Factors affecting ERP system effectiveness in post-implementation stage within Malaysian manufacturing companies

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Abstract: Enterprise resource planning (ERP) system has become one of the main pre-requisites for many companies enabling them to compete in the local and global market, a price of entry to gain a competitive advantage in the global economy, and a backbone for e-business as well as for the whole supply chain. Many companies are still reluctant to implement ERP system and therefore they will not be able to join the supply chain of several global and local companies where ERP system has become a pre-requisite and a price of entry for the global economy. This study has investigated the impact of ERP system on supply chain performance with respect to top management support, employee involvement, and cultural fit in the context of Malaysian manufacturing companies that are using ERP system and this is to fill up the gap in post-implementation stage. The study found that employee involvement, top management support, and cultural fit partially affects positively and significantly the relationship between ERP system and supply chain performance.

Keywords: enterprise resource planning; ERP; system; supply chain performance; organisational variables; Malaysia.

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1 Introduction

Business management has entered the era of networking competition which moves the competition from local to global business environment and from company against company to that of supply chain against another supply chain. Currently, competition is not measured only by individual company performance but also in terms of supply chain performance. This competition of supply chain performance will increase the pressure on companies to meet customer demands as well as to achieve customer satisfaction and loyalty (Hsu, 2005; Subramoniam et al., 2009).

The current changing business environment with fierce competition in the global market, intense pressure to meet challenges, the need for better and cheaper products with fast delivery, wide spread information networks, globalisation, and the proliferation of e-commerce and e-business, are putting on an increasing demand for companies to build a strong information system infrastructure and to keep up-to-date with new technologies, such as ERP system, in order to remain competitive in the global economy (Palaniswamy and Frank, 2000).

Today, companies are constantly experiencing domestic and foreign competition, and they are seeking for robust technologies that can enable them to achieve better control over their business performance and attain cost reduction. There is also a need to improve quality standards as well as enhancing customer services to enable companies to compete in local and global marketplaces. Companies are also continuously struggling to reduce costs and response time, increase business profits, and improve their market share in order to gain a competitive advantage in the global economy. These great challenges also include managing stocks, distributions, services, customers, sales, workflow, operations, and materials (Spathis and Constantinides, 2003).

Companies are beginning to realise that in order to survive in the global business environment they must improve not only their organisational efficiency, but also their whole supply chain. This is because competition today is not limited between companies only, but it has extended to be among their supply chains as well. These reasons force many companies to keep up to date and make large investments in developing and implementing better technologies and system such as ERP system (Davenport and Brooks, 2004; Maditinos et al., 2012).

2 Research objectives and questions

2.1 Problem statement

Switching from a traditional business processes to a new way of conducting business through implementing new information system such as ERP system and therefore abandons the legacy system in order to run the new business processes, is considered as difficult task and may cause a system failure and then lead the whole company to bankruptcy. Although there are success records with ERP system, there are also cases of failures in some companies (Farmer and Luening, 2001; Chen, 2001).

Due to these failures many companies are still indecisive on making an enormous investment, paying large sum of money, and giving long time in implementing such new system. In fact, these cases of failures prevent many companies to implement ERP system because they frightened to have the same experience of bankruptcy (Huang and Palvia, 2001; Zhang et al., 2002; Rajapakse and Seddon, 2006).

In fact, ERP system show dissatisfactions in many companies, and in some cases the system have shown a system failure. For example, a study has been conducted by Trunick (1999) pointed out that, only 40% of the implemented ERP system shows just some of its full effectiveness, and 20% of the implemented ERP system was considered as complete failure. Moreover, Ptak and Schragenheim (1999) stated that, 60% to 90% of the implemented ERP system was not very effective as what was expected from the companies.

Many studies such as, Stewart et al. (2000), Soh et al. (2000), Nah and Lau (2001), Kashef et al. (2001), Loonam and McDonagh (2005), Boersma and Kingma (2005), have exposed that, the reports of ERP system failure in many companies could be due to the following:

- lack of support from the top management
- paucity of involvement from employees, who are the system users
- poor attention from the whole company of the huge business change
- inadequate preparation of the company for the enormous implementation
- system failure could also be attributed to cultural misfit problem.

2.2 Research objectives

1 To investigate the impact of ERP system on supply chain performance.

2 To explore the effect of top management support on the relationship between ERP system and supply chain performance.

3 To investigate the effect of employee involvement on the relationship between ERP system and supply chain performance.

4 To explore the effect of cultural fit on the relationship between ERP system and supply chain performance.

2.3 Research questions

1 What is the impact of ERP system on supply chain performance?

5 What is the effect of top management support on the relationship between ERP system and supply chain performance?

6 What is the effect of employee involvement on the relationship between ERP system and supply chain performance?

7 What is the effect of cultural fit on the relationship between ERP system and supply chain performance?

3 Literature review

3.1 ERP system

By the late of 1980s and early 1990s many companies were suffering from an enormous IT integration problems and were in need for an absolute software solution that can integrate different functional areas and at the same time allow these functional areas to share from a single and centralised database without any data inconsistency problems and without losing flexibility. Therefore, software vendors established ERP system in the mid of 1990s in order to solve integration problems, make effective business solution, and provide companies with all IT needs under a single software system (Loonam and McDonagh, 2005).

ERP system were emerged in the beginning of 1992, however, in the recent years ERP system has become one of the most well-known business software in the marketplace and an essential part of everyday IT investments for many companies that believe ERP system will provide solutions for their IT problems and therefore provide effective online transactions with the current e-business era. Moreover, one of the significant and global developments of IT is the broad acceptance of ERP system by many companies worldwide which reached today to consider ERP system as the most rapid growing system in operational area (Lopes, 1992; Zhang et al., 2004; Molla and Bhalla, 2006; Subramoniam et al., 2009).

ERP is software for business management system which integrates all business functions, processes, and information between different departments inside the company. This business software system will allow companies to automate and integrate the majority of their business processes, share common data and practices across the entire enterprise, and produce and access information in a real-time environment (Lopes, 1992; Deloitte, 1999; Kemp and Low, 2008).

3.2 Supply chain

Supply chain performs two main functions the first one is physical function which is referring to function of transformation, storage, and transportation. The second function is market mediation and is containing function of matching demand and supply. Therefore supply chain can be viewed as a network comprising suppliers, manufacturers, distributors, retailers, and customers. Briefly, a supply chain is the cycle of buy-make-move-store-sell (Fisher, 1997; Akkermans et al., 2000; Sheikh, 2003).

Supply chain is the sequence of business processes and information that assist the company to provide goods and services throughout the supply chain which passes through suppliers, manufacturers, distributors, retailers and finally end-customer (Schroeder, 2000). Throughout the supply chain the business environment changes and the supply chain design as opposed to supply chain coordination is becoming a core competitive advantage which force companies to manage and integrate their supply chain effectively (Fine, 1998).

3.3 ERP system and supply chain performance

Davenport and Brooks (2004) noted the large impact of ERP system on supply chain in helping companies to share information with other partners. Upon receiving an order from their customer, their suppliers will immediately replenish the raw materials based on the information they received. Therefore, in order to monitor and collect information within the supply chain, ERP system is needed.

There is a wide consensus among many authors on the importance of ERP system in the improvement of supply chain performance. For instance, Wieder et al. (2006) found that, there are positive impacts of ERP system on supply chain performance. Zeng and Pathak, (2003) stated that, there are several records of success indicating that the integration of supply chain can enhance and improve the performance of the supply chain to be effective and competitive in the global business environment. Moreover, Hitt et al. (2002) pointed out that, investment in ERP system improves productivity and business performance. Cotteleer (2002) find that, ERP system able to improve operational performance within the supply chain. Themistocleous et al. (2002) come up with a conclusion as ERP system supported supply chain since long time.

Spathis and Constantinides (2004) note that, ERP system improves flexibility in information generation, as perceived by many companies, and it is able to decrease operational costs and cycle time and thus increase customer satisfaction and loyalty. Tarn et al. (2002) point out that, ERP system able to expedite information sharing within supply chain in order to enable closer cooperation among supply chain partners and to reduce the cost of transaction.

Moreover, Akkermans et al. (2000) find that, ERP system contributes toward enhancing the supply chain in technical areas such as standardisation, transparency and globalisation. They also found that, there is a close interrelation between ERP and SC. Madu and Kuei (2005) state that, in order to support supply chain effectively, companies need to implement ERP system.

In order to improve supply chain performance ERP system is needed where companies can integrate all their business processes through breaking the barriers among different functional departments inside the company in order to be more responsive and flexible and at the same time avoid repeating the same task. This is could be possible because ERP system contain single and integrated database that prevents any data inconsistency problems and smooth the flow of information among supply chain partners (Chuang and Shaw, 2005).

The overall supply chain performance could be improved through the channel coordination, information sharing, operational efficiency, and integrated communication within the supply chain. ERP system provides integration for better communication and coordination within the company and its supply chain. The success of ERP system and the supply chain highly depends on the process of integration achieved in the company

and this is could be achieved smoothly with the core of ERP system which provides web linkage, facilitates electronic data interchange (EDI), and integrates the entire supply chain in order to support effectively the company's supply chain activities (Goodhue et al., 1992; Lee et al., 1997; Olson et al., 2005; Park and Kusiak, 2005).

ERP could be an effective system that assists companies in creating effective and successful supply chain. In fact, ERP system introduced to integrate all functional units of a company and its supply chain in order to make it in one system. Therefore, all data and information related to SC will be accessible and retrieve from one system. The ease of access to one system from various functional units and the advancement of IT and computing research have resulted in enhancement of SC performance (Tjoa and Raman, 1999; Rashid et al., 2002; Turban et al., 2008).

ERP system also able to enhance the sharing, exchange, and movement of information, goods, and services, improve product quality, flexibility, and customer responsiveness, and also reduce inventory and operation costs, and therefore enhance the efficiency of supply chain performance, and ultimately gain a competitive advantage in the global economy which will definitely increase productivity and profitability (Ekman and Thilenius, 2011).

3.4 Implementation of ERP system

Loonam and McDonagh (2005) state that, when companies plan to implement ERP system, they have to pass through three implementation stages:

1 Pre-implementation stage: Where companies need to decide why they want to implement ERP system, what they hope from this system, what they need to prepare before initiate ERP implementation, and what are the critical success factors (such as top management support) that could assist them to achieve successful implementation.

2 Implementation stage: Which require the company to be ready for coming challenges and problems expected during implementation stage. Organisational and technical issues usually take place during implementation.

3 Post-implementation stage: In this stage companies need to keep upgrading with up-to-date technology in order to be able to deal with any new technology such as extending to suppliers and customers.

