ERP CRITICAL SUCCESS FACTORS TO ENHANCE CROSS-FUNCTIONAL INTEGRATION

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Supapich Wongchotewiriyakit

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ABSTRACT

None of the prior studies have stated clearly and comprehensively on what are needed to be done in order to let ERP reaches its full potential on enhancing cross-functional integration level. As a result, the objective of this research is to gain an insight on the following research questions. (1) Why some ERP user organizations are successful in promoting cross-functional integration, while the others are not? (2) Is CSF the root cause of different levels of firm cross-functional integration after ERP implementation? (3) If yes, how they are put into practice so that it will enhance cross-functional integration?

To gain in-depth knowledge, this study follows qualitative methodology, using multiple-case studies approach. As a result, the study proposes the definition of ERP success in terms of cross-functional integration from ERP experts along. Moreover, list of critical success factors that bring about higher level of cross-functional integration is proposed. Furthermore, the study finds out that the most crucial factor is the individuals who are "change agents" that drive the ERP project to its full potential of unifying cross-functional departments. Moreover, certain characteristics of change agents and the empowering factors that can strengthen their capability. Furthermore, insight on how organization have practically done to sustain or even improve cross functional integration through ERP systems overtime is discovered. The findings of this research should be able to trigger the new dimension of further development of theory about the relationship between ERP system and organization behaviour as well as the further research about sustainability factors that could improve organization performance through ERP usage.

KEY WORDS: ERP / ERP CRITICAL SUCCESS FACTOR / ORGANIZATION BEHAVIOR / CHANGE AGENT / SUSTAINABILITY

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CHAPTER I
INTRODUCTION

1.1 Background

Back in 1776, Adam Smith outlined the concept of division of labor in his classic book, The Wealth of Nations. According to him, division of labor is the concept of breaking down work operations into miniscule work steps so that each worker can focus only on contracted set of responsibilities which finally will result in higher productivity as compare to the approach that one man performed multiple set of operations. Later in 1911, Frederick Taylor affirmed the concept by describing that the segregation of work helped men sharpen their expertise and, therefore, could offer their outputs with most effectiveness. Since then, the philosophy have not only impacted on organization model, but also on educational institutes where both strive to build functional expertise into individuals through corporate training or specialized curriculum (Smith, 1776; Timothy Galpin R. H., 2007).

Their concept on the division of labor still prevails in today's organization structure as 'departmental functions' where managers and staffs are qualified by their functional expertise and get to job positions so as to get their work assignment done. However, on extreme cases, the segregation of works into functions may unconsciously cause negative impact of silo mentality, the imperceptible boundary between departments. Within the boundary, organizational wide goals are usually neglected (Cilliers, 2012). Moreover, with the increasing of competitive environment and shift on customer demand, where customers need more comprehensive solutions in a timely manners, departmental silo has become unwanted condition which required to be solved (Cilliers, 2012) (Timothy Galpin R. H., 2007). Silos are criticized as causes of negative things incurred within organizations such as personal conflicts, zero-sum game, poor performance, etc. Some researchers even compare the phenomenon as 'silo virus' which must be cured (Peter Schutz, 2006). As we can see from the number of modern-day

researches and articles, businesses are guided to focus on eliminating such silo and promoting cross-functional integration through different means, for examples:

- develop cross-functional leaders (A.Ready, 2004)
- promote enterprise-wide goals/strategic plan (A.Ready, 2004; Pagell, 2004; Basnet, 2013)
- set clear work processes and definition of responsibility (Peter Schutz, 2006)
- conduct knowledge sharing (Basnet, 2013)
- implement business process reengineering (Silvestroa & Westley, 2002; Thomas H. Davenport, 1990)
- establish rewards and employee evaluation system based on organizational processes (A.Ready, 2004; Emery, 2009),
- enhance communication effectiveness through flow of information (Peter Schutz, 2006)
- use of information technology (Emery, 2009)

Due to changing of global economy and shift in customer demand, firms need to deal with a lot of uncertainty which require a robust information technology to process huge amount of data and generate in a form of information for further decision making (Tushman & Nadler, 1978) (Richard L.Daft, 1986). Predicted by Peter F. Drucker in 1988, in 20 years most of the companies would become "information-based" where work are done by teams of knowledgeable specialists. With the evidence of the internet rising and increasing of popularity enterprise systems (ES) (Davenport, 1998; Sock Hwa Chung Charles A. Snyder, 2000), Drucker's prediction seems to be accurate. Information technology has become a common facilitator for enhancing cross-functional integration. Stated by Davenport and Short in 1990, business process reengineering would be most effective in promoting Cross-functional Integration if it was synergized with information technology.

One of the most commonly used ES for business process re-engineering are Enterprise Resource Planning systems (ERP) (Krishnankutty, 2009). Since 1990s, ERP systems have not only been prevalent information technologies, but also have become one of the major IT investments of many organizations (Sock Hwa Chung, 2000).

ERP systems are one of the means that has been applauded by a lot of practitioner and academic literatures on its promising benefit of unifying cross-functional departments (Hendricks, Singhal, & Stratman, 2007; Davenport, 1998; Ketokivi, 2012; Gupta, 2000). At plant level which , ERP is an effective "coordination mechanism" (Gattiker, 2007).

In general, ERP studies have been mostly focused on 2 major areas which are (1) system implementation and (2) organizational performance after implementation, which the researches of the former are more outnumbered (Gattiker, 2007). Despite of their popularity and tremendous impact on firms operation and processes, the researches about the success of ERP systems on the intangible aspect such as on human behavior are far less in numbers. Among one of those literatures, ERP systems are identified as enterprise-wide systems that not only involved heavily on technological aspect, but also related to changes in social aspect of the firms (Vries & Boonstra, 2012) (Elbanna, 2007). On one hand, individual, group, organization and society have a role on influencing the development and use of enterprise systems. On the other hand, enterprise systems form the behavior and attitudes of individuals, groups, organizations and societies (Howcroft, Newell, & Wagner, 2004).

Critical success factors of ERP implementation have been studied vastly in the past years (Akkermans & Helden, 2002), but none of researches have directly studied on the CSF and how they were applied which would result in enhancing firm cross-functional integration. ERP systems can only enhance integration when they are "properly" set up. In other words, just the existent of the systems themselves could not enable integration (Pagell, 2004). Thus, what should be considered as the 'proper' characteristics, list of deliverables, and implementation strategy of ERP that would bring about Cross-functional Integration? To the best of our knowledge, there are only a few researches that are focus on ERP and its effects on cross-functional integration and none of them have stated clearly and comprehensively on what are needed to be done in order to let ERP reaches its full potential on enhancing Cross-functional Integration level.

1.2 Research Objectives

To understand what are actions or ERP implementation strategies that would bring about the full potential of ERP on promoting cross-functional integration.

1.3 Scope of the Study

This study is focused on ERP impact on internal supply chain integration, or so-called cross-functional integration. External integration or supply chain integration beyond firm's boundary is out-of-scope.

1.4 Methodology of the Study

A literature review was conducted to review researches about ERP and cross functional integration which we finally see that gap of those researches that none of them has explicitly relate CSFs to cross-functional integration. As a result, further review of ERP CSFs was conducted in order to identify and categorize CSF and come up with our research framework. Afterward, a multiple-case study method is proceeded through in-depth interview with ERP consultants and representative from various manufacturing industries.

1.5 Contribution of the Study

The outcomes of this research can also be used by any firms and practitioners who is about to implement or upgrade their ERP system so as to ensure that their ERP would result beneficially in terms of enhancing cross-functional integration which is the most critical element of ERP success. Moreover, it could be used as a measurement of their current ERP set up in order to seek for gaps of improvement as well as to prioritize integration effort.

1.6 Structure of Research

The following chapter is the literature reviews on why firms need integration, 'integration' in organization context, definition of cross-functional integration, what is ERP and its role on cross-functional integration. Then a comprehensive review of exiting researches on ERP and cross-functional integration are described. In the last section of literature review is about identifying CSFs and framework for further qualitative research in the following chapter. Next, the research methodology, data collection and analysis are elaborated. Finally, the paper concludes findings, contributions and directions for future research.

