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A collaborative supply chain management framework: Part 1 - planning stage  
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# REGULAR PAPERS

## A collaborative supply chain management framework

Collaborative  
supply chain  
management

### Part 1 – planning stage

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#### Abstract

**Purpose** – This paper presents issues associated with the needs of collaborative supply chain management (CSCM) and proposes a planning stage of a CSCM framework.

**Design/methodology/approach** – The proposed planning stage of a CSCM framework incorporates issues of organisation profile, internal functional strategy and supplier-customer strategy. The gauging absence of prerequisites (GAP) analysis technique which embedded in the knowledge-based system is proposed in the planning stage to analyse the gap between the current and the desirable position (benchmark) for an effective implementation in organisation.

**Findings** – The planning stage framework provides information specifically for designing a CSCM by focusing on the organisation capability and business processes and discussed the important issues in planning a CSCM for business organisations, specifically for a manufacturing environment.

**Research limitations/implications** – Further research could be carried out to capitalise the framework for improving the CSCM.

**Practical implications** – The proposed planning stage of a CSCM framework enables the chain members to identify key factors or issues for CSCM development.

**Originality/value** – The new aspects of the proposed CSCM are firstly, the proposed planning stage model is supported by a KBS approach. Secondly, the use of GAP analysis technique and finally, the planning stage framework provides information and issues for the design stage of CSCM framework.

**Keywords** Supply chain management, Channel relationships, Gap analysis

**Paper type** Research paper

#### Introduction

Supply chain management (SCM) is a system that contains multiple entities, processes and activities from suppliers to customers. The basic concept behind SCM is how the raw materials and information flow from the supplier to the manufacturer, before final distributions to customers as finished products or services. In addition, functional areas within the organisation also need information that flows through the SCM in order for them to make a decision to produce products. The capability of sharing and



exchanging information is essential to improve the effectiveness of the SCM. According to various literatures, SCM can be defined in many ways, such as:

A loop that starts and ends with the customer, where through the loop flow all materials and finished goods, all information and all transactions (Gattorna and Walters, 1996).

The integration of key business processes from end-user through original suppliers that provides products, services, and information that add value for customers and other stakeholders. (Lambert *et al.*, 1998).

SCM encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. It also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers and customers. In essence, SCM integrates supply and demand management within and across companies (CLM, 2004).

It can be seen that different perspectives of SCM have been proposed, whether from product flows, financial flows, information flows perspectives or from the perspective of relationship amongst the entities in the chain. This is in line with Bechtel and Jayaram (1997) who stressed that the SCM definitions vary due to the different perspective of academicians, researchers or practitioners. However, the basis for these definitions is related to the flow of materials and information, from initial sources to the transformation process before delivery to the end-users.

In the current era of dynamic competition, production costs are not the only factor that could help organisations to gain and sustain competitive advantage. Other factors such as improving customer's service levels, product customisation, product delivery times and product quality are the major contributors to the organisation's competitiveness. Organisations should plan a new strategy by considering these factors in developing a collaborative or integrated SCM in order to improve or sustain their organisation's competitiveness through their SCM capability. By imposing a collaborative and co-operative environment or culture among suppliers, logical boundaries among the SCM partners can be eliminated in order to gain same benefits through a win-win situation. In addition, it is believed that the success of this relationship can be supported through intensive use of information and technology, and improvement in human resources and business processes.

Collaborative supply chain management (CSCM) is a new strategy that has evolved in the 1990's (Barratt and Oliveira, 2001), and is motivated by the earlier approaches such as just-in-time (JIT), electronic data interchange (EDI) and quick response (QR). CSCM not only enables the smooth information sharing and exchanging but also preparing in sharing knowledge, risks and profits by taking into account all related functional areas which participate in any process along the supply chain (Chandra and Kumar, 2001). According to Mentzer *et al.* (2000), CSCM can be defined as:

...all companies in the supply chain are actively working together as one toward common objectives by sharing information, knowledge, risk and profits which could involve on how other companies operate and make decisions.