This study focused on post-implementation stage because the gap in ERP system literature was found in the post-implementation stage. Yu (2005) note that most of ERP system literature focused on two main domains, the first one focused on the evaluating the suitability of ERP system' software, vendors, and consultants, and the second domain focused on the critical success factors that affecting ERP system implementation success. Resistance and cultural fit perceived by IS and non-IS managers as two of the main success factors of ERP system implementation (Kamhawi and Gunasekaran 2009).

The journey of ERP system is not only the implementation of the system, but it continues after the implementation stage. Continuous efforts are needed after 'go-live' of ERP system and this is to reap full benefits of the system. In fact, the journey of ERP system begins after the implementation stage. "*Yes, there is life after go-live*" (Deloitte, 1999). Therefore, this study focused on post-implementation stage in order to contribute toward filling up this gap in ERP system literature.

3.5 Measuring the supply chain performance

According to Neely et al. (1995) performance measurement can be defined as the procedures to measure the effectiveness and efficiency of overall operation. The effectiveness here indicates the range of achieving the customers' demands. But the efficiency refers to the economic utilisation of the recourses that available in the company. All of these are to achieve customer satisfaction and loyalty.

However, supply chain performance has been measured in literature by Beamon (1999), Neely et al. (1995), and Shepherd and Gunter (2006) using the following measures:

1 Cost: Cost has been classified as an important part of the supply chain measurement which includes inventory costs, distribution costs, and operation costs. The ratio of cost measure concern in literature is 42%, and that considered high.

2 Quality: In order to measures the quality, supply chain management should be able to provide the customers with a high quality products. The ratio of concern for quality measure in literature is 28%.

3 Time: Time can be measured by offering a high customer service through on time delivery. The ratio of time measure concern in literature is 19%.

4 Flexibility: Whereas flexibility means the ability of the supply chain to respond and cope with uncertain or changing environment including supply and demand. Flexibility includes volume flexibility, delivery flexibility, mixed flexibility, and new product flexibility. The ratio of concern for flexibility measure in literature is 10%.

5 Customer responsiveness: While customer responsiveness refers to lead time, stock out probability, and fill rate. The ratio of customer responsiveness measure concern in literature is only 5%.

On the other hand, Beamon (1999) noted that, supply chain performance measurement types include:

1 Resources: Resource measure encompasses inventory levels, personal requirements, equipment utilisation, energy usage, and cost. The goal of supply chain analysis is to reduce these resources.

2 Output: Output measure includes customer responsiveness, product quality, customer satisfaction, the quantity of final product produced, sales, profits, and on-time delivery. Output performance measures should meet the company's strategic goals as well as customer's goals.

3 Flexibility: Flexibility refers to the ability of the supply chain to respond to and accommodate the following:

   a demand variations, such as seasonality

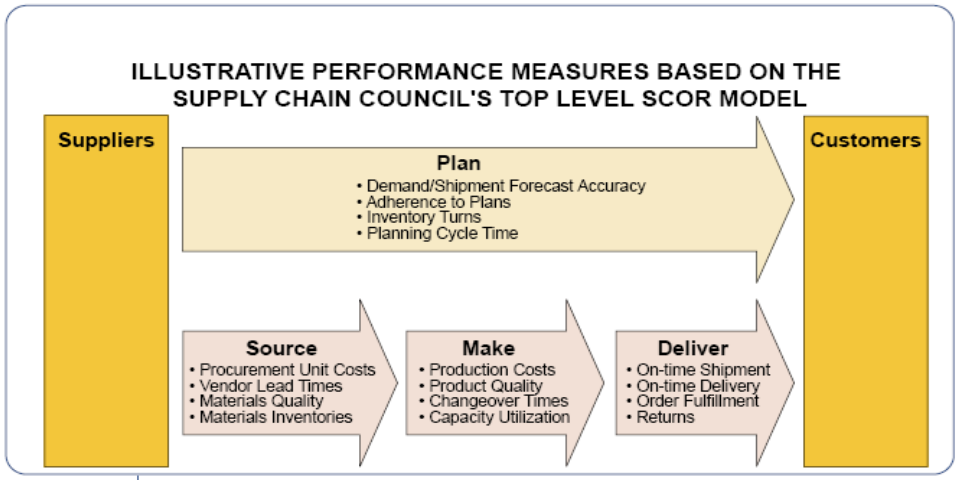
   b periods of poor suppliers' performance

   c periods of poor delivery performance

   d new products, new markets, or new competitors.

Figure 1 (supply chain council SCOR model) shows supply chain processes such as plan, source, make and deliver. The approach that company can use in order to measure their supply chain performance contains cycle time metrics, i.e., production cycle time and cash-to-cash cycle, cost metrics, i.e., cost per shipment and cost per warehouse pick, service/quality metrics, i.e., on-time shipments and defective products, and finally asset metrics, i.e., inventories (Lapide, 2000).

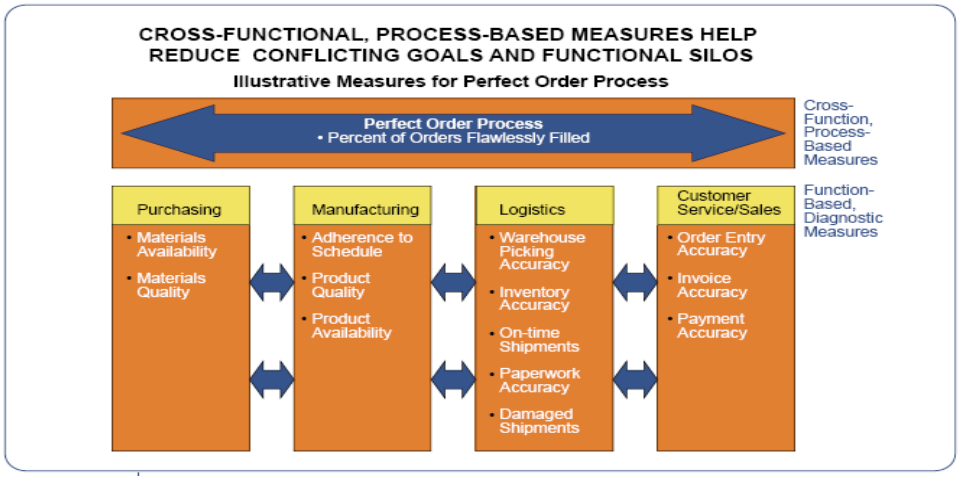
Figure 1 Supply chain performance measure (see online version for colours)



Source: Lapide (2000)

Usually, many manufacturers used cross-functional and process-based measures in order to measure performance in case the functional area are separated from each other, as it is illustrated in Figure 2, functional areas such as purchasing, manufacturing, logistics and customer service and sales all are isolated from each other (Lapide, 2000).

Figure 2 Supply chain measure (see online version for colours)



Source: Lapide (2000)

3.6 ERP system and top management support

Top management support considered in literature as an important variable in supporting ERP system success. For example, Nah and Lau (2001) found that, a critical factor that can assist the company to achieve successful implementation of ERP system is top management support. Kashef et al. (2001) state that top management support is the key to achieve successful implementation. McAdam and Galloway (2005) suggest that, training and awareness about ERP implementation could assist managers and staff to understand the issues related to the system and then could enable them to deal effectively with ERP system in order to obtain better results.

Moreover, Loonam and McDonagh (2005) added that, top management support is the most critical success factor in enterprise system. Beheshti (2006) considered the commitment of top management from the beginning to the end of ERP project is important for the success of ERP system, and meanwhile top management also responsible to form a team to study the feasibility of ERP system.

However, in order to achieve successful ERP implementation top management should provide commitment and leadership during the ERP implementation and they must keep continue doing that until the project completed as well as after the implementation stage. Top management should also select the best people among their employees and then identify them, free them, train them, organise them, put them in a team, guide them, empower them, and finally give them the responsibility of the project. Top management should give time to the ERP project, provide training and educational programmes and also offer reward system to obtain desirable results from ERP system investment (Chen, 2001).

Successful implementation of ERP system is not the last goal of the company; however, the continuous considerations and evaluations after the ERP system implementation are also vital in order to ensure the successful of ERP system. Once companies achieved successful implementation of ERP system, they need to find ways to maximise the effectiveness of ERP system in the post-implementation stage and therefore maximise the return on investment. One of the ways could be the effective support from top management because top management commitment influences the effectiveness during post-implementation where ERP system can improve business performance effectively (Faleti, 2001; Willis and Willis-Brown, 2002; Yu, 2005; Lee et al., 2011).

3.7 ERP system and employee involvement

A wide argument has been found in literature about the involvement of employees in the three stage of ERP system life cycle. Byron (2005) note that, employee involvement and commitment during ERP implementation contribute toward enhancing the process of this implementation. Brehm and Markus (2000) emphasise that, during the ERP implementation, vendors and adopters must interact with each other in order to achieve best implementation. Yu (2005) state that, end-users of ERP system must be educated and knowledgeable about how to use ERP system after ERP system implementation.

In fact, the involvement of employee with ERP system is important to achieve valuable results from ERP system; therefore, executives need to reduce the worry of system users and help them to understand and accept the new information system and technology and this is require appropriate education, training, and communication for the

system's users during system implementation (Yang et al., 2006). The failure of ERP system may lead the whole company to bankruptcy, and the main reason behind ERP system implementation failure is the poor attention given from the company to the user involvement issue, thus executives need to give more attention to the system users in order to avoid any undesirable results (Stewart et al., 2000).

In order to assist employees to accept changes in their daily routine tasks and help them to embrace the new way of conducting tasks, companies need to make a comprehensive change management programme to train their employee to accept the change (Burca et al., 2005). Therefore, comprehensive education and training for the employee is required and important to achieve the success of ERP system. This comprehensive level of training will influence the success of ERP system in a great and positive manner (Park and Kusiak, 2005).

However, many studies have proven that, 60% of ERP system implementation shows poor performance and sometimes failure in many cases, and this is mainly because of poor attention given from the company to human and organisational issues. Therefore, companies need to give more attentions to human and organisational issues same as they give to technical issues in order to gain better returns from ERP system investments (Loonam and McDonagh, 2005).

In case the ERP system users (the employees) are not able to use the system in an effective and proper manner this will lead the ERP system to function in inefficient manner and therefore ineffective usage of ERP system will be obtained (Willis and Willis-Brown, 2002). Hence, the involvement of employees is really important during the three stages of ERP system life cycle particularly during post-implementation stage in order to make use of the ERP system efficiently and then maximise the value and benefits of the ERP system.

As a conclusion, the main issue in the post-implementation stage of ERP system is not with the technology, but the main issue and the biggest challenge are with the system users (Deloitte, 1999). Therefore, the company needs to educate the employees how to use the ERP system. Future research should focus on enhancing the effectiveness use of ERP system and then manage any challenges occurred in the interaction between the users and the ERP system (Nah, 2004). Briefly, human are the key success factor for any new system adoption (Yang et al., 2006).