CHAPTER II
LITERATURE REVIEW

The concept of division of labour still prevails in today's organization structure as 'departmental functions' where managers and staffs are qualified by their functional expertise and get to positions so as to get their work assignment done (Smith, 1776; Timothy Galpin R. H., 2007) through own distinct departmental technology (Richard L.Daft, 1986). However, on extreme cases, the segregation of works into functions may unconsciously cause negative impact of silo mentality which is the phenomenon when each function creates the imperceptible wall between departments. Within the wall, organizational wide goals are usually neglected (Cilliers, 2012). In modern world business where increasing of competitive environment which customers need more comprehensive solutions in a timely manner, departmental silo has become unwanted condition which required to be solved (Cilliers, 2012) (Timothy Galpin R. H., 2007). Departmental silos are criticized as causes of negative things incurred within organizations such as personal conflicts, zero-sum game, and poor performance. Some authors even compare the silos as 'virus' or syndrome which must be cured (Peter Schutz, 2006; Tett, 2015). Departmental silo decelerate time to market and kill innovative ideas (Tett, 2015).

As a result, in modern-day researches and articles, businesses are guided to focus on eliminating such silo by promoting cross-functional integration through different means, for examples:

- develop cross-functional leaders (A.Ready, 2004)
- promote cross-functional team (Tett, 2015)
- promote enterprise-wide goals (A.Ready, 2004; Pagell, 2004)
- set clear work processes and definition of responsibility (Peter Schutz, 2006)
- implement business process reengineering (Silvestroa & Westley, 2002; Thomas H. Davenport, 1990)

- establish rewards and employee evaluation system based on organizational processes (A.Ready, 2004; Emery, 2009),
- enhance communication effectiveness through flow of information (Peter Schutz, 2006)
- encourage job rotation (Tett, 2015)
- use of information technology (Emery, 2009)

Regardless of which levels of integration, the existence of them results in better firms' performance (Narasimhan & Kim, 2001; Droge, Jayaram, & Vickery, 2004; Flynn, Huo, & Zhao, 2010; Pagell, 2004; Boyer & McDermott, 1999; Barratt, 2004) and helps boost firm's innovation (Tett, 2015). Furthermore, internal integration or so-called cross-functional integration is proven to be not only a significant factor of business and operational success, but also as a foundation for extended integration to suppliers and customers (Flynn, Huo, & Zhao, 2010; Barratt, 2004; Fawcett & Magnan, 2002). Before striving for external collaboration, firms should understand that the real obstruction to an outrival supply chain happens internally as 'functional silos' (Vos, 1999; Mitchell, 2006). Also, studies show that higher level of cooperation between internal supply chain related functions (e.g. purchasing, manufacturing, and logistics) is correspondingly to better customer services, higher customer and employee satisfaction, competitive advantages, inventory turn-over, lower forecast inaccuracy, and operating costs reduction (Ensign, 1998; Barratt, 2004; Kahn & Mentzer, 1996).

There are two major areas of researches on cross-functional integration which are (1) researches that have been conducted to prove the benefits of internal integration on firm performance (Turkulainen & Ketokivi, 2012; Droge, Jayaram, & Vickery, 2004; Basnet, 2013) and (2) another area of research, which is less in numbers, focuses on prerequisites of internal integration (Pagell, 2004; Emery, 2009).

2.1 Integration in Organizational Context

Integration in organizational context has generally been studied, mostly in terms of supply chain integration (Barratt, 2004), at three different levels of analysis:

- External integration examines integration that occurs between organizations who are the member of supply chain so as to establish a collaborative process (Narasimhan & Kim, 2001; Pagell, 2004)
- Internal integration where each business unit in an organization coordinate with one another to achieve organizational goals of providing products or services to the customer (Pagell, 2004; Barratt, 2004; Basnet, 2013)
- Integration within each function, intra-integration, which different levels within each function communicate in order to implement firm strategies (Pagell, 2004; Barratt, 2004)

This research is scoped down to see the impact of ERP only on internal integration.

2.1.1 Cross-functional Integration

Best to our knowledge, there is no one single definition of cross-functional integration (Basnet, 2013). Nevertheless, most of the literatures define the term cross-functional integration based on a common ground of two elements (1) **interaction** and (2) **collaboration**. In other words, cross-functional integration happens when interdepartmental entities interact and/or collaborate so as to achieve organizational goals (Pagell, 2004; Alsène, 2007; Daugherty, 2007) and each department will not set up functional goal which eventually will deteriorate organizational goals (Ketokivi, 2012). Characteristics of firms with high level cross-functional integration will work holistically as a single unit where each business unit is able to transfer and interpret information with each other with minimum effort (Ketokivi, 2012).

Kahn and Mentzer further elaborates the two mentioned fundamentals of cross-functional integration.

(1) **Interaction** or activity which is happened in forms of communication (i.e. meetings, information sharing, emails, telephone calls), between departments where each of them attempts to win the best result for own department.

(2) **Collaboration** which is more on the *intangible* side of integration where each department cooperates to satisfy organizational goals through strategic alignment (e.g. teamwork, organization-wide goals, shared visions, etc.), rather than a competition of resources (Kahn & Mentzer, 1996; Brache, 1992).

2.1.2 Level of Cross-functional Integration

In supply chain environment, integration has been classified into 4 stages in which stage 1 to 3 are within the scope of firm boundary. Such three stages are the conditions where organizations evolve from (1) no integration at all to (2) intra-departmental integration and (3) internal integration. Finally, at stage (4), firms are capable of integrating their business processes with external entities such as customers and suppliers (Stevens, 1989). In this research, it combines the stages of internal integration as proposed by the work of Steven and Pagell for better understanding (Stevens, 1989) (Pagell, 2004).

Table 2.1 Cross-functional Integration Level, Adapted from Pagell, 2004;Stevens, 1989

Cross-functional Integration Level	Indicators	Characteristics
3. Full cross-functional integration	The majority of the time manufacturing, logistics and purchasing **interact** to actualize customer requirement. The majority of the time manufacturing, logistics and purchasing **collaborate** to actualize customer requirement.	• Each department is able to transfer and interpret information with each other with minimum effort (Ketokivi, 2012) • Each department will not set up departmental goal which in the end will deteriorate organizational goals (Ketokivi, 2012) • Full visibility of material movement across internal supply chain (Stevens, 1989)
2. Intradepartmental integration	Some of the time manufacturing, logistics and purchasing **interact** to actualize customer requirement. Some of the time manufacturing, logistics and purchasing **collaborate** to actualize customer requirement.	• Poor visibility of real customer demand at manufacturing sites as customer orders are aggregated by production planning (Stevens, 1989). • Level 2 indicates some interaction and collaboration between some departments rather than the whole values chain (Pagell, 2004).
1. No Integration	The majority of the time manufacturing, logistics and purchasing **do not interact** to actualize customer requirement. The majority of the time manufacturing, logistics and purchasing **do not collaborate** to actualize customer requirement.	• Each internal supply chain element buffers inventory due to lack of trust and inconsistent demand • Each department making decision based own benefits • Poor customer service (Stevens, 1989)

Organizations are striving to cope with internal and external uncertainty by seeking for information and optimize means to process such information through the arrangement of organizational structure, liaison between sub-units and information technology. Effective information processing should be relevant, real-time and undistorted (Tushman & Nadler, 1978). Structure of organizations are set according to division of labor concept, for efficiency reasons, firms are established and divided into business units. Consequently, various technologies are built and applied to satisfied individual department. However, to effectively achieve organizational objectives, each business unit must share information so as to reduce "uncertainty" and "equivocality". Uncertainty happens in organization when there are no answers to explicit and important questions, for examples, what it the total sales figure last year. On the other hand, equivocality is when the answers are formulated subjectively by experiences and/or opinion of managers, such as when setting company's goals. While, enterprise systems are developed to process huge amount of data when interdependency between departments is high so as to allow managers to gain insight to sufficient information for better understanding towards quantitative aspects of the firms rather than to solve equivocality questions (Richard L.Daft, 1986). An important aspect of robust ERP systems is to be able to effectively transfer relevant information through the whole organization when needed (Beretta, 2002).

