong forecasts • Poor delivery system • Sloppy workers • Inefficient layout of the factory • No proper control of inventory 	<ul style="list-style-type: none"> • Poor communication with suppliers • Late delivery • Unavailability of necessary raw materials • Fluctuation of product demand • Unreliable suppliers • Poor quality raw materials • Change in customer requirement • Raw materials price fluctuation • Change of technology

The present study will utilise the barriers discovered by [14] to produce the ranking based on varying demographics perspectives.

3. Research Methodology

This study employed the quantitative approach. Firstly, the internal and external barriers were identified through a literature review. These barriers were then brought to and validated by expert academics and the relevant manufacturing industry practitioners involved in supply chain activities.

Subsequently, these internal and external barriers were used to design the AHP survey questionnaire. The AHP data was obtained via structured interviews with five practitioners involved in supply chain activities and five expert academics in the area of SCM. These academics and practitioners were selected through purposive sampling technique. The use of purposive sampling technique is appropriate since the AHP requires opinions from experts possessing the necessary information. Furthermore, acquiring responses from various academics and practitioners is considered a prudent move as it enables the exploration and identification of multiple perspectives on the internal and external barriers to SCM implementation in manufacturing companies [23].

Descriptive analysis such as frequency and percentage was used to explain the respondents' demographic information. The data on the other hand, was analysed using the four AHP stages as recommended by [24], specifically in prioritising the internal and external barriers to SCM implementation. The four AHP stages are 1) define the problem, 2) structure the hierarchy, 3) construct the pair-wise comparison matrices and 4) use the priorities obtained from the comparison to weigh the priorities in the level immediately below. The priority list was then ranked by using Spearman's Rank Correlation to illustrate the ranking from different demographic perspectives namely race,

age group, educational level, work experience and designation [25].

4. Result

4.1 Demographic Profile

Twelve respondents were contacted and ten agreed to participate in the study (refer to Table 5). Majority or 40 per cent (4/10) of the respondents are Malays as well as Indians and 70 per cent (7/10) are aged 51 and above. Most or 90 per cent (9/10) of the respondents are either Master's degree or PhD holders. Five or 50 per cent of the respondents are attached to private organisations and possess 10 to 15 years or more than 15 years working experience. As to their designation, Table 5 shows that 50 per cent (5/10) of the respondents are academics in universities as well as manufacturing industry practitioners with practical experience in supply chain activities. It can be surmised that all the respondents are credible and have sufficient expertise in organisational supply chain management.

Table 5: Demographic information of the respondents

Demographic Profile	Frequency	Percentage
Gender		
• Male	9	90.00
• Female	1	10.00
Race		
• Malay	4	40.00
• Chinese	-	-
• Indian	4	40.00
• Others	2	20.00
Age Group		
• 21 – 30 years	-	-
• 31 – 40 years	-	-
• 41 – 50 years	3	30.00
• 51 year and above	7	70.00
Educational level		
• Certificate/Diploma	1	10.00
• Bachelors	-	-
• Master's	5	50.00
• PhD	4	40.00
Type of employment		
• Public sector	4	40.00
• Private sector	5	50.00
• Others	1	10.00
Working experience		
• 1 – 5 years	-	-
• 6 – 10 years	-	-
• 10 – 15 years	5	50.00
• 15 years and above	5	50.00
Designation		
• Supply-chain manager	1	10.00
• Senior estate manager	1	10.00
• Business consultant and trainers	2	20.00
• Environment and safety consultant	1	10.00
• University Professor/Associate Professor	5	50.00

Based from data in Table 5, the study intends to investigate the ranking of internal and external barriers assigned by different demographic groups namely race, age, education level, employment type, working experience and designation. Section 4.2 discusses the findings in detail.

4.2 Analysis Based on Different Demographic Groups

The findings are divided into two, firstly; the analysis of ranking based on different demographic groups namely race, age, education level, employment type, working experience, and designation. Secondly, the findings show the Rank Correlation Coefficient (RCC) results, evaluating the similarity of rankings assigned by the seven identified demographic groups in this study [23].

The ranking assigned by the six groups and their corresponding priority values for internal and external barriers, and the internal barrier and external barrier items are presented in Tables 6, 7 and 8 respectively (refer to Appendix 1).