3.8 ERP system and cultural fit

A study has been conducted by Hofstede (2001) shows the systematic differences between USA/Germany and Asia. However, according to the study data the obvious differences between USA/Germany and Asia only were in power distance and individualism/collectivity. In fact, power distance refers to the unequal distribution of power among people, and individualism/collectivism refers to the relationship between individuals and groups, these two dimensions indicate how people work together which may affects the implementation and the performance of ERP system in Asian companies. Therefore, those companies who expect from ERP system to increase the centralised control and decision making, ERP will not be suitable for them (Reimers, 2002; Soh et al., 2003; Davenport, 1998). In fact, ERP system designed to cope with decentralisation in order to fit with western organisational culture (as cited in Rajapakse and Seddon, 2006).

For example, access to information, in open organisational culture ERP system doing well because it is an open system. In this organisational culture authorised employees can access to most of information, but in different culture such as Chinese business culture where the critical information is only accessed by managers and that may cause a problem with ERP open system (Davison, 2002).

Table 1 Index of cultural dimensions

Country	*Power distance*	*Uncertainty avoidance*	*Individualism/ collectivism*	*Masculinity/ femininity*
USA	40	46	91	62
Germany	35	65	67	66
Malaysia	104	36	26	50
Philippines	94	44	32	64
Indonesia	78	48	14	46
India	77	40	48	56
Thailand	64	64	40	34
Pakistan	55	70	14	50

Source: Hofstede (2001) , as cited in Rajapakse and Seddon (2006)

Rajapakse and Seddon (2006) found four cultural dimensions that contribute in preventing many companies in Asia to implement ERP system.

Table 2 Four cultural clashes for ERP system in developing countries in Asia

National culture (Asia)	*ERP culture = West*
Centralised	Decentralised
Low level of accountability and discipline	High level of accountability and discipline
Low level of commitment	High level of commitment
Low level of change	High level of change

Source: Adopted from Rajapakse and Seddon (2006)

4 Research methodology hypotheses

4.1 Socio-technical theory

Socio-technical theory studies the impacts of technologies on companies and the effects of organisational process, culture and works to technology implementations (Bostrom and Heinen, 1977a, 1977b). Based on socio-technical theory this study aimed to investigate the impact of technology (ERP system) on company performance (supply chain performance).

Typically, researchers use socio-technical theory in information system research as well as in the issues that related to the information system research. Some of the issues related to information system research like the introduction of technology, the implementation issues, the failure of the system to achieve the expected benefits, and resistance of the workforce to innovation and new technology as well as new information system (Cartelli, 2007).

Socio-technical theory contains two main sub-systems, the first one is the technical sub-system and the second is the social sub-system. The need was to fit between these two sub-systems which together made up an organisation. The technical sub-system includes the devices, tools and techniques that are needed in order to transform inputs into outputs in a way that improves the business performance of the company. On the other hand, the social sub-system contains all employees, knowledge, skills, attitudes, values, reward system, and authority (Cartelli, 2007).

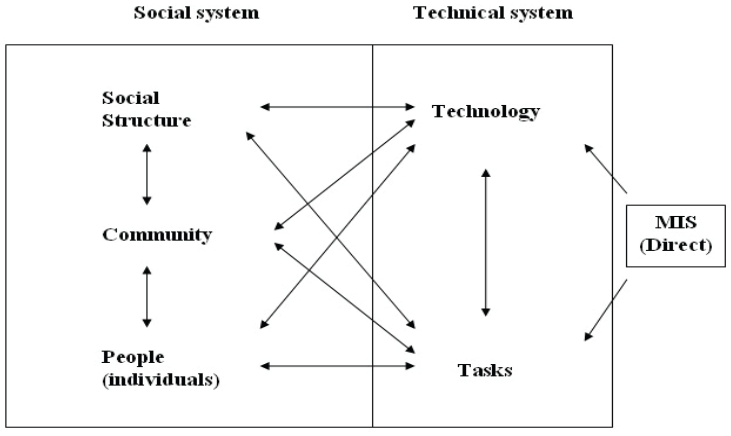
The approach of socio-technical theory was the fit and the joint of the two sub-systems together. The interdependency of the two sub-systems should be clearly recognised in order to maximise the business performance. This is in fact the cornerstone of the socio-technical approach. However, both of the sub-systems must be working in harmony in order to achieve better results (Cartelli, 2007).

Increasingly, organisations commence to realise the importance of individuals' participation in the organisational environment as well as the communities of practices in groups in order to motivate individuals to participate and share in both tacit and explicit knowledge particularly in the knowledge society where the socio-technology increase value to knowledge and develop interactions among individuals inside the organisation (Coakes, 2004; Cartelli, 2007).

Recently, a consensus has taken a place in many information system researches that communities with the encouragement of professional development of individuals in the organisation provide a large enhancement to the organisations. Individual, community, and organisation (society) are able to participate in knowledge construction and development especially when companies implement new information system and this is exists to introduce a new way of looking at knowledge management and therefore support the new system (Cartelli, 2007).

In this study, top management is supposed to manage and direct the knowledgeable and skilled employees to be familiar with ERP system and to know how to use the system effectively in order to replace the consultants of ERP providers as well as to increase the effectiveness of ERP system and therefore enhance the impact of ERP system on the supply chain and eventually improve the supply chain performance.

Figure 3 New model for the socio-technical approach with the introduction of communities



Source: Cartelli (2007)

Figure 3 presents the new model for the socio-technical approach with the introduction of communities.

4.2 Theoretical framework

The theoretical framework of this study was developed based on the above discussion of the socio-technical theory. This study was designed in order to investigate the impact of ERP system (the technology) on supply chain performance (the organisation) and to maximise the effectiveness of ERP system as well as improve the performance of the supply chain through explicitly recognise the joint and fit as well as involvement of the social sub-system (employee, top management, and cultural fit). ERP system, employee, top management, and cultural fit should work in harmony in order to improve supply chain performance as well as obtain the expected benefits of ERP system and eventually achieve better results and returns on investment.

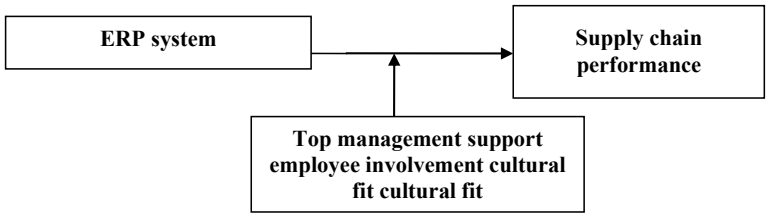
The literature survey and the initial observation lead us to formulate and develop the theoretical framework that explains the interrelationships among the variables of primary interest in this research. However, as determined by previous research findings, such as Davenport and Brooks (2004) and Wieder et al. (2006), the basic relationship between ERP system and supply chain is a large and positive relationship. Whereas, this relationship could be affected by organisational variables such as employee involvement, top management support, as well as cultural fit (Deloitte, 1999; Willis and Willis-Brown, 2002; Yu, 2005; Loonam and McDonagh, 2005).

The impact and the enhancement of ERP system on the performance of supply chain performance would be through the coherent integration of several supply chain networks of business partners in order to make the whole supply chain as one integrated company; the effective planning for production to minimise stock, reduce inventory costs as well as operational costs; the comprehensive controlling over the supply chain network in order control the bullwhip effect and therefore decrease the variability in the supply chain; the efficient management of materials and workflow to provide sufficient amounts of material in the stock and suitable human and information required by any work activities; and finally the electronic procurement and the rapid distribution in order to provide sourcing and on-time delivery. Consequently, all of ERP system would contribute towards the improvement of supply chain performance.

On the other hand, organisational variables such as employee involvement, top management support, and cultural fit could increase the relationship between ERP system and supply chain performance through the inclusive involvement of employees who may replace the consultants of ERP provider and therefore save the extra costs that may occurred from the consultants; the firm support from top management by offering allowances to employees in order to insure the continuous success of ERP system; and the appropriate cultural fit in order to prevent the conflict between the organisational culture and ERP system and finally avoid any likelihood of system failure. This will lead to effective usage of ERP system and consequently increase the effectiveness of ERP system on supply chain performance.

Based on the above discussion, this study develops the following proposed framework to test the impact of ERP system on supply chain performance which moderated by employee involvement, top management support, and cultural fit. The following Figure 4 shows the relationships between all proposed variables.

Figure 4 The proposed theoretical framework



4.3 Hypotheses formulation of research dimensions

Based on the theoretical framework, the hypotheses for this research dimensions were formulated and developed in order to test the relationships between ERP system and supply chain performance, to examine the proposed moderating effects of employee involvement, top management support, and cultural fit, and finally to achieve the research objectives.

4.3.1 The relationship between ERP system and supply chain performance

There is a large relationship between ERP system and SC and this is through helping companies to share information with other supply chain partners (Davenport and Brooks, 2004). The relationship between ERP system and supply chain performance is a positive relationship (Wieder et al., 2006).

ERP system improves productivity, operational, and business performance as well as enhances SC performance (Hitt et al., 2002; Cotteleer, 2002; Akkermans et al., 2000). ERP system considered as an important precursor to supply chain performance and a very useful information system for the improvement of SC (Zheng et al., 2000). In fact, ERP system supported SC since long time (Themistocleous et al., 2002).

H_1 There is a relationship between ERP system and supply chain performance.

Successful implementation of ERP system is not considered as the final goal of the company, but the continuous considerations and assessments after the ERP system implementation are also important to prevent the likelihood of system failure. In fact, after the successful implementation of ERP system, companies must find effective ways in order to maximise the effectiveness of ERP system and then maximise the return on ERP system investment (Faleti, 2001; Willis and Willis-Brown, 2002).

Top management support considered as most critical success factor in ERP life cycle. Particularly during post-implementation stage where top management support influences the effectiveness of post-implementation stage and therefore ERP system can improve business performance (Yu, 2005; Loonam and McDonagh, 2005).

H_2 Top management support increases the relationship between ERP system and supply chain performance.

ERP system, integration, and applications will not function effectively in case the system's users are not able to use the system in an effective and proper manner (Willis and Willis-Brown, 2002). Deloitte (1999) note that, the main issue in the post-implementation stage of ERP system is not with the technology, but the main issue

and the biggest challenge are with the system users. Therefore, the company needs to educate the employees how to use the ERP system.