As a result, many firms continuously strive to actualize the promised benefits from ERP by reconsidering their business processes and drive their ES based on the following drivers:

- Lessen the number of enterprise systems into single-instance so as to reduce maintenance cost in terms of human resources and IT infrastructure.
- Integrate ERP to legacy systems
- Develop common terminology for data and process definition
- Robust analytic competence (H.Davenport, Harris, & Cantrell, 2004)

2.2 Enterprise Resource Planning

Firms are striving to enable integration in many ways. Enterprise Resource Planning (ERP) is one of the means that has been applauded by a lot of practitioners and academic literatures on its promising benefit of unifying functional integration (Hendricks, Singhal, & Stratman, 2007; Davenport, 1998; Ketokivi, 2012; Gupta, 2000). At plant level which characterized with high level of interdependence-related uncertainty, ERP is one of the effective "coordination mechanism" (Gattiker, 2007).

Back in 1970's, ERP systems stemmed from manufacturing environment where Materials Requirements Planning (MRP) logic was used for planning raw materials required to produced finished products. Then later, by adding up the concept of production scheduling and capacity planning, MRP transformed to MRP II. Soon in 1990's MRPII was evolved to ERP system with the extension of modular functions, including Finance, Human Resources, etc. With ERP system, companies are able to actualize data traceability and improve intra-organization processes. Nowadays, ERP II system allows companies to go beyond its boundary by including its supply chain counterparts (Antonucci, Corbitt, Stewart, & Harris, Fall 2004; Vathanophas, 2007; Kakouris & G. Polychronopoulos, 2005).

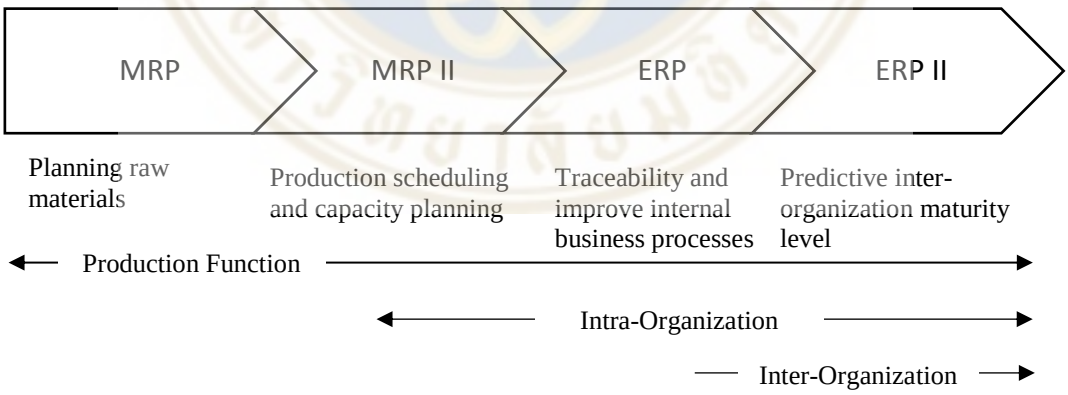

Figure 2.1 ERP Evolution (Adapted from Antonucci, Corbitt, Stewart, & Harris, Fall 2004 and Polychronopoulos, 2005)

2.2.1 ERP Success

The evaluation of ERP implementation success depends on the perspective of stakeholders (Dezdar & Ainin, 2011).

- Similar to any other project implementation, project management aspect which comprises of time, cost and performance must be according to what project managers and ERP implementation consultants have defined at the initial project phase.
- Avoid turbulence after go-live and ensure smooth business operations is what ERP users perceive it as ERP success.
- For top management, achieving long-term business results, such as return on investment and achieve predefined business goals, are their expectation of the implementation outcome (Markus & Tanis, 2000; Dezdar & Ainin, 2011)

Evidence shows that firms which able to achieve smooth early operations may not be able to realize business benefits or the systems may become just the cost of doing business rather than providing competitive advantage in the long run. Moreover, the company should aim to achieve higher performance standard than trying to achieve static and unambitious goals. Therefore, to realize a comprehensive evaluation, Markus and Tanis have suggested that the evaluation of enterprise systems should not solely be judged by only single aspect. Aforementioned aspects of ERP success should be combined as ERP success evaluation metrics (Markus & Tanis, 2000).

Another group of researches about ERP success focuses on developing model for measuring ERP success (Gable, Sedera, & Chan, 2003) (Ifinedo P., 2006). Closest to our interest, Ifinedo and his colleagues have included work-group impact to their ERP measurement model which is the extension to the model proposed by Gable in 2003.

The model is proposed to use to measure ERP success in a snapshot manner. As depicted as Figure2.2, there are two dimensions covering in the model (1) impact dimension and (2) quality dimension. Impact dimension refers to the benefits that derive or not derive from the system. Quality dimension refers to the future potential of the system.

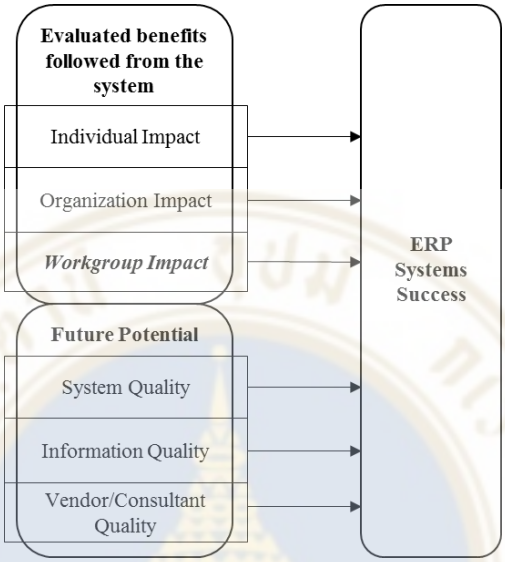

Figure 2.2 The Extended ERP Systems Success Measurement Model (adapted from (Gable, Sedera, & Chan, 2003) (Ifinedo P., 2006))

2.2.2 ERP and Cross-functional Integration Researches

In general, ERP studies have mostly focused on 2 major areas which are (1) system implementation and (2) organizational performance after implementation, while the researches of the former are more outnumbered (Gattiker, 2007). Despite of their popularity and tremendous impact on firm operation and processes, the researches about the effectiveness of ERP systems on the intangible aspect such as on human behaviour, especially on cross-functional integration, are far less in numbers.

Among one of those literatures, ERP systems are identified as enterprise-wide systems that not only involved heavily on technological aspect, but also related to changes in social aspect of the firms (Vries & Boonstra, 2012) (Elbanna, 2007). On one hand, individual, group, organization and society have a role on influencing the development and use of enterprise systems. On the other hand, enterprise systems form

the behavior and attitudes of individuals, groups, organizations and societies (Howcroft, Newell, & Wagner, 2004).

ERP systems are one of the means that has been applauded by a lot of practitioner and academic literatures on its promising benefit of unifying cross-functional departments (Hendricks, Singhal, & Stratman, 2007; Davenport, 1998; Ketokivi, 2012; Gupta, 2000). Cultivating coordination between functional units and internal communication have been highly rated as the reasons for ERP implementation in many organizations (Constantinides, 2003). By observing various work situations and conducting interviews, ERP system facilitates coordination within a firm in terms of enhancing seamless interdepartmental operation flows, increase transparency and tasks standardization (Alsène, 2007) which result in reducing inventory level and cost cutting from non-value-added activities (Davenport, 2000). ERP is able to reduce gap between manufacturing and marketing department (Hsu & Chen, 2004). As a result, it is not surprising that a study shows a proven of positive response of investors on the announcement of ERP implementations among 112 public companies in the US during 1990-2010 (Patnaik, 2014).