Based on this definition, it can be seen that by implementing CSCM all parties (suppliers, manufacturers, customers) need to develop a trust among them as the basic principle in this strategic partnership, which is the key factor in forming supply chain collaboration (Akintoye *et al.*, 2000). This factor would lead to the other factors such as

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openness, mutual help, corrective and preventive action among parties, synchronization of resources and developing a common interest. CSCM is viewed as one of those SCM strategies that would give significant benefits, including:

- *Customer service improvements.* Service to customers (internally and externally) could be improved through implementation of CSCM. Internally, the functional barrier could be reduced through a better communication which could also improve the effectiveness in making decisions related to forecasting, designing and marketing. This situation indirectly influence the effectiveness of delivering, producing and distributing products to the external customer which would increase the satisfaction and loyalty of customers towards organisations and its products.
- *Cost reduction.* By implementing CSCM, the cost of inventory could be reduced. Contrary to the JIT approach, which transferred the cost to upstream or downstream of the supply chain, in CSCM this cost will be shared among the parties and this would lead to a reduction of production costs. In addition, the risk could also be dispensed among the parties in the supply chain.
- *Efficient use of resources.* Resources that are available among the supply chain parties could be utilised more effectively such as human resources, technology and raw materials. In the collaborative environment, each party are agreeing to work together in order to achieve a common objective. Furthermore, resource-planning decisions such as human resource development and technology planning could be done effectively by considering the capabilities of all parties.
- *Business process improvement.* The CSCM implementation is believed to help all parties in the supply chain to align and improve their business processes in order to maximise their capabilities in facing the challenge of dynamic market. Improvements in business processes would help these parties to eliminate the redundant and valueless processes. This improvement could maximise the effectiveness of the supply chain and build up the competitive advantage over other supply chains.

These benefits could be achieved through an appropriate planning and designing of a CSCM. In order to make it work effectively, CSCM needs to echo the changes in the dynamic market by addressing some barriers that exist in the supply chain collaboration. Impediments such as human development programs, internal and external business processes alignment and technology enhancement are among the issues that are considered in this CSCM planning. Furthermore, with advances in the information and communication technology, customisation-based products and emergence of the world economic groups, it is clear that a CSCM is an option for manufacturers to implement in order to prevail in the market competitiveness.

## 2. Research background

Recently, many organisations have focused more attention into the concept of CSCM (Peterson and Cecere, 2001) after the success that was shown by several companies who implemented it, and gained significant advantages highlighted earlier. All parties or organisations (suppliers, manufacturers and customers) in the supply chain must work together as one organisation moving toward a common objective and taking a responsibility in sharing and exchanging common planning, forecasting, performance

measurement and management of information (Anthony, 2000; Mentzer *et al.*, 2000). This capability is needed in order to make the supply chain work effectively in this collaborative environment. Apart from that, the infrastructure or technologies that enables organisations to collaborate with its suppliers and customers are also needed (Anthony, 2000). Technology such as computer hardware, database, information system and the internet are factors that contribute in making CSCM a success. Furthermore, people factors such as openness, trust, willing to change, leadership style, co-operative and clear objectives also play a significant roles in CSCM (Mentzer *et al.*, 2000). The real collaboration only happens when changes (people and technology) take place in organisations and partners. In developing a CSCM, an appropriate amount of planning and design is needed in order to make it work effectively and efficiently.