The involvement of employee or system users is extremely important during the three stages of ERP system in order to utilise the ERP system efficiently and maximise its value and benefits. Future research should focus on maximising the effective use of ERP system and managing the challenges in ongoing interaction between users and the system (Nah, 2004). Irving and Coleman (2003) found the possibility of employee involvement to play as an important moderating variable affecting between two relationships such as role ambiguity and job tension as an outcome of stress. Thus, the following hypothesis is proposed:

H_3 Employee involvement increases the relationship between ERP system and supply chain performance.

According to Soh et al. (2000) and Davison (2002), several countries like Japan, China, and many other Asian countries may encounter various difficulties during ERP implementation more than Europe countries and this is mainly because of the cultural misfit problem. Most of ERP vendors are western and they design ERP packages for western-type companies, therefore, when ERP system implemented in countries other than western countries, cultural misfit problem will definitely take place.

However, implementing ERP system require major changes in the whole organisational culture because ERP system enforces its own new way of conducting business upon the existing culture of the company which may not be compatible with each other (Al-Mashari and Zairi, 2000; Norris et al., 2000; Davenport, 1998). On the other hand, if a company aim to be a global company and therefore deal with international businesses, it need at the beginning to make some changes in the company including eliminating the cultural close-mindedness, and this is will enable the company to deal with other countries with different culture in an easy manner (Daniels and Daniels, 1993).

Many studies in literature considered organisational culture as an important moderating variable that assist in accepting and adopting information system in companies. Organisational culture could cause a failure in information system which negatively affects the company, but at the same time, it is an important factor for the success of information system in the companies (Chai and Pavlou, 2004; Abdul Rashid et al., 2004; Frotaine and Richardson, 2003; Fey and Denison, 2003; Cameron and Quinn, 1999; Davison, 1996).

H_4 Cultural fit increases the relationship between ERP system and supply chain performance.

4.4 Research approach

The aim of this study is to establish and examine the proposed relationship between ERP system and supply chain performance. Therefore, a field study was conducted in a natural business environment were a questionnaire was used in order to collect data relating to the variables of interest in this research. Narrowly, the purpose of this research is to investigate the relationship between ERP system and supply chain performance, and explore the moderating effects of top management support, employee involvement, and cultural fit on this relationship.

The unit of analysis of this study is the Malaysian manufacturing companies that are using ERP system. ERP system is information system that implemented in the company. On the other hand, supply chain performance is one the output of the company's overall performance; and the organisational variables are supposed to affect the company as a whole including the information system that the company uses. The MIS manager was utilised in this study as a key informant about the ERP system and its impact on business performance including supply chain performance, because MIS manager considered as a reliable source to get information about ERP system and supply chain performance.

4.5 Sampling design

The population of this research is the Malaysian manufacturing companies that are using ERP system. The list of the manufacturing companies that are using ERP system was obtained from several sources such as, local and worldwide ERP providers in Malaysia, Small and Medium Industries Development Corporation (SMIDEC), Standard and Industrial Research Institute of Malaysia (SIRIM Berhad), and Federation of Malaysian Manufacturers (FMM). The total number of manufacturing companies that were found using ERP system in Malaysia is about 200 manufacturing companies.

The method used to obtain the population of this study is coincided with a study conducted by Jafari et al. (2006) on Malaysian companies, where the study found 232 companies using ERP system that include 200 manufacturing companies and 32 service companies. From the 200 manufacturing companies, 132 companies were selected randomly in order to be the sample of this research, and that was based on the sample tabled by Krejcie and Morgan (1970).

The sample of this study determined using simple random sampling technique. The reason for sampling and not conducted a census study was based on the suggestion of Sekaran (2005) who suggested that *"study of a sample rather than the entire population is also sometimes likely to produce more reliable results. This is mostly because fatigue is reduced and fewer errors will therefore result in collecting data"*. In fact, simple random sampling was selected because of its accuracy, accessibility, least bias, and the most generalisability. The subject of this study was selected using Excel in order to generate a random subject of the sample (Kervin, 1992; Saunders et al., 1997; Sekaran, 2005).

Ten companies were used for the purpose of questionnaire modification, i.e., content validation, which conducted through interviews and pilot testing. Two in-depth interviews were conducted with two MIS managers from two different companies in Penang. The pilot test was also conducted in Penang Island on ten manufacturing companies using ERP system in Penang Industrial Zone. However, these ten manufacturing companies were excluded from the real data collection. On the other hand, the 132 companies were used in the real data collection stage. Every company was contacted through the telephone and e-mail and then a copy of the final questionnaire was mailed to all of them.

4.6 Questionnaire design SC

The design of the questionnaire for this research required variety of measures and items. The items have been collected and adapted from different sources. The following sections explain the design of the questionnaire instruments including sources, dimensions, items, and scales that used in the instruments.

4.7 Variables and measurements

This research used variety of measurements in order to measure each variable of this study which includes ERP system, supply chain performance, top management support, employees involvement, and cultural Fit.

4.7.1 ERP System

The operationalisation and the instrument for ERP system were adapted from different sources such as Spathis and Constantinides (2004), Tadinen (2005), and Vanderfeesten and Reijers (2006). In literature, researchers study ERP system as one software package with all its or modules which contains more than 20 functionalities or modules designed in order to improve overall business performance including supply chain, financial, and managerial performance.

Table 3 Items for ERP system

ERP system		*Items*	*Source*
Integration (4 items)	1	Software applications across	Themistocleous and Irani (2003)
	2	Software applications supported	
	3	Data is entered only once	
	4	Enterprise integration has improved	
Production planning (4 items)	1	The product is described	Spathis and Constantinides (2004)
	2	The goals of the product	
	3	The budget to produce the product	
	4	The raw materials needed	
Controlling (4 items)	1	Managers regularly receive	Tadinen (2005)
	2	All employees in company's	
	3	Company's supply chain	
	4	All customers' complaints	
Materials and workflow management (7 items)	1	All materials received	Vanderfeesten and Reijers (2006)
	2	Company can send back	
	3	Separate location is available	
	4	Inventory is well managed	
	5	Each employee can operate	
	6	Employees can adjust	
	7	Customers can return feedback	
Procurement and distribution (6 items)	1	Authorise payment can be made	Spathis and Constantinides (2004)
	2	Procedures are generally easy	
	3	There are strong connections	
	4	Sales department representative	
	5	Sales department representative is	
	6	The waiting time for having customers	

ERP system measures contain 25 items, 4 items for measuring integration, and 4 for measuring production planning, 4 items related to measure controlling, 7 for measuring materials and workflow management, and 6 items for measuring procurement and distribution. A five-point Likert-type scale rating from 1 = strongly disagree to 5 = strongly agree was used for all ERP system items.

4.7.2 Organisational variables

Top management support, employees involvement, and cultural fit were selected as moderating variables because of the importance of these three variables in the continuous success of ERP system during the post-implementation stage of ERP system. Employees will be able to replace the consultants of ERP provider and therefore save the extra costs that occurred from these consultants. Top management can offer allowances for employees in order to support and insure the success of ERP system. And finally cultural fit prevent the conflict between the organisational culture and ERP system to avoid any likelihood of system failure (Willis and Willis-Brown, 2002; Deloitte, 1999; Yu, 2005; Loonam and McDonagh, 2005; Chai and Pavlou, 2004; Maditinos et al., 2012).

The instrument to measure these variables adapted from Stratman and Roth (2002), Tadinen (2005), and Sivunen (2005). The measures of moderating variables contain 15 items, 5 items for measuring top management support, 6 items for measuring employees involvement, and 4 items for measuring cultural fit. A five-point Likert-type scale rating from 1 = strongly disagree to 5 = strongly agree was used for all organisational variables items.

Table 4 Items for organisational variables

Organisational variables		*Items*	*Source*
Top management support (5 Items)	1	Top management enthusiastically	Stratman and Roth (2002)
	2	Top management has allocated	
	3	Top management is aware	
	4	Top management actively encourages	
	5	Top management considered	
Employee involvement (6 Items)	1	Employees are willing to accept	Tadinen (2005)
	2	Employees are aware	
	3	Employees are well trained	
	4	Employees are motivated	
	5	Employees understand	
	6	Employees are engaged	
Cultural fit (4 items)	1	In my company, change is viewed	Sivunen (2005)
	2	There is openness to suggestions	
	3	When problems emerge	
	4	Top executives values new ideas	

4.7.3 Supply chain performance

The instrument for supply chain variable was adapted from Zhang et al. (2006), Beamon (1999), Neely et al. (1995), Shepherd and Gunter (2006), and Li et al. (2005). The measure for this variable consists of 12 items. Five-point Likert-type scale rating from 1 = strongly disagree to 5 = strongly agree was used for all SC performance items.

Table 5 Items for SC performance

SC		*Items*	*Source*
Supply chain performance (12 items)	1	Inventory costs have been reduced	Zhang et al. (2006)
	2	Operational costs have been reduced	Beamon (1999)
	3	Products quality has been improved	Neely et al. (1995)
	4	We continuously renew our competence	Shepherd and Gunter (2006)
	5	We take some actions quickly-based	Li et al. (2005)
	6	On-time delivery has been improved	
	7	Customers' responsiveness	
	8	Company's customers are satisfied	
	9	Information flows quickly	
	10	Accurate information is usually available	
	11	We link information system	
	12	We have joint production planning	

In this research, cost, quality, time, flexibility, and customer responsiveness have been selected as elements to measure supply chain performance because of the importance of these measures in supply chain literatures. Cost, quality, time, flexibility, and customer responsiveness considered as an important measures in the supply chain literature because with these measures companies will be able to evaluate their supply chain as well as the management of the supply chain and therefore identify whether their supply chain getting improves or getting worse and then take action based on the final evaluation (Beamon, 1999; Neely et al., 1995; Shepherd and Gunter, 2006).

4.8 Validity of measures

According to Sekaran (2005) "content validity ensures that the measure includes an adequate and representative set of items that tap the concept being measured". Content validity or face validity is the means to evaluate how well the content of scales represents the measures. Researchers and experts are able to evaluate and assist for content validity through examining and reviewing the scale items in order to ensure that these items cover entire domain of the constructs, and then a pilot test can be conducted in order to edit these items.

Therefore, a copy of the questionnaire has been given to ten full, associate, and assistant professors in the Faculty of Technology Management in order to obtain their suggestions and feedback on the content validity of the items that used in the research instruments. After one week the questionnaires have been received from them, and their

recommendations and suggestions were followed. Based on their feedback, some items were re-worded, and the overall questionnaire design was refined.

4.9 Pilot study

A pilot study was conducted to ascertain the reliability of the instruments to be used to measure the research variables from the samples in order to achieve the objectives. It was also important for validating the measures of the variables, since the researcher designed them based on a literature review and some of them are based on previous instruments.