On the contrary, some literatures are doubtful whether the existence of ERP system will spontaneously create cross-functional integration. A series of qualitative case studies has been done in order to identify positive and negative factors in internal supply chain integration. ERP is mentioned to be one of the factors that enables effective communication only if data in ERP systems is maintained ***correctly*** (Pagell, 2004). In other words, just the existent of them could not enable integration as evidence by inconsistent result in different social contexts. Companies with low level of integration cannot design or gain benefits from the system in terms of enhancing integration (Pagell, 2004).

Another study also critiques that ability of ERP in terms of connecting two distant facilities does not come spontaneously after ERP implementation, Elbanna investigates an ERP implementation on the attempt of a company on unifying two manufacturing sites operated in two different countries. The study has revealed that social fragmentation has a negative impact on ERP implementation and obstruct the integration benefit (Elbanna, 2007), which is in contrast with the classical belief that ERP enabled integration across business units, regardless of geographical differences

(Davenport, 1998). The implementation cannot overcome power and interest of each functional department (in this research sales and production teams) have direct influences on the project implementation and outcomes (Vries & Boonstra, 2012).

A case study conducted at a Malaysian company, focused on the effects of social integration on enterprise system usage. Face-to-face interviews along with eight informal conversations, five observations, and secondary data are conducted with top management, the middle management, representative of departmental users, the IT department, and IT vendor. Enterprise systems alone cannot guarantee organizational success, it is required social integration processes to actualize the integration of 3 social capital aspects which are organization structure, employee relationship, and cognitive aspect (i.e. shared language and code) (Teoh & Pan, 2008).

The most relevant researches to our research question are the works done by Rowe, Amrani, Bidan, Marciniak, & Geffroy-Maronnat. Ellaborating. In their researches, ERP implementation do have an influence on cross-functional awareness, however, the result is varied with size of the companies in which ERP systems improve cross-functionality in SMEs, but not in larger firms (Rowe, Amrani, Bidan, Marciniak, & Geffroy-Maronnat, 2005). Extending to the mentioned study, the same group of the researchers further proves that ERP implementation strategy is a crucial factor in enabling cross-functional awareness in case of SMEs in France (Marciniak, Amrani, Rowe, & Adam, 2014).

Nevertheless, none of the literatures has explicitly mentioned or conduct an empirical study to test whether certain factors related to ERP implementation would predict cross functional integration or not.

The researches on cross-functional integration and ERP are summarized as in Table 2.2.

Table 2.2 ERP and Cross-functional Integration Researches

Researchers	Source of information	Results	Affirm ERP on enabling cross-functional integration?
Alsène, 2007	Observing work situations and conducting interviews	The researcher proves that ERP system facilitates coordination within a firm in terms of enhancing seamless interdepartmental operation flows, increase transparency and tasks standardization	Yes
Pagell, 2004	Interview with internal supply chain managers (i.e. manufacturing, purchasing, and logistics managers) Facility tour	ERP systems enhance integration when they are properly set up, but just the existent of them could not enable integration. In other words, companies with low level of integration cannot design or gain benefits from the system in terms of enhancing integration	Yes, with conditions
Rowe, Amrani, Bidan, Marciniak, & Geffroy-Maronnat, 2005	ERP project managers, CIOs, CEOs, and functional managers	Firm size has an influence on enhancing cross-functionality via ERP projects which ERP systems improve cross-functionality in SME, but not in larger firms.	Yes

Table 2.2 ERP and Cross-functional Integration Researches (cont.)

Researchers	Source of information	Results	Affirm ERP on enabling cross-functional integration?
Marciniak, Amrani, Rowe, & Adam, 2014	ERP project managers, CIOs, CEOs, and functional managers of SME and large French firms (a single respondent per firm)	Size of the firms influences ERP implementation strategy and the strategy itself is a crucial factor in enabling cross-functional awareness.	Yes, with conditions
Hsu & Chen, 2004	Managers of manufacturing and marketing department in Taiwan	ERP is able to reduce gap between manufacturing and marketing department.	Yes
Elbanna, 2007	Project director, project manager, module managers, change managers, and project members, external consultants	ERP system could not improve integration on the "already fragmented environment".	No
Vries & Boonstra, 2012	Key players at the production-sales interface	Power and interest of each functional department (in this research sales and production teams) have direct influences on the project implementation and outcomes	Not applicable

Table 2.2 ERP and Cross-functional Integration Researches (cont.)

Researchers	Source of information	Results	Affirm ERP on enabling cross-functional integration?
Pan, 2008	A case study conducted at a Malaysian company, focused on the effects of social integration on enterprise system usage. Face-to-face interviews along with eight informal conversations, five observations, and secondary data. Informants were EIS users from the top management, the middle management, different user departments, the IT department, and IT vendor.	Enterprise information system alone cannot guarantee organizational success, it is required social integration processes to actualize the integration of 3 social capital aspects which are organization structure, employee relationship, and cognitive aspect (i.e. shared language and code).	Not applicable
Gattiker, 2007	Managers and operational staffs at plant level (e.g. production scheduler, planner, buyer, materials manager, purchasing manager, operations manager, etc.)	The study proves that, at plant level which characterized with high level of interdependence-related uncertainty, ERP is one of the effective "coordination mechanism"	Yes

From above comprehensive literature review, it shows that the desirable outcome of ERP systems on enhancing cross-functional integration is not easily met as the researches about ERP effects on cross-functional integration showing varied results (Table 1). ERP system can only enhance integration when they are "properly" set up. In other words, just the existent of the systems themselves could not enable integration (Pagell, 2004). Thus, what should be considered as the 'proper' characteristics of ERP that would bring about cross-functional integration?

As a result, this paper further reviews literatures about ERP preferable factors which would lead the implementation project to firm success, such factors are commonly called *critical success factors* (CSFs). There are many literatures which have studied about CSFs of ERP implementation, but to the best of our knowledge, there has been no study which focus on preferable ERP CSFs which would enhance cross-functional integration. Therefore, for this paper, given that cross-functional integration is the preferable outcome of ERP implementation and CSFs are means leading to ERP success, this results in the following research questions:

Research Question 1: Why some ERP user organizations are successful in promoting cross-functional integration, while the others are not?

Research Question 2: Is CSF the root cause of different levels of firm cross-functional integration after ERP implementation?

Research Question 3: If yes, how they are put into practice so that it will enhance cross-functional integration.

Thus, the following section would be a comprehensively review of critical success factors of ERP systems and our research propositions.

2.3 Critical Success Factors of ERP

There are 17 CSFs are recognized and 11 of them are realized as critical success factors by more than one-third of previous literatures published between 1999 to 2008 (Dezdar & Sulaiman, 2009). Table 2.3 shows the total of 17 CSFs and their frequency of prior studies which recognized them as CSFs, those medium to high frequency are in italic.

Table 2.3 CSFs Taxonomy and Their Synonymic Terms (Source: Dezdar & Sulaiman, 2009)

Critical Success Factors	**Wider range of terms and phrases**	**Frequency of recognition (%)**
Top management support and commitment	Top management/executive involvement; top management/ executive commitment; top management/executive awareness; top management/executive participation; company-wide support; companywide commitment; dedicated resources; employee recognition and incentive; funds support	72
Project management and evaluation	Effective project management; project planning project schedule and plan; project scope; work time schedule; detailed schedule; project completion time; project cost; auditing and control; project management of consultants and suppliers	70
Business process reengineering and minimum	BPR; business process reengineering; business process change; business process improvement, optimization, and reengineering; alignment of the business with the new system; process adaptation level; process	62
ERP team composition, competence and	Composition of project team member; balanced implementation team; project team: the best and brightest; project team empowerment; steering committee; project team competence; the domain knowledge	56
Change management program	Change management plan; managing changes; managing conflicts; argument for change; management of expectations; organizational resistance to change; change readiness; understanding changing requirements;	51
User training and education	Training employee; education on new business processes; adequate training and instruction; training of project team and end-user; effective training; Hands-on training	47

Table 2.3 CSFs Taxonomy and Their Synonymic Terms (Source: Dezdar & Sulaiman, 2009) (cont.)

