Chapter 2

Prioritisation of Internal and External Barriers for Supply-Chain Implementation in Manufacturing Companies: A Malaysian Perspective

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Additional information is available at the end of the chapter

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Abstract

Manufacturing companies as well as service providers often encounter barriers in successful implementation of supply-chain management (SCM) principles and practices. This research, through extensive literature review, has identified the main barriers of SCM implementation for Malaysian manufacturing companies. Having identified the list of barriers, the items in the list are prioritised by applying the analytic hierarchy process (AHP). Ten respondents who have a wide range of experiences in dealing with SCM have provided the necessary inputs in the prioritisation exercise. The individual AHP pair-wise comparison matrices are aggregated and Superdecision software has been used to compute the priorities. From the generated ranks, the most critical barriers can easily be identified. The onus on the Malaysian manufacturing companies is to take note of the present research findings and take appropriate measures so that the full benefits of SCM can be reaped. Though the findings are valid in the Malaysian context, judgements from people from other countries can be taken and a comparison of the results can be made.

Keywords: internal barriers, external barriers, supply-chain management, analytic hierarchy process, manufacturing companies

1. Introduction

Traditionally, supply-chain management (SCM) is represented by the forward flow of materials and backward flow of information [1]. Over the years, the activities of SCM have evolved from the flow of materials, information, products and funds from supplier to manufacturer to distributer to retailer and ultimately to the end users [2]. SCM has generated much interest in recent years due to its significant benefits. Among others, the benefits include reduction in inventory, improved sharing of information, increased mutual trust among supply-chain partners, reduction of product life cycle and increased customer satisfaction [3]. These benefits have provided the impetus for organisations to invest more in their supply chain (SC) [4, 5].

Even though organisations benefit from SCM implementation, it is, however, challenging and costly [1, 4, 6–8]. Organisations often encounter barriers in implementing effective SCM [7], and these barriers exist in both intra- and inter-organisations. Lack of top management support, employee empowerment and training, financial resources and information technology infrastructure are some examples of intra-organisational or internal SCM barriers. On the other hand, inter-organisational or external barriers range from resistance to share critical information, lack of collaboration with SC partners, lack of information sharing and mistrust among SC partners [9–11]. Although a large amount of the study is available on SCM barriers, yet their mere identification and explanation are considered inadequate [7]. For example, to date, no study has been conducted to rank the barriers to SCM implementation, at least in the Malaysian context. This is important as successful SCM implementation requires managers to identify and understand which barriers are deep-rooted and destructive, besides identifying the most important barriers to be urgently addressed [12].

This chapter thus aims to determine the ranking or priority list of barriers to SCM implementation by focusing on manufacturing companies in Malaysia. The ranking and priority list is obtained by applying a well-known decision-making tool, the Analytic Hierarchy Process (AHP).

2. Literature review

2.1. Supply-chain management

A supply chain (SC) involves all activities, functions and facilities that are required in transforming goods and services from the material stage to the end, customer stage [13]. Basically, the SC consists of five main stages namely (1) supplier, (2) manufacturer, (3) distributor, (4) retailer and (5) customer [14]. The interaction of these five stages is illustrated in **Figure 1**. 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].

According to Ferguson [2], supply-chain management (SCM) is a cooperative effort by members, using different approaches, in implementing, designing and managing a value-added process to fulfil customer requirements. That is, SCM is a collaboration of product, information and financial management starting from the supplier to manufacturer to distributer to retailer and to customer [2]. A continuous development in communications technology and transport, such as the Internet and overnight delivery, are some of the strong drivers for supply-chain management and development [15].

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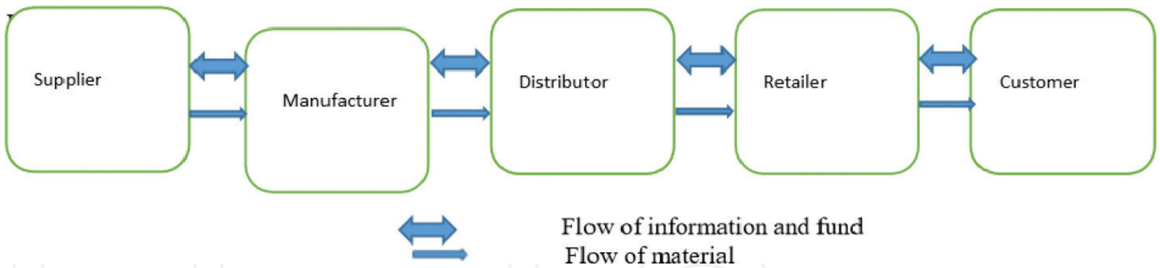

Figure 1. Five stages of supply chain [13].