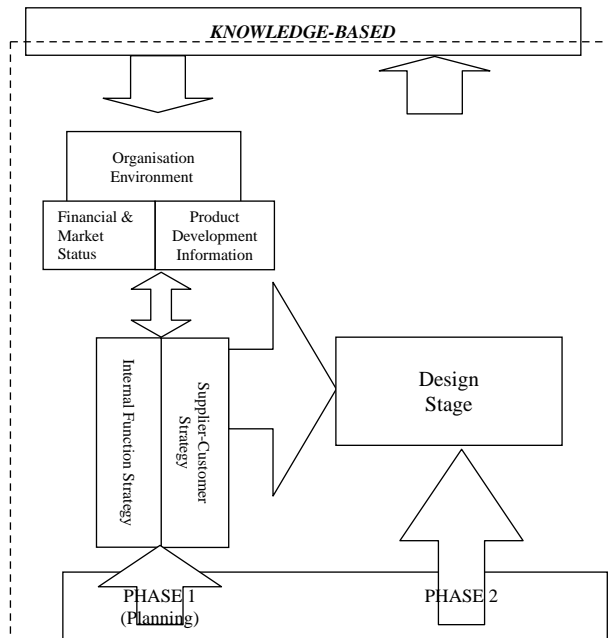
The integration problems that arise in SCM also contribute to the need for redesigning it into a CSCM. Hoyt and Huq (2000) cited that in order to make CSCM successful, drastic action is needed to change or redesign the organisational business processes and structures. Referring to Lee and Billington (1992), among the factors that impact the effectiveness of SCM is the separation of the supply chain. This situation has effect on the operational decision that is needed in managing the flow of materials along the supply chain. Furthermore, they stressed that differences in objectives and performance measurement, unwillingness to share resources and controlling the flow of information are the factors that contribute to the ineffectiveness of the supply chain. This situation negatively impacts organisations in producing a better product for customers. Stevens (1990) stresses that the conflict that arises in SCM is due to the inadequacy of the traditional approach in designing a SCM where organisational business processes are viewed as separated and disintegrated functions.

However, there is still a lack of effort in planning and developing an integrated or collaborative SCM (Bechtel and Jayaram, 1997). Integration across disciplines or functional areas is needed in order to resolve the complexity of linkages in the supply chain. Traditional approaches, known as “arms-length” approaches which are based on the market-price should move into more strategic partnership through supply chain collaboration to ensure the effectiveness of supply chain system (Hoyt and Huq, 2000). By implementing a collaborative supply chain it is believed that, through involvement of many functional areas, this would increase the capability in producing better products or services at lower cost and lead-times, which leads to high level of supply chain integration that foster the development of C-commerce (collaborative commerce) in the future business.

### **3. A planning stage framework for CSCM development**

The planning stage framework is the basis for developing the CSCM. The utilisation of a knowledge-based system (KBS) throughout the framework adds an advantage in planning, designing and implementing a CSCM (Figure 1). In this research, there are three main components in this stage. This first stage of the research framework includes explanations on organisation profile (organisation environment, financial and market status and product development information), internal function strategy and supplier-customer strategy.

In order to analyse the gap between the actual organisation’s environment that currently exists and the desirable position (benchmark) for an effective implementation in organisation, the gauging absence of prerequisites (GAP) analysis technique is used in the



**Figure 1.**  
Framework of CSCM  
development (planning  
stage)

planning stage. GAP analysis is a technique that is used to assess the gap between the organisation's actual environment and an ideal one, resulting in knowledge of the desirable prerequisites for an effective implementation (Kochhar *et al.*, 1991) and has several objectives according to the scope of its application. In this research, the first objective is to identify the main element for the effective implementation of CSCM. Through the GAP analysis, the main elements that are needed for CSCM implementation can be revealed from the implementation of the KBCSCM system. The second objective of utilising GAP analysis in this research is to provide a quantitative basis for comparing the status in the present condition with the future requirement for the effective functioning of CSCM. The final objective is to identify the strengths and weaknesses of current practices in suppliers, OEMs and customers so that some practices can be aligned or amended for suitability in the new environment of SCM.

In order to identify whether the response given by users (suppliers, OEM and immediate customers) is in the good point category or bad point problem category (PC), the specific code is used and shown in Table I. The PC is ranked from 1 to 5, as shown, with the latter PC-5 being the least critical condition. Based on the GAP analysis technique, only the bad points are categorised into PC, due to the aim of the system being to identify the missing pre-requisites that are needed in order to make the implementation of CSCM a success.