Critical Success Factors	**Wider range of terms and phrases**	**Frequency of recognition (%)**
Business plan and vision	Business plan-vision-goals-justification; vision statement and adequate business plan; feasibility-evaluation of ERP project; Effective strategic thinking and planning strategic; competitive pressure; clear goals and objectives; clear desired outcomes; strategic IT planning; link to business	45
Enterprise-wide communication and cooperation	Effective enterprise-wide communication; interdepartmental communication; interdepartmental collaboration; interdepartmental cooperation; open and honest communication among the stakeholders; cross-functional	41
Organizational culture	Cultural and business change; cultural differences; cultural readiness; change culture; cultural fit; cultural issues; shared beliefs; centralization of decision making; commitment to learning; national culture; trust; unfocused information seeking; deal with organizational diversity; human	39
Vendor support	Vendor-customer cooperation; Vendor-customer partnership; usage of vendor's tools; technical competence of supplier; effective communications with users; domain knowledge of supplier; implementation team members; connectedness with user department; effective communications	38
Software analysis, testing and troubleshooting	System development; stabilization of ERP; adequate testing; data accuracy; data analysis and conversion; data management; data fit; data migration; accurate and prompt data acquisition; trouble shooting; tests	34
Project champion	Project manager; project leader expertise; strong and committed leadership; ERP project manager leadership	32

Table 2.3 CSFs Taxonomy and Their Synonymic Terms (Source: Dezdar & Sulaiman, 2009) (cont.)

Critical Success Factors	**Wider range of terms and phrases**	**Frequency of recognition (%)**
Careful selection of ERP Software	Adequate ERP selection; system selection process; suitability of software; package standards; completeness of software; selection of ERP vendor; ERP vendor quality; ERP vendor reputation; related experience of supplier; ERP supplier option and service; technical competence of supplier;	30
Use of consultant	Consultant-customer partnership; consultant involvement; consultant support; usage of consultant's tools; consultant selection; consulting services; technical competence of consultants; domain knowledge of	26
Appropriate business and IT legacy systems	Legacy systems and IT infrastructure; IT infrastructure skills; pre-existing data and systems; suitability of hardware and software; technological context; technology or infrastructure in place; integration and	25
System quality	System reliability; system integrity; system stability; compatibility of software; timeliness; ERP adaptation level; ERP software features; competency and flexibility of the ERP; ease of use; perceived complexity;	25
User involvement	User participation; user support; feeling of user involvement; willingness to participate; employee cooperation; key user involvement	23

Among 11 CSFs, User Training and Education and Change Management are highly correlated, therefore, it is reasonable to group both factors together (Bhatti, 2005). Consultant and Vendor Support factors are used interchangeably and both are external influence, therefore, 'Use of consultant' to 'Vendor Support' are considered to be the same factor (Ifinedo P. , 2006). Finally, the final candidates of CSFs are shown in Table 2.4.

Table 2.4 Final candidates of CSFs.

No.	**Critical Success Factors**
1	Top management support and commitment
2	Project management and evaluation
3	Business process reengineering and minimum customization
4	ERP team composition, competence and compensation
5	Change management program
6	Business plan and vision
7	Enterprise-wide communication and cooperation
8	Organizational culture
9	Vendor support and use of consultant
10	Software analysis, testing and troubleshooting

2.3.1 Top management support and commitment

Top management support and commitment have been recognized as the most frequently mentioned ERP CSFs (Dezdar & Sulaiman, 2009). Prior ERP implementation, the communication from top management on the vision of the future integrated firm preceding to ERP implementation (i.e. centralized database which accessible to all functions) promotes a stronger cross-functional perspective of the organization (Rowe, Amrani, Bidan, Marciniak, & Geffroy-Maronnat, 2005; Gosain, Lee, & Kim, 2005). In ERP success cases, Top management contribute to the project by getting control and directly involving with the project since planning phase until implementation complete. Their mindsets were set that project not just as technology challenges, but also as a business challenges (Davenport, 1998; Dezdar, 2012). Moreover, Top management play a vital role by cultivating the right culture for ERP project success (Ke & Wei, 2005).

During implementation, top management take an active role in leading the implementation (Ifinedo P. , 2008), such as being decision makers in requirement gathering workshops (Akkermans & Helden, 2002) and allocating resources to the ERP implementation project (Dezdar, 2012). In addition, they need to promote the project as company's top priority and set up a suitable and capable project team (Dezdar, 2012). They have indirect impact to ERP success through conflict resolution (Wang & Chen, 2006; Maditinos, Chatzoudes, & Tsairidis, 2011).

Top management support and commitment positively contributes to ERP project success not only during implementation, but also post-implementation phases (Ifinedo P. , 2008). On the contrary, insufficient top management commitment on conveying higher degree of cross-functionality conflict, the implementation could end up as simple as the superficial requirement to automate simple tasks of individual function instead of reflecting cross-functional vision to the requirement; therefore, limit the integration potential of the ERP application (Rowe, Amrani, Bidan, Marciniak, & Geffroy-Maronnat, 2005). Moreover, when top management do not commit their human resources to the project teams would lead to project failure (Kim, Lee, & Sanjay Gosain, 2005).

2.3.2 Project management

Strong project management leads to higher chance of project success (Seddon, 2009; Fergal Carton, 2008). From a case study conducted by Fergal, it is recommended to follow project management body of knowledge which was proven to encourage a successful case study of ERP implementation (Fergal Carton, 2008).

Project management knowledge area:

- Project integration management
- Project scope management
- Project time management
- Project cost management
- Project quality management
- Project human resource management
- Project communications management
- Project risk management
- Project procurement management

Project managers are the main factor to actualize ERP success. Their tasks include project chartering, project monitoring and control, project governing, directing team member, and securing resources (Seddon, 2009).

In developing countries, project management contributes to ERP success. Firms should define project plan in detail with clear objectives, deliverables, achievable milestones and measurable outcomes where formal project progress tracking is necessary. It is recommended for firms to define and control project scope (Dezdar, 2012). The scope of ERP projects is normally covered many business functions and with the right implementation strategy, cross-functionality awareness could be actualized. Certain strategies are proven to be valid in promoting cross functional awareness in French SMEs which are (1) implementing multiple modules of ERP and (2) using big-bang cut-over. In their work, cross functional awareness is the acknowledgement of employees that actions of their own functions are interrelated (Rowe, Amrani, Bidan, Marciniak, & Geffroy-Maronnat, 2005).

2.3.3 Business process management and business process reengineering

Business process reengineering (BPR) is a drastic transformation approach to as-is processes of the organization in order to achieve a far-reaching improvement on cost, quality, service and speed. Such alteration could not be actualized without the use of information technology. The most commonly use information technology for enabling BPR is ERP (Hammer M. , 1990; Hammer & Champy, 1993; Subramoniam, Tounsi, & Krishnankutty, 2009). Both BPR and ERP emerged with the same goal of transforming organization from functional silo to a process-based organization (Davenport, 1998; Subramoniam, Tounsi, & Krishnankutty, 2009). Implementing BPR on the initial stage of ERP project brings about a successful project implementation (Annamalai & Ramayah, 2013). While some researches state that ERP and BPR have a recursive relationship which the implementation of each would be beneficial to the others (Subramoniam, Tounsi, & Krishnankutty, 2009). Even after ERP implementation, business objectives could be realized with the continuous effort of improving business processes (H.Davenport, Harris, & Cantrell, 2004).

There are certain steps before implementing information technology for the purpose of process redesigning (Subramoniam, Tounsi, & Krishnankutty, 2009) (Davenport & Short, 1990).