Consequently, ten questionnaires were given by hand to ten MIS managers in several manufacturing companies that are using ERP system and were randomly selected in Penang Island, and their doubts and questions were clarified on the spot. The ten questionnaires have been collected by hand and all recommendations, suggestions, and feedback were considered.

Two managers were interviewed in depth in order to gain more feedback from experts and therefore confirm the ERP system that is related to supply chain performance, as well as to obtain information on the issues of interest. A positive image on ERP system has been drawn as a conclusion from these two interviews and that shows believes from the two MIS managers and stated that ERP system able to reduce all costs including inventory, labour, and overhead costs. On the other hand, they also believe that ERP system able to increase sales, efficiency, effectiveness, and customer satisfaction, where all these will eventually lead to the improvement of supply chain performance.

The data were entered to the statistical package of social sciences (SPSS). Based on exploratory factor analysis Cronbach's alpha and on the feedback of MIS managers the necessary modifications and rewording were undertaken. The length of the questionnaire takes around 15 minutes to be answered and completed. After all the necessary modifications and rewording, a final copy of the questionnaire was designed and send to MIS managers in 132 manufacturing companies using ERP system.

5 Data analysis and results

5.1 Data collection procedures

In this study, more than 300 questionnaires were sent by mail to MIS managers in Malaysian manufacturing companies that using ERP system and listed in local and worldwide ERP providers in Malaysia, SMIDEC, SIRIM (Berhad), and FMM. Before sending the questionnaires, the persons-in-charge for ERP system (MIS managers) were contacted by phone and their names were obtained in order to follow up with them later on. Some companies refuse to disclose the name of the persons-in-charge and instead they requested the questionnaire to be directed to the MIS manager and in some cases to the IT manager because this manager is the same person holding the two positions of IT and MIS manager.

The total number of collected and usable questionnaires from the three waves was 80 usable questionnaires. However, a tremendous effort was made in order to obtain this number of questionnaires and this is mainly includes the personally administered questionnaires. In fact, this is has taken a place due to many problems arises during the data collection such as most of the respondents were very busy and they have no time at

all to answer the questionnaire, the ignorance of the e-mails and the reminder letters, as well as the difficulty to reach to them through the phone and even some times with the personally administered.

5.2 Statistical techniques

For the purpose of data analysis and hypothesis testing, several statistical techniques and tools were used from the SPSS software for windows, version 12.0. This includes the following techniques:

1 Factor and reliability analysis: This technique used in order to test the validity and the reliability of the measures used in this study.

2 Chi-square test: This technique conducted to diagnose the response bias between early and late responses.

3 Descriptive statistics: This technique was run in order to describe the characteristics of the respondents.

4 Multiple regression: This technique was used to test the effects of ERP system on SC performance.

5 Hierarchical multiple regression: This technique was utilised to test the moderating effects of the three moderating variables consist of top management support, employees involvement, and cultural fit on the relationship between ERP system and SC performance. The details of each statistical techniques discussed as follows:

5.3 Response rate

A total of 132 Malaysian manufacturing companies that are using ERP system were selected randomly to be the sample of this study and were also contacted in order to respond to the questionnaire. Out of 132 companies, only 83 companies were responded the questionnaire. From the responded questionnaires, 80 questionnaires were extracted as usable questionnaires and were used for data analysis in this research

Table 6 Summary of the questionnaire and the response rate

The sample size of the study	132
Returned questionnaires	83
Returned and usable questionnaires	80
Returned and unusable questionnaires	3
Not returned questionnaires	49
Response rate	63%
Usable response rate	*61%*

5.4 Test of differences

In order to detect the response bias and compare between early and late responses a typical chi-square test was carried out. In this research the early responses were 32 respondents and that were received in the first wave of questionnaire. Whereas in the

second and third waves 48 questionnaires were received and considered as late responses from the target respondents.

Table 7 Chi-square test for early and late responses

Variables	*Category*	*Responses*		*Sig.*
		Early (32)	*Late (48)*	
Company ownership	Local	17	30	.55
	Foreign	15	18	
Company size in term of employees	5–50 employees	0	2	.41
	51–150 employees	7	13	
	More than 150 employees	25	33	
Geographic scope	Local	12	20	.89
	Regional	5	6	
	Worldwide	15	22	
Customers number	Less than 50 customers	6	13	.37
	51–100 customers	3	7	
	101–150 customers	2	6	
	More than 150 customers	21	22	
Suppliers number	Less than 50 suppliers	4	5	.90
	51–100 suppliers	6	9	
	101–150 suppliers	7	8	
	More than 150 suppliers	15	26	
ERP provider	SAP	10	15	.47
	Oracle	2	3	
	PeopleSoft	0	1	
	J.D. Edwards	4	1	
	Baan	2	2	
	Others	14	26	
Start using ERP system	Less than 1 year	5	3	.27
	1–2 years	4	4	
	2–3 years	2	6	
	3–4 years	1	8	
	4–5 years	3	6	
	More than 5 years	17	21	
Reasons to adopt ERP system	Improve overall business performance	11	24	.47
	Improve SC performance	18	20	
	Enhance decision making	0	1	
	Integration of application	1	2	
	Integration of information system	2	1	

The significance value for all cases is larger than the alpha value of .05, and therefore this is indicates that there are no significant differences, as well as no response bias has taken place between early and late responses. The details of chi-square test for early and late responses on the basis of company ownership, company size, geographic scope, customers' number, suppliers' number, ERP provider, start using ERP, and the reasons to adopt ERP system.

5.5 Demographic profile of respondents

Majority of the companies' ownership was local ownership rating 58.8%; on the other hand the foreign companies' ownership was rating 41.2%. All companies' type was manufacturing companies because this study focused only on manufacturing companies. The size of the companies in term of employees' number shows that, the majority of respondents were having more than 150 employees constituting 72.5%. The geographic scope of most companies was worldwide rating 46.3%.

In term of customers' and suppliers' number, more than half of the respondents were having more than 150 customers rating 53.8% and more than 150 suppliers rating 51.3%. On the other hand, 31.3% of the target companies selected SAP as the provider of their ERP system, where SAP is the leader of ERP system in the global market. Typically, companies need eight months after the implementation of ERP system in order to start reap the benefits of the system and observe its impact on the companies. In this study the majority of companies implemented and currently uses ERP system since more than 5 years rating 47.5%. The main two reasons behind adopting ERP system in most of the companies was to improve supply chain performance and overall business performance rating 47.5% and 43.8% respectively.

Table 8 Summary of demographic profile of respondents

Variables	*Category*	*Frequency*	*Percentage*
Company ownership	Local	47	58.8
	Foreign	33	41.2
Company type	Manufacturing	80	100
Company size in term of employees	5–50 employees	2	2.5
	51–150 employees	20	25
	More than 150 employees	58	72.5
Geographic scope	Local	32	40
	Regional	11	13.8
	Worldwide	37	46.2
Customers number	Less than 50 customers	19	23.8
	51–100 customers	10	12.5
	101–150 customers	8	10
	More than 150 customers	43	53.7

Table 8 Summary of demographic profile of respondents (continued)

Variables	*Category*	*Frequency*	*Percentage*
Suppliers number	Less than 50 suppliers	9	11.2
	51–100 suppliers	15	18.8
	101–150 suppliers	15	18.8
	More than 150 suppliers	41	51.2
ERP provider	SAP	25	31.2
	Oracle	5	6.3
	PeopleSoft	1	1.2
	J.D. Edwards	5	6.3
	Baan	4	5
	Others	40	50
Start using ERP system	Less than 1 year	8	10
	1–2 years	8	10
	2–3 years	8	10
	3–4 years	9	11.3
	4–5 years	9	11.3
	More than 5 years	38	47.4
Reasons to adopt ERP system	Improve overall business performance	35	43.8
	Improve SC performance	38	47.5
	Enhance decision making	1	1.3
	Integration of application	3	3.7
	Integration of information system	3	3.7

5.6 Status of supply chain performance

The majority of respondents rating 77.5% are agree that, the management able to renew their capability in any time in order to meet changing customer needs. This result indicated that ERP system provide flexibility to the company in order to respond to the changes in customer needs as well as in marketplace.

Moreover, 72.5% of the respondents agree that, the management can take quick actions based on the available information within the supply chain. In other words, ERP system provide on-time and accurate information that enable the management to take rapid and precise actions. This is followed by 68.8% of the respondents believe that accurate information is usually available for decision making, whereas 67.5% of the respondents agree with the quick flow of the information within the supply chain.

ERP system improves supply chain performance through reducing inventory and operational costs, improving product quality and on-time delivery, and enhancing flexibility and customer satisfaction. Briefly, the majority of Malaysian manufacturing companies believe that supply chain performance has been improved after the implementation of ERP system.

Table 9 Summary of distribution for SC performance

Supply chain (SC) performance	*Frequency (80)*	*Percentage (100%)*
Inventory costs have been reduced	46	57.5
Operational costs have been reduced	45	56.3
Products quality has been improved	42	52.5
Response to the changes has been improved	62	77.5
Quick action can be made based on accurate and on-time information	58	72.5
On-time delivery has been improved	47	58.8
Customers responsiveness has been improved	52	65.0
Customers are satisfied	47	58.8
Quick information flow	54	67.5
Accurate information is usually available	55	68.8
Link of information system	42	52.5
Joint with production planning and scheduling	36	45.0

5.7 Goodness of measures

In order to test the goodness of measures two procedures must be achieved, and this is should be before conducting any further analysis, these procedures are factor and reliability analysis. The results of factor and reliability analysis for all variables in this study are discussed as follows:

5.7.1 Factor analysis

To reduce a large number of variables to a smaller number and to summarise the patterns of correlations among the dimensions and variables to be manageable, factor analysis was conducted. In fact, preliminary analyses were conducted in order to ensure no violation of the underlying assumptions of sample size, normality, linearity, homoscedasticity, inter-correlations, and factorability. Factor analysis requires a sample size of five subjects per variable as a minimum, whereas ten observations or above is preferable. In other words, the minimum ratio of observations to variables is 5:1 (Coakes and Steed, 2007; Pallant, 2001; Tabachnick and Fidell; 2007; Hair et al., 2006).

The factor analysis was conducted on all variables of this study which includes the ERP system, top management support, employee involvement, cultural fit, and supply chain performance.

Factor analysis was conducted in order to determine the constructs in combination with the principal components as a method of extraction and varimax rotation. According to the recommendations by Hair et al. (2006), the minimum requirement for factor loading range between 0.30 to 0.40, and loading of 0.50 or above is considered more significant, and for the cross loading 0.35 or less should load on the other factors. The detailed of factor analysis for all variables in this study discussed as follows:

5.7.1.1 Factor analysis on ERP system

The factors loadings of ERP system items after deleting the items that show either low factor loading (< 0.40) or high cross loading (> 0.35), the results indicate that the loadings of the remaining items were from 0.40 to 0.85. These loadings are acceptable because they were greater than the minimum requirement level which is 0.30 (Pallant, 2001; Hair et al., 2006).