Through this result, the missing pre-requisites of the current position of suppliers, OEMs and customers can be identified through the number of bad points. The utilisation of GAP analysis within the KBS is not only provides advantages in terms of user-friendliness, quicker, detailed analysis and the quality of output but also the capability of KBS provides a support to the management in terms of providing

**Table I.**  
Problem categories and  
description of GAP  
analysis technique

| Category | Code | Description   |
|----------|------|---|
| 1        | PC-1 | This indicates a serious problem, which should and can be resolved in the short term and the result of the problem is quite likely to provide a real short-term benefits  |
| 2        | PC-2 | This indicates a serious problem, which is likely to have pre-requisites and is better dealt with as part of an appropriate and logical improvement and implementation plan   |
| 3        | PC-3 | This is not a serious problem and can be dealt with now. If resolved, it is likely to produce short-term benefits   |
| 4        | PC-4 | This is not a serious problem. Although it could be dealt with now, it is unlikely to produce short-term benefits. Therefore, it should only be dealt with if it is a pre-requisite for other things  |
| 5        | PC-5 | This is not really a Good or Bad point it self. The questions associated with this category are primarily asked to identify certain situations in the environment, which upon subsequent probing by succeeding questions may well reveal problems |

**Source:** Kochhar *et al.* (1991)

solutions during the process of planning, designing and implementing the CSCM. Solutions that are generated through rule-based procedure are the results that are inferred from the compilation of knowledge and data by utilising an inference engine that is embedded in the KBS.

### 3.1 Organisation profile

Organisation profile is used to gather the information that relates to general information and organisation background of the company that being is analysed. The function of this component is to understand the current status of organisations by examining the current operation and process through information that is supplied by users. There are three sub-components namely: organisation environment, financial and market status information and product development information.

*3.1.1 Organisation environment.* Firstly the general information such as the user's background, which includes name, position and department, is gathered. The user also needs to enter the name and address of organisation. This information is used for identification and location purposes. In addition, this general information is used for making a comparison with other users from different organisation and also for reporting purposes. Secondly, the organisation background information is gathered in order to see the current situation of the organisation, which relates to the type of industry where the organisation exists, age of organisation, number of employees, number of products, number of suppliers and number of customers. The type of industry data is needed in order to classify the organisation into various standardised grouping: high technology, medium technology or low technology (Willmott and McCarthy, 2001) and shown in Table II.

The classification is done due to the reason that different industries have different types of processes and operations, which influence the strategy in developing a CSCM. Furthermore, this classification is needed due to the differences in the SCM between various industries, for example the supply chain activities in automotive industry is different from the supply chain activities for electronic equipment industry. By utilising

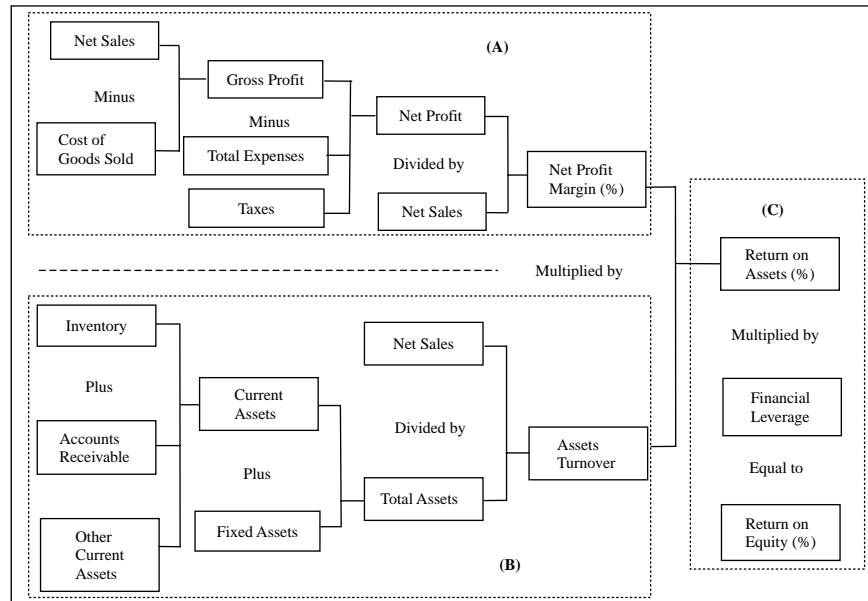


the number of employee's data, organisations can be categorised into small-scale, medium-scale or large-scale organisation as described by Wong *et al.* (1994), Higginson and Alam (1997) and Houben *et al.* (1999). In addition, to understand the operation of organisations, information about employees who work in such organisations is gathered in order to see the size and changes in term of organisation employees. By utilising the data that relates to the age of organisations, information about the duration of organisations established in that industry and their relationship with suppliers and customers (whether it is in the initial, growth or maturity phase) can be identified. Information that relates to the number of suppliers and number of customers is needed in order to see those who supply to the organisation and those who buy the products from the organisation. This is important for organisations in order to make an evaluation before the potential supplier and customer is selected in CSCM development. In this research, information about supplier and customer is restricted to the 1st-tier supplier and 1st-tier customer (distributor) only.