Insufficient or lack of process documentation can be the cause of BPR failure. Paying attention to existing business processes and document them is vital (Štemberger, 2009).

1. Set up business vision and outline and prioritize process objectives. Common business objectives are
    a) Cost Saving
    b) Shorten Time
    c) Quality enhancement of physical and informational output
    d) Quality of work life, employee learning and empowerment
2. Select key processes to be redesigned either based on urgency (so-called exhaustive approach) or importance of the processes which are in conflict with business vision and process objectives (high-impact approach).
3. Assign process owner or “ES Process Leader” is an important factor which firms claim to be their cause of ERP project success (Al-Mudimigh,

2007). Process owners should be included as key stakeholder since the beginning of the project. Usually process owners are those high authority who are familiar with the processes and be accountable for overall operations (Štemberger, 2009).

4. Understand & measure as-is process performance so as to be reference line for future improvements.

5. Recognize available information technology capabilities prior to the redesign.

6. Design and build prototype by using IT as a design tool in creating a generic design so that the new process tasks could be done by more than one person.

7. Pilot the reengineered process to study the actual benefits before implementing it on a firm wide.

8. If the pilot is successful in meeting the process objectives, launch the redesigned process throughout the organization (Subramoniam, Tounsi, & Krishnankutty, 2009) (Davenport & Short, 1990).

Case studies of six companies in Saudi Arabia which gain positive results after ERP implementation concluded that most of those successful companies reengineer their business prosses to be consistent with the software (Al-Mudimigh, 2007). The more modern philosophy and wider scope of BPR is business process management (BPM). According to Michael Hammer, in order to enhance the performance of end-to-end processes, firms must be able to progress the following elements (Hammer M. , 2007)

- Process Design
- Process Performer
- Process Owner
- Process Infrastructure
- Process Metrics

ERP is mentioned as an integrated system which support business process management in terms of *Process Infrastructure*. In other words, processes could not be integrated without an integrated system. ERP system itself is a robust application connecting interdepartmental transactions through a centralized database. On the other

hand, it is unlikely to actualize the full potential of such system without developing an integrated process (Hammer & Stanton, 1999; Hammer, Brocke, & M. Rosemann (eds.), 2010). Štemberger ellaborates that the existence of BPM leads to a successful ERP implementation (Štemberger, 2009).

On the contrary, BPR was proved to be irrelavant to ERP success in Iran. Based on Dezdard's research, due to differences on cultural perspective, deploying BPR in Asian countries would cause firms a countless challenge than in Western countries. Gradually changes in business process improvement concept is a more suitable approach, therefore, selecting an ERP which is suitable with existing business process promise a greater success (Dezdar, 2012). In a case study conducted at Mobil Oil Australia an implementation of BPR after ERP implementation led to realizing ERP benefits in time and cost reduction of account payable processes (Martin & Cheung, 2005).

Minimizing enhancement of ERP project and follow the best practice offered by the ERP vendors or so-called 'vanilla' approach would decrease the effort of cross-functional team during implementation which is named by the researchers as "Lean Coordination" (Gosain, Lee, & Kim, 2005). However, with this approach organizations need to adjust their processes to the standard of selected applications (H.Davenport, Harris, & Cantrell, 2004).

A study by Beretta argues that activation of ERP benefit of creating integrated organization can be actualized even after the implementation by using ***process-based performance measurement system***. Without such approach employees will fall back into old habits. In his work, Beretta summarizes ERP roles in enabling firm integration as follow (Beretta, 2002).

- ERP enables process visibility through its single database
- ERP, in this study as SAP, actualizes process-based performance measurement
- SAP conceptually supports a process-based organization

His research aligns with a study by Davenport, Harris and Cantrell that to appointing a process owner and measuring the process performance will help organization actualize the full potential of ERP. In their researches, focusing business

needs and implementing processes and system fine-tuning in a continuous manner can help organization to actualize the real benefits of ERP systems (H.Davenport, Harris, & Cantrell, 2004; Willis & Willis-Brown, 2002).

Likewise, case studies done by Al-Mudimigh illustrates the importance of process performance measurement not only on measuring project success, but also on the purpose of continuous improvement througout ERP lifecycle (Al-Mudimigh, 2007).

2.3.4 ERP team composition, competence and compensation

Selecting competence project team across organization is proved to be one of the most important factors contribute to ERP success (Agarwal, 2014) which results in higher user satisfaction after implementation (Wu & Wang, 2006). A full-time effort of a project team consisting of both business and technical personnel is crucial. Moreover, the project team should consist of the best people with business knowledge across organization who are authorized to make decisions relating to all aspects of the project, including technical and business issues (Dezdar, 2012; Wu & Wang, 2006).

Key-users are connections between their business function and the ERP consultants. Their roles involve in reflecting business requirement, data preparation during implementation and providing training to end users. Delegation the right key users will impact the daily operation after the system went live. Key users must not only understand the processes of their own functions, but also the cross-functional processes, including all exception cases. However, it becomes difficult for the project team to have cross-functional thinking if the organization has not already cultivated such culture (Sammon, 2008).

Key users should have knowledge of computer literacy to be able to interpret their function requirement to system functionality and to perform data preparation assignments (Kakouris & G. Polychronopoulos, 2005). Roles and responsibilities of key users during project implementation and guidelines for selecting the right persons are important information which managers should prepare on initial phase.

Organizations should facilitate project communication between stakeholders in order to let key users be able to exchange knowledge between functions

effectively. Lack of structured mean of communication between key users lead in negative outcomes. Moreover, firms should ensure that key users are encourage to swiftly reach consensus of interdepartmental issues through steering committee meeting. Organizations should promote the identity of key users as ERP expert advisor and trainers so as to let key users be able to influence other stakeholders, including their own managers and end users. Key users support to actualize the different interests of various stakeholders and help them actualize their needs by gathering feedback and align requirement and reflect them into the ERP systems. In additional, empower key users to apply ERP knowledge to real business scenario and provide training to end users based on cases simulation would help the whole organization eliminate functional silo and overcome knowledge management issues. Lastly, firms could support all ERP users to share their practice through internal knowledge management platform so as to ensure that the best practices are used to get the best result out of firm operations (Maas, Fenema, & Soeters, 2016; Al-Mudimigh, 2007).

In some researches call group of key users and IT personnel as 'cross-functional team'. Regardless of the names, their importance is undeniable and their involvement in any information technology projects has a direct impact to project success (Howle, 2004; Annamalai & Ramayah, 2013; Gosain, Lee, & Kim, 2005). Moreover, as most of the time users are required to collaboratively work with ERP consultants, the relationship between the two groups become important to project results (Maditinos, Chatzoudes, & Tsairidis, 2011).

2.3.5 Change management

Aladwani proposes an approach for change management of ERP implementation using marketing strategies of introducing new products. Change management in ERP implementation context is to prepare organization readiness for the new system by reducing user resistance (Aladwani, 2001). There are two sources of user resistance in ERP projects, (1) perceived risk linked with the decision to adopt the system and (2) habit. Like other practices, change management for ERP project required top management drive the following procedure (Aladwani, 2001; Al-Mudimigh, 2007).

1. Knowledge formulation

- Identification of resisting individual and/or groups and capture their needs, beliefs, values, and interests so as to eventually identify causes of resistance.

2. Strategy implementation

- Assure employees through the communication about the benefits of ERP as comparable to marketing approach which the communication is focused on the benefits of a product rather than its features. However, management should be careful not to overemphasize, otherwise there will be risk of losing credibility which in turn creates more resistance afterward. The communication should be done prior the implementation and ensure that the scope, objectives, activities of the project, any changes to current practices should be informed. Open and honest information can boost up confidence and acceptance of the implementing project (Al-Mudimigh, 2007).

- Communicate on how ERP will work, including expected input, output, and responsible functions.

- Develop positive attitudes such as gained benefits would be higher than spent effort which could be done through user trainings (Aladwani, 2001; Al-Mudimigh, 2007). In Bhatti's research, he found that "user training and education" and "change management" CSFs are highly correlated; therefore, it is reasonable to group both factors together (Bhatti, 2005).