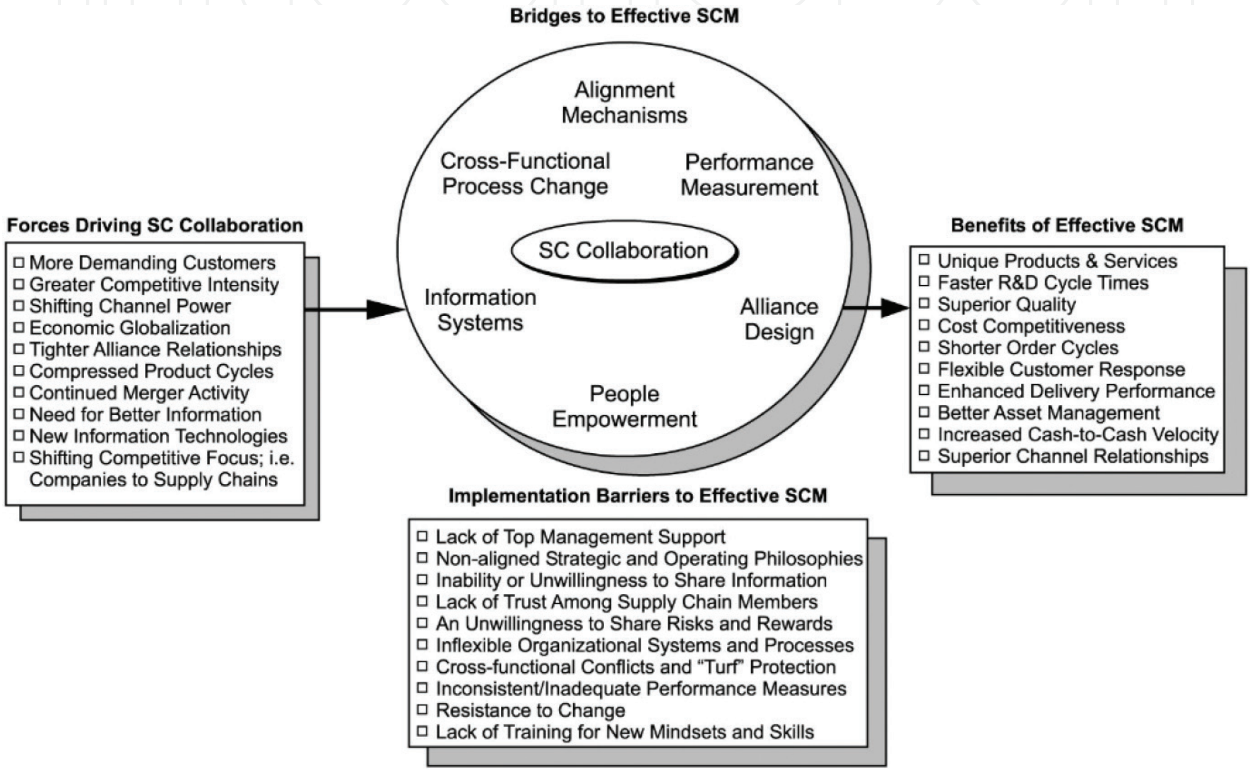

Figure 2. A framework for SCM implementation [16].

A comprehensive framework for SCM implementation developed by [16] is illustrated in **Figure 2**. The framework put SCM implementation into four stages. The first stage is the strategic management initiatives that function as the heart of SCM implementation. The second stage constitutes several factors that act as driving forces for SCM implementation such as customer demand, competition, economics and technology. The third stage is the performance outcome for SCM implementation such as faster product life cycles, higher quality and cost-effectiveness. The last stage comprises problematic factors that act as barriers disrupting the implementation of SCM namely lack of top management support, unwillingness to share information and reluctance to share risks among SC partners.

Effective implementation of SCM helps reduce inventory level, improve information sharing, fulfil customer requirements and obtain mutual trust among supply-chain partners [3]. An effective implementation of SCM has become *sine qua non* for companies in the competitive market which in turn helps them attain competitive advantage [7].