The Kaiser-Meyer-Olkin (KMO) measure, measure of sampling adequacy (MSA) for all items was 0.62 which is ranged within the acceptable level, i.e., between 0.51 and 0.90, in other words, if the MSA values above 0.50 indicate appropriateness (Hair et al., 2006). The Bartlett's test of sphericity was significant, which indicates that there is sufficient number of significant inter-correlations for factor analysis, and the assumptions of factor analysis were met. In fact, if the KMO measure is greater than 0.6 and the Bartlett's test of sphericity is large and significant then factorability is assumed (Coakes and Steed, 2007; Pallant, 2001; Tabachnick and Fidell; 2007).

The Cronbach's alpha of the items is reliable, i.e., 0.76, 0.68, 0.71, 0.71, and 0.67, respectively. These results provide support to discriminate and convergent validity of ERP system. Moreover, the results also show homogeneity within the dimensions and heterogeneity between the dimensions.

Table 10 Summary of factor and reliability analysis on ERP system

Items	*Factors loadings*				
	1	*2*	*3*	*4*	*5*
Integration					
Authorise payment can be made easily to suppliers in company's supply chain.	*0.68*				
Software applications supported the real-time sharing of data across company's supply chain.	*0.66*				
Data is entered only once in order for it to be retrieved by applications in different business units within the company's supply chain.	*0.66*				
Enterprise integration has improved information quality within company's supply chain.	*0.64*				
Software applications across company's supply chain worked seamlessly.	*0.62*				
Sales department representative is very knowledgeable about the products in company's supply chain.	*0.47*				
Inventory is well managed within company's supply chain.	*0.47*				
Materials management					
Company can send back materials to suppliers across its supply chain.		*0.85*			
All materials received as ordered within the company's supply chain.		*0.74*			
Separate location is available for quarantine materials in company's supply chain.		*0.51*			
There are strong connections with suppliers and customers in company's supply chain.		*0.46*			

Notes: 1 items with factor loading less than 0.40 were deleted
2 items with cross loading between the factors higher than 0.35 were deleted.

Table 10 Summary of factor and reliability analysis on ERP system (continued)

Items	*Factors loadings*				
	1	*2*	*3*	*4*	*5*
Production planning					
The budget to produce the product is identified in company's supply chain.			*0.75*		
The product is described before produce in company's supply chain.			*0.66*		
The goals of the product are identified within company's supply chain.			*0.66*		
The raw materials needed to produce the product are identified in company's supply chain.			*0.59*		
Sales department representative handled customers call quickly within company's supply chain.			*0.40*		
Controlling					
Managers regularly receive analytical information that enables them to timely monitor events and activities and to identify what actions need to be taken within company's supply chain.				*0.77*	
Company's supply chain routinely obtains feedback from suppliers, customers, and other clients regarding supply chain performance or ways to improve services.				*0.74*	
All employees in company's supply chain have the information they need to carry out their assigned responsibilities.				*0.73*	
All customers' complaints fully investigated by personnel who are independent of those involved with the original transaction within company's supply chain.				*0.48*	
Workflow management					
Employees can adjust the appearance of work items in their work lists to their own preferences.					*0.84*
Customers can return feedback to the company's as detailed as possible and as far as possible to the workers in company's supply chain.					*0.76*
Each employee can operate in different roles in company's supply chain.					*0.62*
Reliability	*0.76*	*0.68*	*0.71*	*0.71*	*0.67*
Eigenvalue	5.36	2.17	1.93	1.77	1.61
Percentage of variance	14.02	11.52	11.22	9.76	9.31
KMO			*0.62*		

Notes: 1 items with factor loading less than 0.40 were deleted
2 items with cross loading between the factors higher than 0.35 were deleted.

5.7.1.2 Factor analysis on organisational variables

The factor analysis on the 15 items provides three factors with 13 items of the organisational variables, i.e., two items were deleted. The name of factors remained same as employees involvement, top management support, and cultural fit.

The factors loadings for all items were above 0.60, and the relatively explanatory power (eigenvalues) of the three factors was 5.50, 1.82, and 1.35, respectively. The KMO measure, MSA for these three factors was 0.77, and the Bartlett's test of sphericity was significant. The three factors cumulatively captured 66.79% of the variance in the data. The reliabilities (Cronbach's alpha) for these three factors are 0.88, 0.85, and 0.77, respectively.

Table 11 Summary factor and reliability analysis on organisational variables

Items	*Factors loadings*		
	1	*2*	*3*
Employees involvement			
Employees are motivated to use ERP system.	*0.85*		
Employees are willing to accept the new changes with the ERP system.	*0.80*		
Employees understand how they fit into the new ERP system.	*0.74*		
Employees are aware of the benefits of ERP system.	*0.73*		
Employees are well trained to use ERP system.	*0.70*		
Employees are engaged in ERP system.	*0.67*		
Top management support			
Top management is aware of the benefits of ERP system.		*0.84*	
Top management actively encourages employees to involve with ERP system in the daily tasks.		*0.80*	
Top management considered ERP system to be strategic investment.		*0.77*	
Top management enthusiastically supports ERP system project.		*0.77*	
Cultural fit			
There is openness to suggestions from people at all levels of the company.			*0.82*
When problems emerge, there is a willingness to fix them.			*0.80*
In my company, change is viewed as a challenge and an opportunity.			*0.71*
Reliability	*0.88*	*0.85*	*0.77*
Eigenvalue	5.50	1.82	1.35
Percentage of variance	28.45	21.54	16.80
KMO		0.77	

Notes: 1 Items with factor loading less than 0.40 were deleted
2 items with cross loading between the factors higher than 0.35 were deleted.

5.7.1.3 Factor analysis on supply chain performance

The results of factor analysis of the 12 items related to the supply chain performance have been rotated in one factor. All items of supply chain performance had a factor loading ranged within 0.35 and 0.70. Whereas, the eigenvalue 3.67. The factor cumulatively captured 30.57% of the variance in the data. The reliability (Cronbach's alpha) was 0.78. The KMO measure, MSA was 0.63, and the Bartlett's test of sphericity was significant.

Table 12 Summary of factor and reliability analysis on supply chain performance

Items	*Factors loadings*
Supply chain	
Products quality has been improved within company's supply chain.	*0.70*
On-time delivery has been improved within company's supply chain.	*0.69*
Inventory costs have been reduced within the company's supply chain.	*0.65*
Company's customers are satisfied with our products and services.	*0.63*
Operational costs have been reduced within the company's supply chain.	*0.60*
Information flows quickly along the value chain.	*0.58*
Customers' responsiveness has been improved within company's supply chain.	*0.50*
Accurate information is usually available for decision making.	
We continuously renew our competence to meet changing customer needs.	*0.49*
We have joint production planning and scheduling among suppliers, manufacturing, marketing, and distributors.	*0.48*
	0.44
We take some actions quickly based on all the information continuously collected along company's supply chain.	*0.38*
We link information system so that each member of a supply chain knows others' requirements.	*0.35*
Reliability	*0.78*
Eigenvalue	3.67
Percentage of variance	30.57
KMO	*0.63*

Note: One component extracted, the solution cannot be rotated.

Table 13 Summary of reliability analysis of scales

Main variables	*Dimensions*	*No. of items*	*Item deleted*	*Cronbach's alpha*
ERP system	Integration	7	None	0.76
	Materials management	4	*D3*	0.68
	Production planning	5	None	0.71
	Controlling	4	None	0.71
	Workflow management	3	*P2*	0.67
Organisational variables	Employee involvement	6	None	0.88
	Top management support	4	*T2*	0.85
	Cultural fit	3	*C4*	0.77
Supply chain	SC performance	12	None	0.78

5.7.2 Reliability analysis

The coefficient alphas for the different constructs were computed through the reliability test in SPSS. In this study, the Cronbach's alpha of the measures was all comfortably

above the lower limit of acceptability which is 0.60 (Cronbach's alpha > 0.60). Therefore, all the measures were highly reliable.

5.8 Descriptive analysis

Descriptive statistics has been conducted in order to provide mean value and standard deviation for all variables of this study as well as to presents a primary idea about the study from the raw data. A five-point Likert-type scale rating from 1 = strongly disagree to 5 = strongly agree was used for measuring all items of this study.

5.8.1 Descriptive analysis on ERP system

The mean value for independent variable is 3.99, 3.92, 3.94, 3.78, and 3.88, respectively which are above the midpoint of three. The standard deviation ranges from 0.45 to 0.77. These results indicated that the ERP system worked seamlessly and smoothly in the Malaysian manufacturing companies.

5.8.2 Descriptive analysis on organisational variables

The mean value of employee involvement, top management support, and cultural fit are 3.70, 4.19, and 3.98, and the standard deviation 0.58, 0.53, and 0.56, respectively, which indicates that, the respondents perceived the importance of employee involvement, top management support, and cultural fit, for the success of ERP system.

Particularly, the respondents perceived the importance of top management support and that is because top management support has scored the highest mean value of 4.19. Many studies pointed out that, top management support considered as one of the most important factors in ERP system success.

5.8.3 Descriptive analysis on supply chain performance

Supply chain performance obtained mean value of 3.89, and standard deviation of 0.39, which shows improve in the supply chain performance.

Table 14 Summary of descriptive and frequency analysis

Construct	*Composite*	*Mean*	*Std. deviation*
ERP system	Integration	3.99	0.45
	Materials management	3.92	0.55
	Production planning	3.94	0.54
	Controlling	3.78	0.61
	Workflow management	3.88	0.77
Organisational variables	Employee involvement	3.70	0.58
	Top management support	4.19	0.53
	Cultural fit	3.98	0.56
Supply chain performance	SC performance	3.89	0.39

5.9 Hypotheses testing

5.9.1 Correlation analysis

In order to test the Pearson correlation between every two variables, the correlation analysis was conducted among all variables. Bivariate correlation was subjected to two-tailed test of significance from two levels namely, highly significant ($p < .01$), and significant ($p < .05$). In fact, preliminary analyses were conducted in order to ensure no violation of the underlying assumptions of normality, linearity, and homoscedasticity.

The ERP system is significantly correlated with each other. Integration ($r = 0.56$, $p < .01$), materials management ($r = 0.37$, $p < .01$), production planning ($r = 0.49$, $p < .01$), and controlling ($r = 0.41$, $p < .01$), are significantly and positively correlated with supply chain performance.

However, workflow management is not significantly correlated with supply chain performance, but still there is a positive relationship between workflow management and supply chain performance. These results indicated that the relationship between ERP system and supply chain performance is positive and significant relationship.