*3.1.2 Financial and market status information.* The organisation financial and market status information is the second sub-component in the organisation profile component in CSCM planning stage, and relates to financial information and financial movement in organisations. The information that is needed here is related to sales, profit, expenses, cost, inventory, assets and liabilities. This information is used to calculate the organisation financial ratios. Measuring the organisation financial performance is important in order to see the current financial position of organisation where, through this information, the top management make a decision whether to proceed or not proceed with their plans. As discussed by Rockstroh (2002), financial conditions specifically are related to cost, play an important role along with quality and speed in facing the challenges in the global market. In developing a CSCM, the financial position is used by organisations to evaluate the suppliers and customers in order to make sure that suppliers and customers are having a potential to make the CSCM work smoothly. Inadequate financial strength would only deliver a burden and risk to other parties in this collaboration. In measuring an organisation's SCM, profitability ratio is widely used along with the utilisation of the du Pont Model, which has been used by many organisations due to its reliability and consistency (Gattorna and Walters, 1996). Through this model, as shown in Figure 2, the changes can easily be analysed and managers can focus on what aspects in the supply chain deliver significant impact on the organisation's financial performance. In profitability ratio, there are six ratios that could be used in measuring the financial status of organisations SCM, which are return on sales (ROS), asset turnover, return on assets (ROA), financial gearing (leverage), return on equity (ROE) and inventory turnover. These financial data are important to examine the organisation's SCM competitiveness and to analyse which factors are

| Industry classification | Type of industry  |
|-------------------------|---|
| High-technology         | Scientific instruments, pharmaceuticals, electronics, IT and communication equipment, aerospace, electrical machinery |
| Medium-technology       | Chemical, rubber and plastics, non-electrical machinery, motor vehicles and other transport equipment                 |
| Low-technology          | Wood products, textiles, footwear, food and beverages, tobacco, paper and printing, petroleum refining                |

**Table II.**  
Classification of industry  
based on technology  
implemented



Note: (A) = Margin Management, (B) = Asset Management, (C) = Financial Management  
Source: Mentzer (2001)

Figure 2.  
du Pont model

highly contributing to making the organisation competitive and potential to collaborate with other parties in CSCM.

The market status analysis assesses how successful organisations are in positioning their products and capturing customers in their chosen market locally or globally. This assessment shows how competitive the price and products offered in the market are. Hill (1995) highlighted that market share assessment is the first stage in evaluating customer demand and analyse the product characteristics that need to be offered in order to win in the market place. It has been proven that the structure and management of the supply chain plays an important factor in improving organisation's competitiveness to capture a large market share (Womack *et al.*, 1990). Christopher (2000) supports this finding, by stressing the importance of agility of supply chain in facing and surviving in the uncertain market challenges.

As mentioned earlier, a major factor that contributes to competitiveness in the market is the product itself. The effectiveness and efficiencies of an organisation's SCM deliver a significant impact on the product development activities. Suppliers' and customers' involvement along the chain in activities such as product design; development process, quality measurement and product tracking are crucial in producing high quality, low cost and short time-to-market products. Sahay (2003) stated that sharing information, expertise and facilities available from suppliers in the supply chain could help OEMs develop products faster and better. Moreover, he revealed that customers could also play a significant role in supporting OEMs through their involvement in demand planning and inventory replenishment by providing information that relates to market or industry demands. Previously, Liker *et al.* (1998), Handfield *et al.* (1999) and Pawar and Sharifi (2002) stressed the importance of supplier

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participation in product development activities, in order to capture market share through low cost product, high quality and faster in concept-to-customer development time.