2.2. Barriers to SCM

Despite its significant benefits, the implementation of SCM is challenging, and companies continue to encounter barriers that prevent them from implementing effective SCM [8]. Ref. [7] categorised the barriers as managerial, technological, financial, organisational and collaborative, whereas [14] grouped the barriers as strategic, cultural, technological, individual and organisational [17], on the other hand, classified these barriers as structural resistors, sociological resistors, organisational routines and individual skills. These barriers exist internally as well as externally. Full benefits of SCM implementation can be achieved when companies are able to identify and overcome these barriers to stay competitive in today's changing environment [18]. These barriers are complex in nature, and thus it is crucial for managers to understand them well so that the barriers can be timely resolved [19].

Internal SCM barriers stem from limited support from management, inadequate employee empowerment and training, insufficient funds and an inferior information technology base. Additionally, the problems among organisations and partners related to their refusal to share vital information, lack of trust and non-collaboration represent the external barriers to SCM [9–11]. [7] as well as [14] analysed and listed the internal and external organisational barriers to SCM implementation obtained from prior research as exhibited in **Tables 1** and **2**, respectively.

No.	Supply-chain management barriers
1.	Lack of top management commitment and support
2.	Unclear organisational objective
3.	Resistance to change
4.	Lack of motivation and employee empowerment
5.	Poor corporate culture
6.	Mistrust among employee and SC partners
7.	Lack of education and training to employee and supplier
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: [7].

Table 1. Supply-chain management barriers from previous literature.

No.	Category	Supply-chain management barriers
1.	Strategic barrier	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
		Lack of resource and capability
2.	Cultural barrier	Unwillingness to implement supply-chain practice
		Unwillingness to share information among supply-chain partners
		Mistrust among employees and supply-chain partners
3.	Technological barrier	Lack of information technology
		Poor ICT structure
4.	Individual barrier	Lack of education to employee and supplier employee
		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 barrier	Lack of financial gain
		Lack of framework
		Lack of measurement system
		Lack of proper organisational structure to create and share knowledge
		A lack of inter-organisational cooperation and coordination

Source: [14].

Table 2. Categorisation of barriers in manufacturing organisations.

Some researchers are also interested in investigating barriers in green supply-chain management. This is because sustainability has been reported as one of the fastest growing supply-chain management trends recently. Barriers in green supply chain can be seen from the work of several researchers such as [20–22]. Some researchers on the other hand have investigated barriers with regard to specific issues in SCM. [23], for example, constructed a model for barriers to supply-chain collaboration. Barriers to customer-responsive SCM are identified by [23], whereas barriers to logistics performance in textile supply chain are explored by [24].

Barriers to SCM implementation are also studied in various contexts including manufacturing companies as found in the work of [1, 4]. This is due to the fact that barriers that have been posited to SCM implementation mostly emerged from SCM discipline and nature [25]. Monzouri et al. [1] recorded several problematic factors that occur in manufacturing companies (refer to **Table 3**) that need to be appropriately addressed if competitive advantage is to be gained through successful SCM implementation.

Barriers/problematic factors	Description of variables
Lack of information	This factor includes information quality (accuracy, adequacy, conciseness, credibility and time line) 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 activity requirements.
Lack of expert employees	Employees should have accurate, specialist knowledge about SCM (strategy, planning, implementing, obstacles, problems, advantages, etc.) to implement SCM.
Increased product stock time	The new method of inventory adjustment (arrangement methods, bar coding systems, 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].

Table 3. Barriers/problematic factors among manufacturing companies.

2.3. Analytic hierarchy process

The AHP model was developed by Thomas L. Saaty in the 1970s while working on studies for the Department of Defence and the National Science Foundation in the United States. The AHP is a model that can help decision-makers in simplifying complex problems.

Saaty [26–28] defined the AHP as a method of breaking down a complex, unstructured situation into its component parts and arranging these parts of judgements according to the relative importance of each variable. These judgements are subsequently synthesised to determine the variable that has the highest priority and that should be acted upon to influence the outcome of the situation. In a simpler way, the AHP is described as a viable technique to help decision-makers face multi-criteria decisions by decomposing the complex decision operations into a multi-level hierarchical structure. The AHP serves to quantify relative priorities of factors and alternatives within specific scales based on human judgements or evaluations. Its pair-wise comparison methodology evaluates several alternatives under particular criteria with respect to the goal [29, 30].

The noticeable merits possessed by the AHP have led researchers to emphasise the AHP as a tool that has the capacity to incorporate elements of subjectivity and intuition [30–33]. It is recommended as a technique that is able to transform subjective judgements into objective measures [31] by organising individual feelings, intuition and logic into a structured manner [34]. Last but not least, it represents a measurement theory competent for both the qualitative and quantitative criteria [35, 36], since the qualitative aspect is required to define the problem and its hierarchy while the quantitative criterion is needed to concisely express judgements and preferences besides executing the consistency test [27].