Sufficient user training and education positively leads to user satisfaction which consequently results in ERP implementation accomplishment. Training should be provided to all users from top management to operational staffs in order to unleash full potential of the system (Dezdar, 2012; Ainin, 2011). By illustrating the benefits, the organization as a whole, training could be a good platform to resolve user resistance issue and break departmental silo (Yusuf, 2001; Brady, 2006). Educate employee through the simulation of potential processes in order to let them understand the impact of change (H.Davenport, Harris, & Cantrell, 2004).

The trainings should consist of two levels for two difference proposes.

- Firstly, the trainings should be a mean to ensure continuous of day-to-day operation after the system went live.

- Secondly, changes must be communicated and get consensus from managers who will further convince with their team on the future consequences. (Brady, 2006).

2.3.6 Business plan and vision

The wider terms of *business plan and vision* are related to goals and objectives of the ERP projects (Dezdar & Sulaiman, 2009). Goals are prerequisite of project success and evaluation for project success. In order to direct team members to increase cross-functional awareness, the goals of an ERP project must steer the organization towards a more integrated information and organization processes. In other words, a clear project goal of actualizing a more integrated organizational processes and information could eliminate silo thinking (Caldas, 2001; Rowe, Amrani, Bidan, Marciniak, & Geffroy-Maronnat, 2005). Judging whether the organization is success with ERP implementation or not is often related to the firm's goals for the system (Ifinedo P. , 2008). Clear goals definition and list of deliverables must be explicit. Goals are basically about why the systems are being implemented and what business requirement the system will satisfy (Bhatti, 2005).

2.3.7 Interdepartmental communication and cooperation

Interdepartmental communication and cooperation are very important in bringing about ERP success as the systems will define how the whole organization will operate after they went live. As ERP implementation has a huge impact on firms' operation, interdepartmental communication and cooperation are crucial (Akkermans & Helden, 2002). It is evident in Akkermans and Helden's case study that insufficient communication and collaboration causes inadequate presence and/or attitude of key stakeholders during the project implementation. The key stakeholders are (a) top management, (b) project team, (c) project management, (d) project champion, (e) package vendor (Akkermans & Helden, 2002). Dezdar argues that the reason of adopting ERP system should be communicated to operational staffs with the objectives of boosting motivation, reducing resistance and anxiety. The communication should even go beyond firm boundaries where suppliers and customers are acknowledged on what is happening inside the firms. The content of the communication generally covers information such as project timeline, expected benefits, change in business processes, system demonstration, change management plan, and project contact points (Dezdar & Ainin, 2011).

2.3.8 Organizational Culture

Lack of cultural readiness for ERP implementation leads to ERP implementation failure (Brady, 2006). Cultivating corporate culture to emphasize the crucial of realizing project success before own functional interest is one of the practices which firm should proceed in order to enhance coordination level in ERP project (Gosain, Lee, & Kim, 2005).

Organizational culture has an influence on moderating the relationship between ERP critical success factors and its successful implementation. In the research, five critical success factors are (1) ERP business goals and objectives, (2) cross-functional team, (3) business process reengineering, (4) project monitoring and control, (4) data analysis and conversion, while they refer organizational culture as values, traditions, policies, business principles, employees' beliefs and beliefs about enterprise systems (Annamalai & Ramayah, 2013). Organizational culture is the pre-requisite of not only the firm openness to innovation, but also the capability to implement the innovation. Implementing ERP is considered as developing new way of operating firm processes, it creates organizational changes both on business operations and human behaviour and require suitable cultural environment so as to be successful. Therefore, it is not surprising that the implementation is prone to failure if there are clashes between existing organizational culture and assumed integrated culture of ERP (Ke & Wei, 2005; F.Hurley & Hult, 1998). We cannot deny that the persons who play vital roles in cultivating culture within an organization are top management. Top management support is one of the most important critical success factors of ERP implementation. There are certain behaviours of top management which nurture organization culture that is suitable for ERP success, however, their work did not include empirical test effort (Ke & Wei, 2005). While other researchers argue that top managers have indirect impact to ERP success through conflict resolution (Maditinos, Chatzoudes, & Tsairidis, 2011; Wang & Chen, 2006).

The organizational cultures that bring about successful innovation as summarized by Hurley and Hult are described as in Table 2.5.

Table 2.5 Organizational Culture and Its Characteristics (F.Hurley & Hult, 1998)

Organizational Culture	**Characteristics**
Learning and Development Culture	• Accentuate on individual learning and inspire employees to the firm with innovative ideas (Damanpour 1991; Hurley 1995; Katz and Tushman 1981; Marquis 1972; Thompson 1965). • Articulate creativity and capability to notice new opportunities (Angle 1989). • Boost employees' capacity to understand novel ideas
Participative Decision Making	• Encourage contribution and obligation to innovate (Damanpour 1991; Thompson 1965). • Enhance perceived freedom to act and innovate(Angle
Support and Collaboration	• Encourage innovative ideas and risk taking by diminishing fear and enhance openness (Cummings 1965; Pierce and Delbecq 1977; Scott and Bruce 1994).
Power Sharing	• Facilitate collaboration and share needed information and resources for implementation of new ideas (Kanter 1983; Thompson 1965; Van de Ven 1986).
Communication	• Comprehensive internal and external communication helps innovation (Ancona and Caldwell 1992; Imai Nonaka, and Takeuchi 1985)
Tolerance for conflict and Risk Taking	• Conflict encourages innovation (Thompson 1965) • Tolerance for risk taking and new ideas promotes innovation (Amabile et al.1996; Jaworski and Kohli 1993; Kanter

2.3.9 Vendor/consultant support

Consultants play a vital role in ERP implementation and considered as an important factor that brings about implementation effectiveness and success (Al-Mudimigh, 2007; Akkermans & Helden, 2002). In an empirical study by Maditinos, Chatzoudes and Tsairidis argues that the support from ERP consultants is more imperative than top management support (Maditinos, Chatzoudes, & Tsairidis, 2011; Ifinedo P. , 2008). Quality consultants can suggest on how the system could help firms achieve organization goals which is essential in planning phase (Ifinedo P. , 2008). As one of the implementation agents, if the knowledge of the consultant is limited, their capabilities in actualizing business requirement becomes more difficult (Kakouris & G. Polychronopoulos, 2005; Caldas, 2001). Therefore, to get most out of the system, when hiring consultants' firms should ensure that they possess both technical skills and experience in implementing the system, especially in similar industries. Moreover, the ability of transferring knowledge to ERP users is also an important qualification which companies need to consider when hiring consultants (Maditinos, Chatzoudes, & Tsairidis, 2011; Ifinedo P. , 2008; Dezdar, 2012). During vendor selection, it is recommended to validate quality of consultants by contacting prior customers of the service provider companies (Dezdar, 2012).

Basically, ERP consultants are requested to provide user training, technical support, user manual, and any formal document required for using ERP system which normally defined in their ERP implementation contract.

Regarding to the topic of cross-functional integration, qualified consultants are able to reach resolution of cross-functional conflict and reflect user requirement into system configuration (Wang & Chen, 2006).

2.3.10 System development and stabilization, testing and data quality

In realization phase business blueprint is interpreted, configured, and developed into ERP application. Business cases are tested to proof whether they are match with project design in integration test. At this phase both key users and consultants need to validate interoperation between business functions by using sample data. The challenge of this phase is to disclose any overlooked points before go-live (Kakouris & G. Polychronopoulos, 2005). Educate employee through the simulation of potential processes in order to let them understand the impact of change will lead to implementation success (H.Davenport, Harris, & Cantrell, 2004). Sufficient testing is the key factor which determine success or failure for some companies (Brady, 2006).