Employee involvement, top management support, and cultural fit are significantly and positively correlated with each other and with supply chain performance. Employee involvement ($r = 0.41$, $p < .01$), top management support ($r = 0.50$, $p < .01$), and cultural fit ($r = 0.30$, $p < .01$), are significantly and positively correlated with supply chain performance.

According to Pallant (2001) in order to interpret the correlation table, four steps must be achieved. The first one is determining the direction of the relationship between variables whether positive or negative relationship. The second step is determining the strength of relationship, from .10 to .29 small relationship, from .30 to .49 medium relationship, and from .50 to 1.0 large relationship as suggested by Cohen (1988). The third step related to calculating the coefficient of determination to get an idea about the variance shared by two variables, and this is by squaring the r value. The last step is assessing the significance level by the sign listed before sig. two-tailed, in fact the significance level should be reported but ignored and the focus should be directed at the amount of shared variance.

In this study, integration $r = .56$ ($.56 \times .56 = .31 \times 100 = 31\%$), that's mean integration helps to explain around 31% of the variance in supply chain performance and this is a quite good amount of variance explained. The relationship here between integration and supply chain performance is a large relationship and there is a high overlap between the two variables.

By applying the same formula to the remaining variables, the results will lead to draw a conclusion that materials management explain 14%, production planning explain 24%, controlling explain 17%, and finally workflow management explain 4 % of the variance in supply chain performance.

The relationship between production planning and supply chain performance can be considered as a large relationship, whereas the relationship between controlling and materials management and supply chain performance is a medium relationship, while the relationship between workflow management and supply chain performance is a small relationship.

Table 15 Summary of correlation analysis

Measures	*I*	*MM*	*PP*	*C*	*WM*	*EI*	*TMS*	*CF*	*SC*
Integration (I)	1								
Materials management (MM)	.41**	1							
Production planning (PP)	.47**	.32**	1						
Controlling (C)	.34**	.30**	.42**	1					
Workflow management (WM)	.19	.20	.080	.16	1				
Employee involvement (EI)	.33**	.24*	.25*	.18	.12	1			
Top management support (TMS)	.39**	.29**	.44**	.35**	.19	.44**	1		
Cultural fit (CF)	.31**	.08	.22	.17	.27*	.48**	.42**	1	
Supply chain performance	*.56***	*.37***	*.49***	*.41***	*.20*	*.41***	*.50***	*.30***	1

Notes: **correlation is significant at the 0.01 level (two-tailed).
*correlation is significant at the 0.05 level (two-tailed).

5.9.2 Multiple regression analysis

5.9.2.1 The relationship between ERP system and supply chain performance

The multiple regression analysis has been conducted in order to test the hypotheses as well as to determine the variance of supply chain performance that explained by the ERP system. Certainly, preliminary analyses were conducted in order to ensure that there is no violation of the underlying assumptions of sample size, normality, linearity, homoscedasticity, multicollinearity and singularity, outliers, and independence of residuals (Pallant, 2001).

Table 16 Summary of the relationship between ERP system and SC performance

Independents variables (ERP system)	*Dependent variable (SC performance) std. beta coefficients and significant level*
Integration	.35**
Materials management	.09
Production planning	.23**
Controlling	.16
Workflow management	.07
R	.65
R^2	*.42*
Adjust R^2	.38
F	10.54***

Note: Significant levels: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

According to the results in the above table ERP system explained 42% of the variance in supply chain performance (R^2 = 0.42). The F-value was 10.45 indicates that there is a significant linear model at alpha = 0.01. On the other hand, integration (β = 0.35, $p < 0.05$), and production planning (β = 0.23, $p < 0.05$), positively and significantly associated with supply chain performance (Pallant, 2001).

These results show that integration, and production planning, having the largest beta coefficient contribution in ERP system, $\beta = 0.35$, and $\beta = 0.23$, respectively, and they are positively and significantly associated with supply chain performance which concludes that ERP system positively and significantly associated with supply chain performance (Pallant, 2001).

Furthermore the above table demonstrates the significant unique contribution of each independent variable to the prediction of supply chain performance, and this is leads to make a comparison between the unique contribution of each independent variable to the equation. For example, integration with ($\beta = 0.35$, $p < 0.05$) made the largest unique and statically significant contribution to the equation, followed by production planning with (β = 0.23, $p < 0.05$) also made the second largest unique and statically significant contribution to the equation that is ($R^2 = 0.42$), whereas the whole model explain 42% of the variance in supply chain performance (Pallant, 2001).

5.9.3 Hierarchical multiple regression analysis

5.9.3.1 The moderating effect of the employee involvement on the relationship between ERP system and SC performance

Hierarchical multiple regression analysis was conducted to test the moderating effect of employee involvement on the relationship between ERP system and SC performance. ERP system explain 42% of the variance in supply chain performance ($R^2 = 0.42$) in the first step, in the second step explain 45% (R^2 = 0.45), and in third step explain 47% ($R^2 = 0.47$). These results indicate that there is an increase in the variance of supply chain performance after entering employee involvement as a moderating variable (Pallant, 2001).

The F-value was 10.45, 10.06, and 5.38, respectively, and all of the F-value in the three steps are significant which indicates that the increase in the variance of supply chain performance was significant at alpha = 0.01. The above results indicate that there is a significant moderating effect of employee involvement on the relationship between ERP system as a whole model and supply chain performance (Pallant, 2001).

The R^2 change value is 4% (R^2 change = 0.04, $p < 0.05$) from step 1 to step 2, that's mean employee involvement explain an additional 4% of the overall variance in supply chain performance. This contribution of the employee involvement is statistically significant as indicated by the sig. F change value ($p < 0.05$). From step 2 to step 3 the R^2 change value is 1% (R^2 change = 0.01) this contribution of employee involvement is not statistically significant.

On the other hand, the result of employee involvement, ($\beta = 0.21$, $p < 0.05$) in the second step illustrates the unique contribution of employee involvement to the equation which is 21%, that significantly contributes in the variance of SC performance. However, in the third step ($\beta = -.81$) it does not make a unique significant contribution to the equation for each unique contribution of ERP system.

The overall results indicated that employee involvement significantly influences the relationship between ERP system as whole model and SC performance as indicated in the significant increases of R^2 during the three steps. On the other hand, employee involvement influences the relationship between ERP system and SC performance in the second step; however, in the third step it does not influence the relationship between the unique contribution for each variable of ERP system and SC performance.

The above results concludes that employee involvement partially moderates the relationship between ERP system and SC performance since it influences the relationship between ERP system as whole model and SC performance, and however, it does not influence the relationship between unique contribution of each variable of ERP system and SC performance in the third step.

Table 17 Hierarchical multiple regression: the moderating effect of the employee involvement on the relationship between ERP system and SC performance

Dependant variable	*Independent variables*	*Std. beta step 1*	*Std. beta step 2*	*Std. beta step 3*
SC performance	Integration	.35**	.30**	–.53
	Materials management	.09	.07	–.30
	Production planning	.23**	.21**	.80
	Controlling	.16		–.16
	Workflow management	.07	.15	.21
			.06	
	Moderating		.21**	
	Employee involvement (EI)			–.81
	Interaction terms			
	Integration × EI			1.54
	Materials management × EI			.61
	Production planning × EI			–.97
	Controlling x EI			.51
	Workflow management × EI			–.19
	R^2	*.42*	*.45*	*.47*
	R^2 change	.42	.04	.01
	F change	10.54	4.89	.33
	Sig. F change	.000	.030	.896
	F	10.54***	10.06***	5.38***

Notes: Significant levels: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.
step 1: refers to regression with the independent of five dimensions of ERP.
step 2: refers to regression with the five dimensions and the moderator.
step 3: refers to regression with the five dimensions, the moderator, and the interaction terms.

Table 18 Hierarchical multiple regression: the moderating effect of the top management support on the relationship between ERP system and SC performance

Dependant variable	*Independent variables*	*Std. beta step 1*	*Std. beta step 2*	*Std. beta step 3*
SC performance	Integration	.35**	.31**	.31
	Materials management	.09	.08	.11
	Production planning	.23**	.17	.15
	Controlling	.16	.12	.08
	Workflow management	.07	.05	1.74
	Moderating		.23**	
	Top management support (TS)			1.24
	Interaction terms			
	Integration × TS			.10
	Materials management × TS			–.11
	Production planning × TS			–.10
	Controlling × TS			.10
	Workflow management × TS			–2.13
	R^2	*.42*	*.45*	*.49*
	R^2 change	.42	.04	.03
	F change	10.54	5.05	.90
	Sig. F change	.000	.03	.49
	F	10.54***	10.11***	5.89***

Notes: Significant levels: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$
step 1: refers to regression with the independent of five dimensions of ERP
step 2: refers to regression with the five dimensions and the moderator
step 3: refers to regression with the five dimensions, the moderator, and the interaction terms.

5.9.3.2 The moderating Effect of the top management support on the relationship between ERP system and SC performance

In order to test the moderating effect of top management support on the relationship between ERP system and SC performance, hierarchical multiple regression analysis was carried out. In the first step ERP system explained 42% of the variance in SC performance ($R^2 = 0.42$), whereas in the second step explain 45% ($R^2 = 0.45$), and in third step explain 49% ($R^2 = 0.49$). This indicates that there is an increase in the variance of supply chain performance after top management support has been entered in the equation as a moderator (Pallant, 2001).

The F-value was significant at alpha = 0.01 during the three steps, and the value was 10.45, 10.11, and 5.89, respectively, and that is reveals the increase in the variance of supply chain performance was significant at alpha = 0.01. The above results indicate that there is a significant moderating effect of top management support on the relationship between ERP system as a whole model and supply chain performance (Pallant, 2001).

From step 1 to step 2 the R^2 change value is 4% (R^2 change = 0.04, $p < 0.05$) and from step 2 to step 3 the R^2 change value is 3% (R^2 change = 0.03). This is identifies that top

management support explain an additional 4% of the overall variance in SC performance in the second step, whereas 3% in the third step. This contribution of the top management support is statistically significant in the second step as indicated by the sig. F change value ($p < 0.05$), while in the third step is not statistically significant.

The result of top management support, ($\beta = 0.23$, $p < 0.05$) in the second step demonstrates the unique contribution of top management support to the equation and that was 23% which significantly contributes in the variance of SC performance. However, in the third step ($\beta = 1.24$) it does not make unique significant contribution to the equation for each unique contribution of ERP system.

However, the overall results indicated that top management support significantly influences the relationship between ERP system as whole model and SC performance as indicated in the significant increases of R^2 during the three steps. On the other hand, top management support influences the relationship between ERP system and SC performance in the second step; however, in the third step it does not influence the relationship between the unique contribution for each dimension of ERP system and SC performance.