Its applicability in both individual and group decision-making has resulted in recognition and acceptance in the decision-making process [28, 37, 38]. As group-based decision-making is often achieved by considering the geometric mean of comparison values, the AHP is valued as it can measure the consistency of pair-wise decision judgements, which in turn reduces biasness in the process [28, 39].

2.3.1. Overview on the applications of analytic hierarchy process

The acceptance of the AHP as a credible managerial decision tool is proven in its applications in three main industrial sectors. For instance, in the primary sector, the AHP was successfully utilised in agricultural [40], fishing [41] and mining [42] sectors. For the secondary sector, the use of the AHP was reported in manufacturing [43, 44], the automobile industry [45] as well as in energy gas or electricity supplies [46]. Additionally, the AHP has been applied in the service industry including information and technology, software development, telecommunications, health care, banking [47] and higher education [48, 49].

The successful application of the AHP in a variety of areas has also been documented in accounting research [50], medical and health care [51, 52], operations management [53] and higher education [54]. A thorough review of the applications of the integrated AHP rather than stand-alone AHP can also be found in the works of [39]. Furthermore, a more comprehensive observation of the AHP related to its application, region, industry and integrated tools has been documented by [31, 36, 55].

AHP applications can also be seen in SCM. It is reported that the AHP was first utilised in SCM in 1993, and its application increased dramatically after 2003 onwards [56]. The use of AHP in several SCM areas can be categorised into five main clusters as suggested by [56]. The first SCM cluster area that highly utilises AHP is supplier or vendor selection. Masella and Rangone [57] claimed to be the pioneers for this cluster. Some recent works that applied AHP in supplier selection include [58, 59]. In fact, [60] produced a review of AHP applications in vendor and supplier selection. In most cases, researchers combined the AHP with another tool such as goal programming [61] and fuzzy logic [62] rather than stand-alone AHP, thus helping to increase credibility of the findings.

Second, green supply chain is another SCM cluster that applied AHP, with [63] identified as its pioneer. Govindan et al. and Wang et al. [64, 65] are some researchers that utilised AHP for green supply-chain management. Ref. [56] found [66] as the pioneer for the third cluster where AHP is applied, that is, in supply-chain development, performance measurement, value chain and supplier collaboration. The fourth cluster had [66] as the pioneers, with several topics identified such as supply chain and distribution network, warehouse location and customer service. Lastly, [56] identified and categorised supplier distribution centre network, supply-chain integration and collaborative planning, forecasting as well as replenishment as the topics that applied AHP in the fifth cluster.

The wide range of AHP applications in various SCM areas emphasises the significant use of the AHP in facilitating decision-making. The above actual applications embraced and validated the AHP as a methodology that can produce insightful results for real-world decision-making problems particularly in the SCM area. The visible merits and a wide range of applications have provided the impetus for using the AHP as a decision-making tool in this study.

3. Research methodology

Quantitative approach has been used in this study. To begin with, the internal and external barriers were firstly identified on the basis of a literature review. These barriers were then brought to and validated by academics that are experts in the area of SCM and relevant practitioners in manufacturing companies who are involved in supply-chain activities.

Subsequently, these identified internal and external barriers were used to design the AHP survey questionnaire. The AHP data were obtained via structured interviews with five academics that are experts in the area of SCM and five practitioners heavily involved in supply-chain activities in manufacturing companies. These academics and practitioners were selected by utilising a purposive sampling technique. The use of a purposive sampling technique is appropriate since the AHP requires opinions from experts possessing the necessary information [67]. Furthermore, acquiring responses from various groups of academics and practitioners is considered common and acceptable in AHP as it enables the exploration and identification of multiple perspectives on the internal and external barriers to SCM implementation in manufacturing companies [39].

Descriptive analysis such as frequency and percentage will be used to explain respondents' demographic information. AHP data, on the other hand, were analysed by utilising the four AHP stages as recommended by [28] in prioritising the internal and external barriers to SCM implementation.