*3.1.3 Product development information.* The product development information sub-component gathers all data related to the organisation's products: product types, product design and development and production strategy. According to Yeh (2000), the product data is needed in order for organisation's to make a strategic decision such as deciding what production planning system should be implemented. In addition, product data or information is important due to the competition among organisations, as this based on the products they produce. This would determine the success or failure of organisations along with other factors such as delivery speed, cost and quality. Products also play an important role in determining the organisation competitiveness and the percentage of their market share. Beside, it also captures suppliers' and customers' information to measure their involvement in product development activities. Twigg (1998) summarises the dimension of supplier involvement, which include contribution from suppliers, level of involvement, stages in product development and components supplied. This dimension could help OEMs in selecting potential suppliers, which are not only based on the offered price, but also consider other important factors such as product development lead-time, delivery schedule time, delivery quality and reliability. Similarly to the other stream of the SCM, customers also play an important role in product development activities. The information about customers' involvement in product design and development activities is gathered for the purpose of evaluating the extent of relationship within the OEM. Customers such as wholesale distributors and retailers are the windows of the OEM in producing products. Information gathered from them relating to demands and needs from end customers is used as a platform in developing products. The relationship between customers and OEM could improve OEM product development activities through utilisation of information such as demand planning and customer expectation (Sahay, 2003).

Initially, information that relates to general information about the product such as type of product, product name, the numbers of product model, the numbers of product sold in three consecutive years, the volume of product per model and the cost of producing one product is needed. Extending from this information, information that relates to speed of product process, product design and development (product competitiveness), production process, strategy and technology, product quality, product order and delivery tracking and question related to product inventory (raw material and finished product) is required for the purpose of investigating the type of production strategy, process and technology that is currently being used. It is believed that, based on their involvement in these activities, the level or degree of their relationship (suppliers, OEMs and customers) can be analysed. Furthermore, the assessment on the product quality is established for the purpose of investigating the extent to which suppliers, OEMs and customers measure the quality of raw materials and products during product development processes. In order to produce high quality products, measurement and assurance of quality should begin in the early process of development. Product tracking is important in order to reduce the loss of materials during the product development process. It helps suppliers, OEMs and customer to eliminate waste along the external and internal chains. This information is critical for OEMs as an initial stage to identify the potential suppliers and customers for CSCM.

### 3.2 Internal function strategy

The internal function strategy component is developed to identify the functional activities in the organisation's internal supply chain. The importance of this module is to see the position of the organisation's internal function with respect to its SCM. This argument is parallel to what has been discussed by Ellinger (2000), Ferguson (2000) and Sarkis and Sundarraj (2000), where the effectiveness and supportiveness of the internal function is the key factor in making organisations work smoothly and successfully in their supply chain. Furthermore, the ability of the internal function to work closely with each other also gives impacts on organisations in developing a good relationship with suppliers and customers, which include development in commitment, responsibility, teams, training, values and policies of organisation, integration and linkages, knowledge, involvement, support and utilisation of information, communication and technology. In organisation's internal supply chain, activities and departments that are involved are procurement (purchasing department), product design, production planning, process planning, process control and quality control (manufacturing and production department), sales planning and forecasting (marketing and sales department), cost control (financial department) and distribution, shipment and warehousing (distribution department).

In developing an effective internal functional relationship, issues such as leadership and commitment, integration and resources utilisation should be considered. Higginson and Alam (1997) identified that commitment development and involvement are the strategic factors that significantly contribute in improving the effectiveness of the internal supply chain, which can reflect on the improvement in the suppliers-customers relationship. The second issue is related to internal integration, which also plays an important role in supporting SCM, as well as in developing CSCM. Issues such as trust development, information sharing and communication development are widely discussed amongst researchers (Mason-Jones and Towill, 1997; Ellinger, 2000; Ferguson, 2000; Sarkis and Sundarraj, 2000; Zineldin and Jonsson, 2000; Burt *et al.*, 2003). These operational issues in functional areas play a significant role in determining the smoothness of the organisation's internal chain. Zineldin and Jonsson (2000) pointed out that the trust development factor is amongst major factors that influence relationship commitment, which is also a core factor in developing CSCM. Trust is not only important to the external supply chain in collaboration development, but also inspires the internal relationship in the organisation. In addition, this factor can also eliminate an uneasy relationship between functional areas and the "turf war" which refers to functional areas that just focus on their own survival and interest in the organisation, as described by Handfield and Nichols (1999).