Data in Table 6 illustrates that all demographic groups namely race, age, education level, employment type, working experience and designation shows a fair amount of consensus in the ranking of internal and external barriers. Overall, most of the demographic groups ranked the external barriers as the most important barriers compared to internal barriers, i.e., 1-2 respectively. Conversely, three demographic groups i.e., race (others), education level (those with Master's degrees) and working experience (those possessing 15 years and more working experience) ranked internal barriers as the most important barriers as compared to external ones i.e., 2-1

Refer to Table 9, 10 and 11 (refer to Appendix 1) that demonstrate the RCC in measuring the similarities in ranking assigned by the six demographic groups. Table 9 reveals significant similarities in the ranking of internal and external barriers by several demographic groups at 1 per cent significant level; specifically, the ranking assigned by the *Malays – Indians* (race), *31 to 40 years old – 41 to 50 years old* (age), *Certificate/ Diploma – Others* (education level), *Public – Private*, *Public – Others*, *Private – Others* (employment type) and *Academic – Practitioner* (designation). Other demographic groups on the other hand, showed a significantly different ranking for internal and external barriers, for instance, the ranking assigned by demographic groups of race (*Malay – Others*, *Indian – Others*), education level (*Certificate/ Diploma – Master*, *Master – Others*) and experience (*10 to 15 years – 15 years and above*).

The ranking assigned by each demographic group for the internal barrier items is exhibited in

Table 8. The following nine items were identified as the internal barriers for manufacturing supply chain activities: 1) untrained workers, 2) poor communication between management and workers, 3) poor quality control 4) machine breakdowns 5) inaccurate forecasts 6) poor delivery systems 7) sloppy workers 8) inefficient layout and 9) poor inventory control. Table 8 reveals that the priority values and ranking differ for various demographic groups. Specifically, differences in the rankings were seen by demographic groups of race (*Malay and Indian*), education level (those with *Certificates/ Diplomas* and *Master's* degree as well as *Certificates/ Diplomas* and *Other* qualifications), by the three employment types i.e., *Public*, *Private* and *Others* and interestingly, the ranking by *Academics* and *Practitioners* (designation).

The differences in ranking assigned by various demographic groups are supported by data in Table 11, which shows the RCC in measuring the similarities in ranking assigned by the six demographic groups in the present study. There are no significant similarities obtained between any demographic groups of race, age, education level, employment type, working experience or designation, demonstrating that the ranking assigned by each demographic group of race, age education level, employment type, working experience and designation are distinct.

The ranking of items for external barriers namely 1) poor communication with suppliers 2) late delivery 3) unavailability of necessary raw materials 4) fluctuation of product demand 5) unreliable suppliers 6) poor quality raw materials, 7) change in customer requirements 8) raw materials price fluctuation and 9) change in technology are presented in Table 8. Table 8 discloses that the ranking for external barrier items are different according to all demographic groups. Notably, divergent rankings were expressed by demographic groups of race (*Indian and Others*), education level (those who possess *Certificates/ Diplomas* and *Master's* degrees as well as *Master's* and *Others* qualification), years of experience (those with *31 – 40 years* and *41 to 50 years* of working experience), employment type especially for those attached to *Public* and *Other* organisations.

The RCC for items of external barriers is shown in Table 11. It is found that none of the RCC for the external barrier items was statistically significant for any combination of any demographic groups. Each demographic group i.e., race, age, education level, employment type, working experience and designation has assigned different priorities for the external barrier items, indicating that each demographic group held differing perspectives in ranking the external barrier items.

5.0 Conclusion

Limited empirical evidence is available on the barriers involved in SCM implementation in Malaysian manufacturing companies [12]. Studies investigating the barriers of SCM implementation among related demographic groups involved in SCM implementation are even less. This study provides useful information to manufacturing companies on barriers for SCM implementation in a multi-cultural setting. This is carried out by obtaining the respondents' ranking of internal and external barriers to SCM implementation, according to various demographic groups, i.e., race, age group, education level, employment type, work experience and designation.

The most striking result is that the RCCs for internal and external barriers were perfectly correlated at 1 per cent significant level. In addition, most of the demographic groups assigned external barriers as most important compared to internal barriers for successful SCM implementation in Malaysian manufacturing companies.

It is apparent that none of the RCCs were statistically significant for any combination of demographic groups for the nine internal and external barrier items. This means each demographic group namely race, age, education level, employment type, work experience and designation has different priorities for the nine items. This study contributes to the literature for without understanding these perspectives and evaluating their implications, SCM implementation in a specific multi-demographic and multi-cultural scenario, runs the risk of inefficient management and loss of value.

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