The four stages of analysing the AHP data are as follows:

a. Define the problem and determine the kind of knowledge sought.

b. Structure the decision hierarchy. The hierarchy is a tree-like structure that comprises several levels. The first level represents the goal of the decision or in other words the purpose of applying the AHP in a particular project, followed by the criteria, sub-criteria and then the alternatives that are located at the lowest level of the hierarchy. The AHP hierarchy model is illustrated in **Figure 3**.

c. Construct pair-wise comparison matrices (PCMs). Each element at an upper level is used to compare the elements in the level immediately below it. A pair-wise comparison matrix

($n \times n$) is constructed for the lower levels with respect to one in the level immediately above. The pair-wise comparison matrix A in which element a_{ij} of the matrix was the relative importance of the ith factor with respect to the jth could be calculated as

$$A = (a_{ij}) = \begin{bmatrix} a_{11} & a_{12} & \cdot & \cdot & a_{1n} \\ a_{21} & a_{22} & \cdot & \cdot & a_{2n} \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ a_{n1} & a_{n2} & \cdot & \cdot & a_{nn} \end{bmatrix} (i, j = 1, 2, \ldots, n) \quad (1)$$

The pair-wise comparisons generate a matrix of relative priorities for each level of the hierarchy. The number of matrices depends on the number of elements at each level. The order of the matrix at each level depends on the number of elements at the lower level that it links to. In terms of judgement, there are $C(n, 2)$ or $n(n-1)/2$ judgements that need to be made in a set of matrix size $n \times n$.

d. Use the priorities obtained from the comparisons to weigh the priorities in the level immediately below. Do this for every element. Then, for each element in the level below, add its weighed value and obtain its overall or global priority. Continue this process of weighing and adding until the final priorities of the alternatives in the lowest level are obtained.

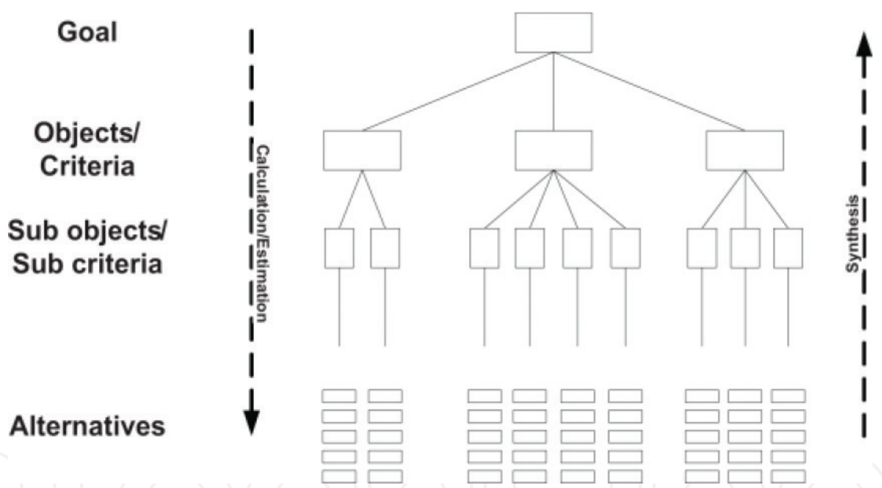

Figure 3. Hierarchy of AHP. Source: [32].

3.1. Group judgements

The AHP also allows a group of individuals to participate in a decision-making process [27]. In this case, each member is required to complete his or her own judgements in their individual comparison matrix. The individual pair-wise comparison matrices were then compiled to perform a group of pair-wise comparison matrix for each level of hierarchy. Next, each entry in the individual pair-wise comparison matrix was aggregated by using the geometric mean. This is conducted to determine the respective entries in the group pair-wise comparison matrices for all the identified criteria and sub-criteria [28, 37, 38].

4. Results and discussion

As mentioned above, the internal and external barriers of SCM implementation at Malaysian manufacturing companies were identified through literature review and subsequently got validated by academics and practitioners. The barriers are shown in **Figure 4** inside the screenshot of Superdecision software.

In order to rank the internal and external barriers of SCM for a Malaysian manufacturing industry, 10 respondents were contacted whose demographic information is provided in **Table 4**. As we see that the majority of the respondents are either Master's degree or PhD degree holders (9 out of 10). **Table 4** also shows that the respondents comprised one supply-chain manager, one senior estate manager, two business consultant and trainers, one environment and safety consultant and the rest five professors/associate professors in universities. All the academicians involved in the survey teach operations management and by virtue of their profession, they have practical experiences in dealing with supply-chain activities in Malaysian manufacturing industries. We also observe that all the respondents have working experiences 10 years or more. So, overall, it can be concluded that all the respondents participated in the present survey have sufficient expertise in organisation's supply-chain management.