Similarly, trust development also has direct linkages with the sharing environment that should evolve in organisations and their partners. Relating to information deployment that flows in the supply chain internally and externally, the capability of supply chain members to share this information can deliver a significant impact on the performance of the supply chain. As an example, Zhao *et al.* (2002) illustrated that the capability of suppliers, OEMs and retailers to share information and co-ordinate their replenishment and production decisions would result in a tremendous improvement in the SCM performance, such as cost reduction and improving the customer service levels. Furthermore, by developing an information-sharing environment, the problem such as order magnification, where information moves up from a downstream process,

information delays could be reduced and eliminated (Mason-Jones and Towill, 1997). This is important for all players in the supply chain to avoid the “Bullwhip Effect” phenomenon, as extensively described by Lee *et al.* (1997) and Xu *et al.* (2001).

Communication aspects should be the first factor in developing a sharing environment amongst players in the supply chain. Burt *et al.* (2003) state that an organisation should foster an open communication environment within it to enable information to flow smoothly in timely and high quality forms. The improvement in formal and informal communication throughout the organisation will increase the relationship between functional areas and contribute in developing trust among them. Zineldin and Jonsson (2000) again raised the issue concerning trust development in the internal and external supply chains by stressing the important communication factor, on which they conclude that by sustaining and improving good communication, this will assist these supply chain players internally or externally to understand each other's goals and better coordinate their effort to achieve those goals.

The third issue in developing an effective internal relationship is related to organisation resources utilisation. The development of cross-functional teams in supporting internal and external supply chains delivers a significant impact on supply chain performance. Dyer (1996) has described this situation by revealing the success of Chrysler in reorganising into cross-functional teams, which resulted in an improvement in its business activities. In the collaborative environment of the supply chain, cross-functional teams are needed, ranging from procurement to distribution activities, in order to reduce miscommunication, to improve the decision-making process and to share risk and responsibility. Another aspect that needs to be considered and has a relation with cross-functional team is training programmes. Burt *et al.* (2003) emphasised that cooperation, understanding and mutual interest development can be improved through training. These are important aspects to make the teamwork effectively and have competency in facing problems that occur in the supply chain activities. In essence, the important part of training is to create a sense of trust among members in the team, which contributes to the close relationship development. The ability of the internal functions to work closely with each other also has impacts on organisations in developing a good relationship with suppliers and customers. Baliga (2001) stressed that the simplicity and consistency of internal processes within the organisation not only improve the interaction with suppliers, they also increase the power of the organisation in dealing with them.

Information that flows throughout the internal supply chain is controlled and managed by the information system department. All these functional areas are need to streamline their business processes in order to implement a collaborative environment. Through this framework, by gathering all information from these departments, a strategy for aligning appropriate business processes can later be identified during the designing stage.

### 3.3 Suppliers and customer strategy

Supplier and customer strategy is the final component in the CSCM planning stage. It is developed to identify activities in the organisation's external supply chain, which includes several processes that are used in producing products. The importance of this component is to investigate and analyse the current position of suppliers and customers with respect to organisation SCM. The relationship between the organisation (OEM) and suppliers-customers is important in the current supply

chain as a platform to develop a CSCM (Sahay, 2003). Dyer (1996) highlighted that benefits such as increasing market share, improving delivery, improving quality and reducing cost are not only achieved by the organisation (OEM), they also spread to suppliers and customers as well. This argument has also been discussed by Ellinger (2000), Ferguson (2000) and Sarkis and Sundarraj (2000), who revealed that the changes in the supplier-customer relationship from adversary to co-operative and collaborative relationship is the strategic initiative to make organisations work smoothly and successfully in their supply chain.

In developing an effective supplier-customer relationship, issues such as leadership and commitment, relationship development, integration and partnering development need to be considered. Zineldin and Jonsson (2000) identified that commitment development from every player in the supply chain is the strategic factor that contributes much in improving the effectiveness of the supplier-customer relationship. In addition, Hoyt and Huq (2000) discovered that without commitment, it is very hard for organisations to form a mutual agreement with their suppliers and customers in developing a good relationship.