In order to conclude with the above results, top management support partially moderates the relationship between ERP system and SC performance as it influences the relationship between ERP system as a whole model and SC performance, and however, it does not influence the relationship between unique contribution of each dimension of ERP system and SC performance in the third step.

5.9.3.3 The moderating effect of the cultural fit on the relationship between ERP system and SC performance

Hierarchical multiple regression analysis was also performed to test the moderating effect of cultural fit on the relationship between ERP system and SC performance. ERP system explained 42% of the variance in SC performance ($R^2 = 0.42$) in the first step, while in the second step explain 43% ($R^2 = 0.43$), and explain 49% ($R^2 = 0.49$) in third step. These outcomes explain that there is an increase in the variance of supply chain performance, and this increase has taken place after entering cultural fit as a moderator in the equation (Pallant, 2001).

During the three steps, the F-value was 10.45, 9.00, and 5.92, respectively, and it was also significant which indicates that the increase in the variance of supply chain performance was significant at alpha = 0.01. These results pointed out that there is a significant moderating effect of cultural fit on the relationship between ERP system as a whole model and supply chain performance as indicated in the significant increase of R^2 during the three steps (Pallant, 2001).

In step two, R^2 change value is 1% (R^2 change = 0.01) and in step three R^2 change value is 6% (R^2 change = 0.06). The contribution of cultural fit is not statistically significant for each unique contribution of ERP system as indicated by the Sig. F change value.

The overall results conclude that cultural fit partially moderates the relationship between ERP system and SC performance, where it influences the relationship between ERP system as whole model and SC performance, and however, it does not influence the relationship between unique contribution of each ERP system and SC performance.

Table 19 Hierarchical multiple regression: the moderating effect of the cultural fit on the relationship between ERP system and SC performance

Dependant variable	*Independent variables*	*Std. beta step 1*	*Std. beta step 2*	*Std. beta step 3*
SC performance	Integration	.35**	.32**	–.25
	Materials management	.09	.10	.20
	Production planning	.23**	.22**	1.62*
	Controlling	.16	.15	–1.62*
	Workflow management	.07	.04	1.62*
	Moderating			
	Cultural fit (CF)		.11	.05
	Interaction terms			
	Integration × CF			1.20
	Materials management × CF			–.23
	Production planning × CF			–2.22
	Controlling × CF			2.62
	Workflow management × CF			–1.51
	R^2	*.42*	*.43*	*.49*
	R^2 *change*	.42	.01	.06
	F change	10.54	1.12	1.71
	Sig. F change	.000	.28	.15
	F	10.54***	9.00***	5.92***

Notes: Significant levels: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$
step 1: refers to regression with the independent of five dimensions of ERP
step 2: refers to regression with the five dimensions and the moderator
step 3: refers to regression with the five dimensions, the moderator, and the interaction terms.

5.10 Hypotheses testing results

Based on the data analysis and finding of correlation analysis, multiple regression analysis, and hierarchical multiple regression analysis the results of hypotheses testing presented in Table 20.

Table 20 Summary of the hypotheses testing results

Hypothesis number	*Statements of hypothesis*	*Remarks*
H_1	There is a positive and significant relationship between ERP system and SC performance.	Accepted
H_6	Employee involvement increases the relationship between ERP system and SC performance.	Accepted
H_7	Top management support increases the relationship between ERP system and SC performance.	Accepted
H_8	Cultural fit increases the relationship between ERP system and SC performance.	Accepted

6 Discussion

6.1 ERP system and supply chain performance

As hypothesised by this study, and in line with other previous research findings such as (Davenport and Brooks, 2004; Wieder et al., 2006; Zeng and Pathak, 2003; Olson et al., 2005; Lee et al., 1997; Goodhue et al., 1992; Arunthari, 2005; Rom and Rohde, 2006; Spathis and Constantinides, 2004; Tarn et al., 2002; Akkermans et al., 2000; Zheng et al., 2000; Themistocleous et al., 2002), ERP system have proven to have a positive and significant relationship and impact on SC performance. This study found a positive and significant relationship and impact of ERP system on supply chain performance within Malaysian manufacturing companies that contribute toward improving supply chain performance.

The finding of this study implies that, those companies who have achieved successful implementation of ERP system and attain effective usage of the system certainly will reap high and effective supply chain performance. In other words, successfully implemented ERP system and effectively used will significantly improve and enhance the performance of the supply chain, and then the company will reap many benefits from ERP system such as, having an easy and reliable access to data and information, adaptability in any changing business environment, improved scalability, improved efficiency, reduced cycle time, reduced time of delivery, reduced costs, avoidance of redundant data, and redundant operations, and reach globally out via CRM and SC modules throughout e-commerce and e-business.

6.2 Employee involvement

The study found that employee involvement affects positively and significantly the relationship between ERP system and supply chain performance. In fact, companies need to make extensive programmes for change management in order to train their employees to accept the new changes that have been occurred due to the implementation of ERP system. These programmes will help employees to accept the new changes that have taken place in their daily routine tasks performance and will also help them to embrace the new way of conducting tasks after the implementation of ERP system. Inclusive training and education programmes will provide successful usage of ERP system as well as prevent the likelihood of system failure which may lead the whole company to bankruptcy. Therefore, these programmes are important in ERP system life cycle to obtain better results from ERP system investment (Burca et al., 2005; Park and Kusiak, 2005).

The respondents of this study (Malaysian manufacturing companies) show that, their employees have been involved with the ERP system before and after the implementation of ERP system. The employees are well trained to use the ERP system, motivated to use the system, willing to accept the new changes of ERP system and they understand how to fit into the new ERP system. These involvements of employees assisted the company to achieve successful and effective usage of ERP system. As a conclusion, employees must be involved with the ERP system from the beginning of ERP system implementations, i.e., before and after the ERP system implementation in order to achieve successful implementation and effective usage of the system and then obtain tremendous benefits of ERP system.

6.3 Top management support

In order to achieve successful and effective usage of ERP system as well as prevent the likelihood of system failure that could take place in the company and therefore could lead the whole company to insolvency, top management should give high attention and support to the ERP project through providing training and educational programmes to the employees as well as offer them with a reward system that could encourage them to use ERP system in an effective manner and eventually achieve successful ERP system usage that leads to better business performance (Aladwani, 2001; Chen, 2001).

Malaysian manufacturing companies show that, there is a strong and continuous support from the top management to the ERP system project from the first day the project started. In fact, top management enthusiastically support ERP system project, they know and understand the benefits of ERP system on the company, and they always encourage employees to be involved with ERP system in an effective manner. This study concluded that, top management support is one of the most important variables that can assist the company to achieve successful and effective performance of ERP system. This is done through the continuous support to the ERP project, encouraging the employees to be involved with the ERP system, giving time to the ERP project, providing training and educational programmes, and offering a reward system. The success of ERP system can provide tremendous benefits through improving overall business performance including supply chain performance.

6.4 Cultural fit

It was hypothesised that cultural fit increases the relationship between ERP system and SC performance. However, the previous research reveals that the implementation and the usage of ERP system in Europe countries is not facing cultural misfit problem mainly because most of the global ERP vendors are western and they design ERP packages for western-type companies. On the other hand, the implementation and the usage of ERP system in countries other than western countries such as Japan and many other Asian countries usually will encounter cultural misfit problem in case they clash with ERP system culture (western culture) such as decentralisation, high level of commitment, high level of change, high level of accountability and discipline (Soh et al., 2000; Davison, 2002).

In fact, ERP system is an open system and therefore it requires an open organisational culture where authorised employees are able to access to most of critical information that they need in order to accomplish a particular task, whereas in different culture ERP system may not work properly, for example, in Chinese business culture the critical information is only accessed by managers and this is certainly will clash with the ERP system since it is an open system and need an open business culture like the western culture (Davison, 2002).

The global economy contains several different business cultures that may clash with each other. However, the ERP system imposes its own culture in order to standardise the whole business culture within the entire supply chain. Therefore, those companies who need to connect their supply chain to the global supply chain they must make some changes in the entire business culture such as eliminating the cultural close-mindedness in order to fit their entire culture with the ERP system culture and then connect their supply chain with the global supply chain and eventually be a global company that can

deal with international business as well as other countries with different culture in a very smooth manner (Daniels and Daniels, 1993; Al-Mashari and Zairi, 2000; Norris et al., 2000; Davenport, 1998).

7 Conclusions

This study aimed to investigate the relationship between ERP system and supply chain performance with respect to the effects of employee involvement, top management support, and cultural fit on this relationship. The finding of this study supports the significant relationship between ERP system and supply chain performance.

This research also found that, in order for companies to ensure the continuous success of ERP system, enhance the relationship between ERP system and SC performance, avoid system failure, and therefore obtain better impact and benefits of ERP system on business performance in general and supply chain performance in particular, employee involvement, top management support, and cultural fit should be present from the first day the ERP project commences and that should continue during the three stages of the ERP system life cycle namely, pre-implementation stage, implementation stage, and post-implementation stage.

The study contributes to the body of knowledge through investigating the relationship between ERP system and supply chain performance with respect to organisational variables such as top management support, employee involvement, and cultural fit, where these organisational variables can contribute to achieve successful usage of ERP system, contributes to fill up the gap in post-implementation stage of the ERP system life cycle, and finally contributes in reducing the likelihood of ERP system failure through those organisational variables.

The findings of this study implies that the successful implementation and the effective usage of ERP systems can contribute toward enhancing supply chain performance in many ways such as, integration of internal business processes, enhancement of information flow among different departments inside the company, improvement of the company's relationships and collaboration with outsourcing suppliers, customers, and supply chain partners, global sourcing, sharing, exchange and movement of information, goods and services, improvement of product quality, flexibility and customer responsiveness, and finally reduction of inventory and operation costs.

Although this study has some contributions as mentioned above, but at the same time it has also a number of limitations. The first limitation of this study is the sample which was only taken from manufacturing sector and therefore the finding will not be generalised for the service sector. The second limitation of this study was the number of companies that have adopted ERP systems in the manufacturing sector which is only 200 manufacturing companies, and however, in the near future this number expected to increase. The third limitation in this research is that, the study focuses only on post-implementation of ERP system life cycle, where ERP system passes through three implementation stages of system life cycle and that includes pre-implantation stage, implementation stage, and finally post-implementation stage. Two or three stages of ERP system life cycle could be investigated simultaneously.

In fact, little research has been conducted on the post-implementation stage and there is an increasing need for future research to focus on issues related to post-implementation stage. Future researches are really needed on post-implementation stage as well as on the

issues related to post-implementation stage. Successful implementation of ERP systems is not considered as the final goal of the company, but the continuous considerations and assessments after the ERP systems implementation are also needed.

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