When there are multiple respondents in an AHP survey, all the pair-wise comparison matrices need to be aggregated by using geometric means of the individual pair-wise comparisons [28, 37, 38]. **Tables 5–7** provide the aggregate pair-wise comparison matrices (PCMs) for all the 10 respondents. All the aggregated judgements were entered into Superdecision software version 2.8. The screenshots for the comparison between internal and external barriers, and comparisons among internal as well as external barriers are provided in **Figures 5–7**. The figures also show the priorities of the factors compared. For clarity purpose, the internal and external barriers and their corresponding priorities and ranks are shown in **Table 8**.

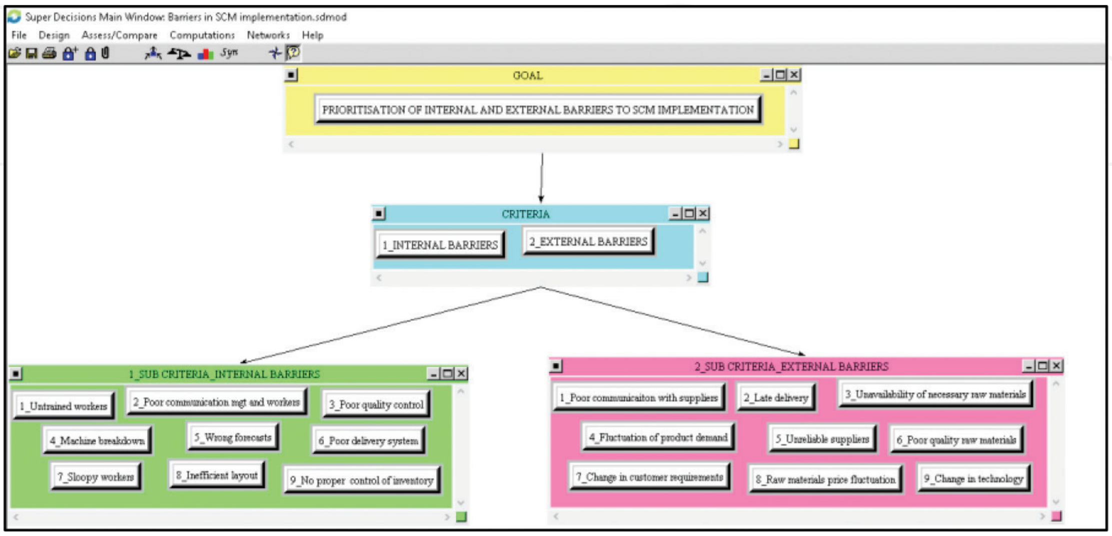

Figure 4. Internal and external barriers in SCM implementation.

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 years 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

Table 4. Demographic information of the respondents.

	C1	*C2*
C1	1	0.9603
C2		1

Table 5. PCM for two categories (internal and external).

	C11	*C12*	*C13*	*C14*	*C15*	*C16*	*C17*	*C18*	*C19*
C11	1	1.6487	0.4507	2.1885	0.7469	0.9815	2.589	2.1779	0.8152
C12		1	0.6297	0.9437	0.9568	1.8882	1.5368	0.9895	0.8572
C13			1	1.3681	1.1962	1.2993	1.1671	0.7575	1.1837
C14				1	0.4122	0.6332	0.2969	0.4695	0.533
C15					1	0.896	0.7435	0.9158	1.096
C16						1	1.1746	1.6531	0.8319
C17							1	3.2664	1.8131
C18								1	0.6297
C19									1

Table 6. Aggregate PCM for internal barriers.

	C21	*C22*	*C23*	*C24*	*C25*	*C26*	*C27*	*C28*	*C29*
C21	1	1.0704	0.7653	1.1279	0.8902	0.3006	0.9099	0.7177	0.7972
C22		1	0.7542	1.3865	1.4538	0.5207	1.8829	1.2267	0.8809
C23			1	1.2569	0.6165	0.3129	0.786	1.5651	1.9775
C24				1	0.6893	0.2577	0.4102	0.5769	1.1487
C25					1	0.4251	0.6534	0.9903	0.8992
C26						1	1.6219	1.6166	1.3266
C27							1	1.1567	1.0831
C28								1	0.6302
C29									1

Table 7. Aggregate PCM for external barriers.