The second factor to develop an effective supplier-customer relationship is the development of a close and good relationship amongst players in the supply chain. According to Dyer (1996), by joint involvement in the product design and development activities through cross-organisational teams, it is not only reduces costs but also helps in developing trust, respect and shared attitude among them. In addition, Rutherford *et al.* (1995) revealed that training is not only a way of improving skills and expertise, it is also a place to synchronise and develop core values and cultures, trust, co-operation and performance evaluation through their activities and programmes. Providing incentives to suppliers and customers for their commitment and performance also contributes in developing a good relationship among OEMs, suppliers and customers. Ellinger (2000) stressed that through the implementation of incentives and rewards schemes in reaching their mutual objectives in the relationship, it is believed the relationship between supplier, customer and organisation could be improved. Simatupang and Sridharan (2002) also identified that there are many ways of providing incentives and rewards to suppliers or customers, whether on a monetary or non-monetary basis, such as based on productivity and performance.

The integration that exists in their current relationship is the third factor for an effective supplier-customer relationship. This is important to avoid misunderstanding between them and also to avoid a bottleneck while conveying information throughout the chain. The utilisation of multiple communication channels such as network and information technology can improve the performance and effectiveness of communication. The utilisation of technology, especially for information and communication, can enhance the relationship between suppliers and customers. Chopra and Meindl (2001) claimed that through an effective utilisation of technology in the supply chain, especially the utilisation of information technology, all players could achieve a significant improvement in terms of quality, delivery and cost.

According to Willis (1998), a strong relationship between suppliers and customers must be established which is committed to quality improvement, cost reduction and time improvement, in order to achieve a win-win situation among them. Thus, partnership development is a preliminary stage, where suppliers and customers make an initial arrangement before a truly cooperative or collaborative relationship can materialise and become visible. The partnership process and success are two factors in the partnership

development that need to be determined and identified by players in the supply chain in order to develop an effective and efficient partnership. However, the success of this partnership could only be justified by measuring performance from supplier and customer satisfaction. The supplier satisfaction programme directly evaluates the performance of suppliers in terms of quality, delivery, cost and after-sales services. Wong (2000) viewed supplier satisfaction as the OEM's programme that is used to gain support from suppliers in order to satisfy their customers. OEMs will evaluate their suppliers' performance by assessing quality of materials or products, delivery time (on-time delivery, late delivery), cost (products, shipments) and services from suppliers (fast response, easy to contact). OEMs will measure these factors and decide whether to continue or terminate their relationship with a particular supplier. Through this programme, OEMs could decide and select suppliers that really have capability to be a partner in developing a CSCM. In addition, since every product moves to customers, it is important for OEMs and suppliers to gather information about satisfaction of customers relating to products that are produced by them, as discussed by Simchi-Levi *et al.* (2000). There are many benefits that could be achieved by implementing the customer satisfaction programme, for example reduction in warranty claims and customer returns, quality and service improvement, repurchasing and after-sales service improvement.

Finally, these factors are not only used for assessing the relationship of suppliers and customers, they also contribute to the development of trust, dependability and respect among them (Stank *et al.*, 2001; Wagner *et al.*, 2002; Simatupang and Sridharan, 2002; Jonsson and Zineldin, 2003).

#### 4. Conclusion

In summary, this paper has described the importance for organisations to implement the CSCM in order to improve their competitiveness. It has also discussed the important issues in planning a CSCM for business organisations, specifically for a manufacturing environment. There are three main components that are included in the planning stage of a CSCM framework for the purpose of identifying the current position and expected condition for all parties in the supply chain. Each of these components has their own variables that correspond to the function in the knowledge-based CSCM (KBCSCM) system. To conclude, the new aspects of the proposed CSCM are firstly, the proposed planning stage model is supported by a KBS approach. Secondly, the use of GAP analysis technique in analysing the gap between the current position and expected position that is need in developing a CSCM through KBCSCM system. Finally, the planning stage framework provides information specifically for designing a CSCM by focusing on the organisation capability and business processes, which is implemented in the design stage of CSCM framework.

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