From the global priorities of the internal barriers, it is observed that the five most critical barriers are (arranged in a descending order of criticality) the following:

1. Untrained workers
2. Poor-quality control
3. Inefficient layout of the factory
4. Lack of collaboration in the supply chain
5. Wrong forecasts

On the other hand, the five most critical external barriers are the following (arranged in a descending order of criticality):

1. Poor-quality raw materials
2. Change in customer requirements
3. Late delivery
4. Unavailability of necessary raw materials
5. Change in technology

Next, we have arranged all the internal and external barriers according to their corresponding global priorities. **Table 9** provides the ranking of all the barriers. From **Table 9**, it is clear that the most serious barrier is 'Poor quality raw materials'. This observation is also supported by [1]. It is also found that the least critical barrier is 'Machine breakdown'. This does not mean that 'Machine breakdown' is not serious; it merely shows that the other barriers considered (internal and external) are more serious compared to it. Once again, considering all the internal and external barriers together, we provide the following 10 most critical barriers:

1. Poor-quality raw materials
2. Untrained workers
3. Poor-quality control
4. Sloppy workers
5. Change in customer requirements
6. Late delivery
7. Unavailability of necessary raw materials
8. No proper control of inventory
9. Wrong forecasts
10. Change of technology

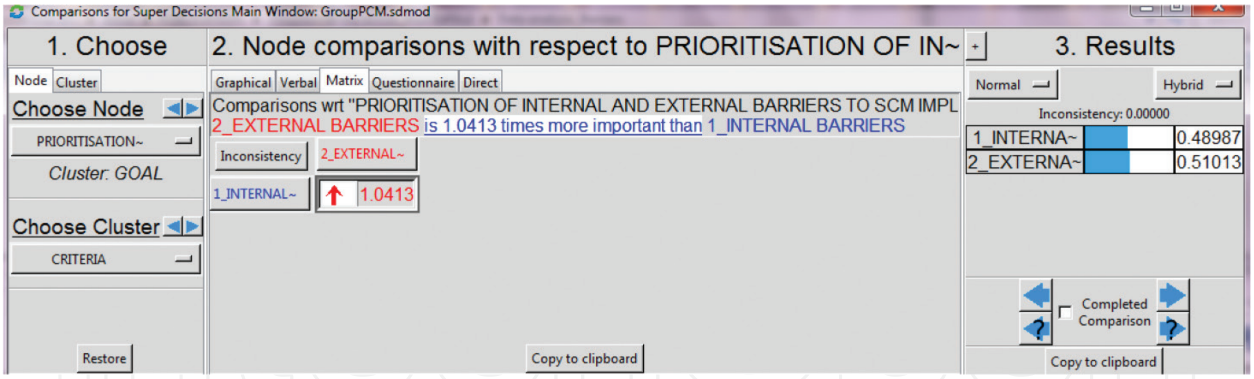

Figure 5. Superdecision screenshot for the comparison of internal and external barrier categories.

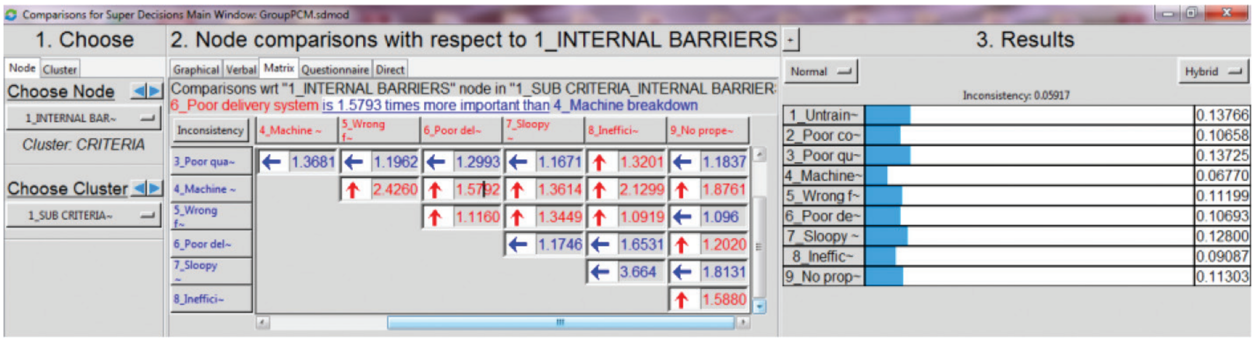

Figure 6. Superdecision screenshot for the comparison of internal barriers.

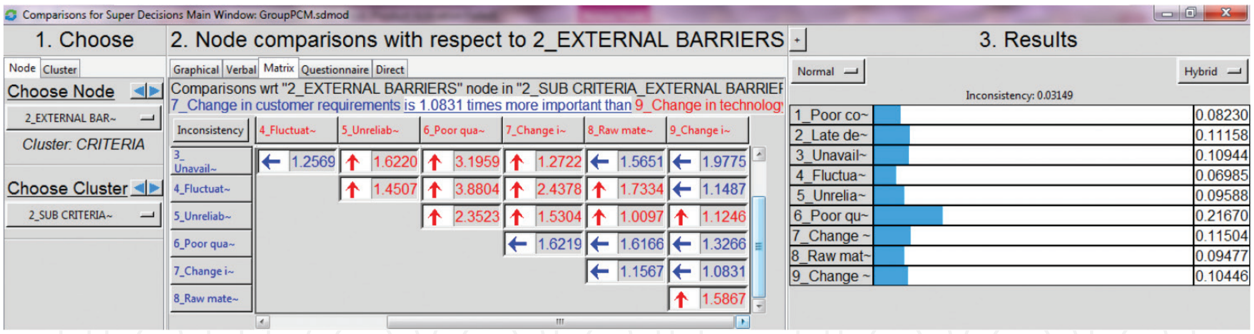

Figure 7. Superdecision screenshot for the comparison of external barriers.

Barrier	Local priority	Global priority	Rank
INTERNAL	**0.4899**	—	
• Untrained workers	0.1377	0.0674	1
• Poor communication between management and workers	0.1066	0.0522	7
• Poor quality control	0.1372	0.0672	2
• Machine breakdown	0.0677	0.0332	9

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Barrier	Local priority	Global priority	Rank
• Wrong forecasts	0.1120	0.0548	5
• Poor delivery system	0.1069	0.0524	6
• Sloppy workers	0.1280	0.0627	3
• Inefficient layout of the factory	0.0909	0.0445	8
• No proper control of inventory	0.1130	0.0554	4
EXTERNAL	0.5101	—	
• Poor communication with suppliers	0.0823	0.0420	8
• Late delivery	0.1116	0.0569	3
• Unavailability of necessary raw materials	0.1094	0.0558	4
• Fluctuation of product demand	0.0698	0.0356	9
• Unreliable suppliers	0.0959	0.0489	6
• Poor-quality raw materials	0.2167	0.1106	1
• Change in customer requirements	0.1150	0.0587	2
• Raw material price fluctuation	0.0948	0.0484	7
• Change of technology	0.1045	0.0533	5

Table 8. Local and global priorities of the internal and external barriers.

No.	Barrier	Category	Global priority	Rank
1	Poor-quality raw materials	External	0.1106	1
2	Untrained workers	Internal	0.0674	2
3	Poor-quality control	Internal	0.0672	3
4	Sloppy workers	Internal	0.0627	4
5	Change in customer requirements	External	0.0587	5
6	Late delivery	External	0.0569	6
7	Unavailability of necessary raw materials	External	0.0558	7
8	No proper control of inventory	Internal	0.0554	8
9	Wrong forecasts	Internal	0.0548	9
10	Change of technology	External	0.0533	10
11	Poor delivery system	Internal	0.0524	11
12	Poor communication between management and workers	Internal	0.0522	12
13	Unreliable suppliers	External	0.0489	13
14	Raw material price fluctuation	External	0.0484	14
15	Inefficient layout of the factory	Internal	0.0445	15

No.	Barrier	Category	Global priority	Rank
16	Poor communication with suppliers	External	0.0420	16
17	Fluctuation of product demand	External	0.0356	17
18	Machine breakdown	Internal	0.0332	18

Table 9. Ranking of all the 18 barriers.

Note that the distribution of these 10 barriers has been evenly distributed between internal and external categories.

5. Conclusions

Business environment in the twenty-first century is competitive which has further been compounded by the impetus of the fourth Industrial Revolution or IR 4.0. The situation is not an exception for the Malaysian manufacturing companies. The reason for considering manufacturing companies in Malaysia is that the lion's share of Malaysia's GDP comes from its manufacturing sector. Therefore, for sustainable performance of these companies, they need to apply best management practices relentlessly. Otherwise, at the passage of time, especially when Malaysia has opened up its manufacturing sector to foreign companies, the indigenous manufacturing companies will lose their competitive edge.

Many empirical research works have shown the substantial benefits that effective SCM practices can bring to an organisation. However, to achieve the optimum outputs in terms of supplier management, handling of inventory and customer satisfaction, the organisations must be aware about the barriers in successful implementation of SCM practices. The findings of this research provide some useful information to Malaysian manufacturing companies in chalking out their action plans in order to overcome those barriers. Once the barriers are overcome, the companies can maintain their competitiveness and continue in contributing to the country's GDP substantially.

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