ERP could be considered as a burden for firm integration if it provides inaccuracy data or not match with user requirement (Pagell, 2004). The linkage of information throughout the organization is a basic element of integration capabilities of a firm (Beretta, 2002). According to Davenport and his colleagues, to unleash the potential of firm integration using ERP system, the system should be set up so that the following qualities are achieved (H.Davenport, Harris, & Cantrell, 2004).

- The system must provide accurate data.
- The data is organized into a format which is meaningful and appropriate for decision making.
- Educate employees to understand the implications of information.
- Assign responsible person to work with report result.

In other literature, accessibility, transparency, timeliness and granularity are the quality of information flow which determine level of integration of business process within a firm (Berente, Vandenbosch, & Aubert, 2009).

Table2.6 Principles of Process Integration (Source: Berente, Vandenbosch, & Aubert, 2009)

Principle	Definition
Accessibility	Information is readily to activities, ease of operations.
Timeliness	Information is available when needed
Transparency	Information is understandable
Granularity	Information is at the right level of detail

In conclusion, while firms are striving to enable integration through ERP which has been applauded on its promising benefit on unifying functional integration, the existing literatures do not emphasize on how firm should adopt CSFs in order to enhance cross-functional integration. In other words, it is still unclear on what actions firms should take in order to achieve higher level of cross-functional integration through ERP implementation. With this discovery we decided to proceed this research in order to fulfil the gap in this area of knowledge.

The following chapter will explain our research methodology and data analysis.

CHAPTER III
RESEARCH DESIGN AND METHODOLOGY

3.1 Qualitative Research Design

The research design is constructed based on five components which are (1) Research Objectives, (2) Conceptual Framework, (3) Research Questions, (4) Methods and (5) Construct Validity. All compositions are interrelated which creates repetitive alterations (Maxwell, 2005).

3.1.1 Research Objectives

From literature review in the previous chapter, it shows no explicit evidence of the linkage between CSFs and cross-functional integration. In other words, it is still unclear on what actions firms should take in order to achieve cross-functional integration through ERP implementation. With this discovery this research is aim to fulfill the gap in this area of knowledge.

In other words, the result of this research should generate the understanding what are actions or ERP implementation strategies that would bring about the full potential of ERP on promoting cross-functional integration.

3.1.2. Conceptual Framework

In order to come up with Conceptual Framework, a Conceptual Map is constructed based on existing literatures in order to realize limitations of reviewed literatures (Maxwell, 2005). From extreme cases of departmental segregation in firms, working into functions may unconsciously cause negative impact of ***silo mentality*** (Cilliers, 2012). However, with the increasing of competitive environment and shift on customer demand, where customers need more comprehensive solutions in a timely manner, departmental silo has become unwanted condition which required to be solved (Cilliers, 2012) (Timothy Galpin R. H., 2007). In modern-day researches and articles,

businesses are guided to focus on eliminating such silo and promoting **cross-functional integration** through different means, **ERP** is one of the means that has been applauded by a lot of practitioners and academic literatures on its promising benefit of unifying functional integration (Hendricks, Singhal, & Stratman, 2007; Davenport, 1998; Ketokivi, 2012; Gupta, 2000). Many studies have been conducted in order to find out what factors would bring about **ERP Success**, those factors are itemized as **ERP CSFs.** However, in existing studies, the desirable outcome of ERP system or **ERP Success on enhancing cross-functional integration** is not easily met (represented in lighter arrow line). Each ERP implementation gives different result on cross-functional integration as presented in Table2.1 Chapter 2. While the system is known as a tool for enhancing integrated information, the existent of the system itself could not enable integration (Pagell, 2004). Dashed arrow line represents the current gap of existing studies that the relationship between ERP CSFs and cross-functional integration is still unclear and have never been never mentioned.

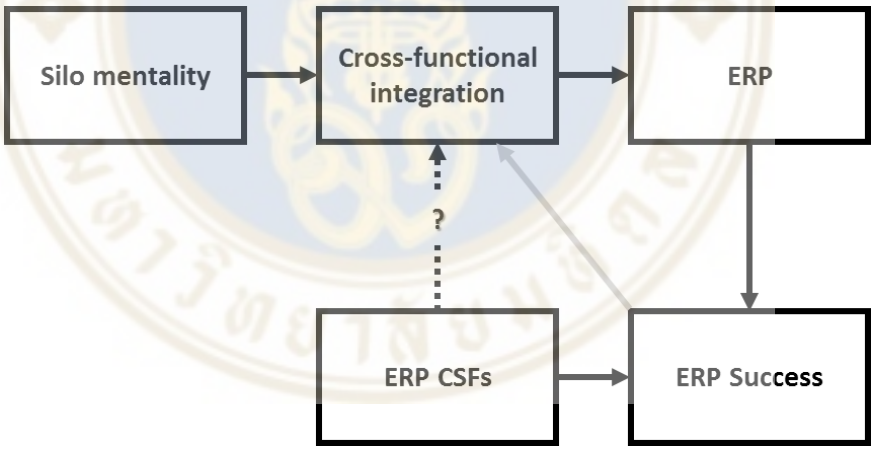

Figure3.1 Conceptual Map: Identifying limitation of existing studies about ERP and cross-functional integration

Finally, Conceptual Framework of ERP CSFs and cross-functional integration can be illustrated as shown in Figure 5. Further in the following section of research question, the conceptual framework regarding to ERP CSFs are drilled down into area of propositions.

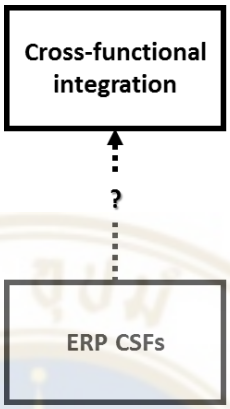

Figure3.2 Conceptual Framework

3.1.3 Research Questions

As the centre composition of the research model, research questions directly link all other elements together. Research questions are normally distilled from interactive thought process between other elements in the research design model (Maxwell, 2005). Finally, this paper has reached the final list of research questions as follow:

1. Why some ERP user organizations are successful in promoting cross-functional integration, while the others are not?

2. Are CSFs the root cause of different levels of firm cross-functional integration after ERP implementation?

3. If yes, how specifically ERP CSFs are put into practice so that they will promote cross-functional integration.

Next, the research questions are framed into propositions so as to make them more operationalize (Maxwell, 2005). First of all, CSFs are reviewed and scoped down to only medium to high recognizable CSFs (Dezdar & Sulaiman, 2009; Bhatti, 2005; Ifinedo P. , 2006). Then CSFs are grouped in order to come up with below operationalized propositions (Figure 3.3). The pre-defined structure helps identify group

of stakeholders in ERP projects and eases the interview. In addition, classifying CSFs into themes makes it easier for stakeholders to recall and be able to point out area of problems (Dezdar & Sulaiman, 2009). The detail of research method is described in the next section.

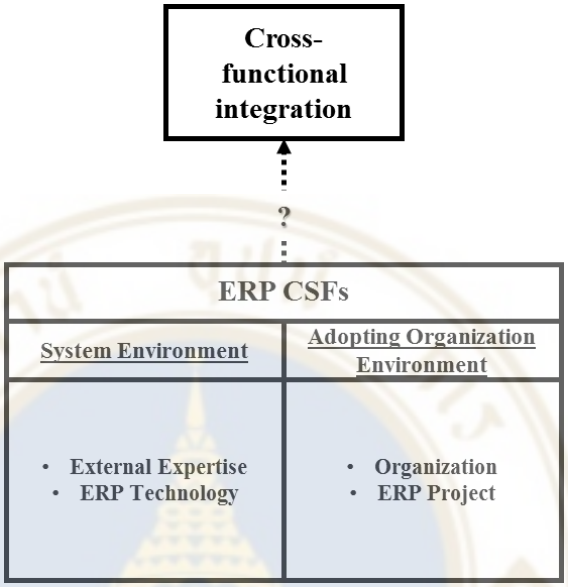

Figure3.3 Research Propositions

System Environment:

- **Proposition 1:** Certain system qualities and how it was set up can sufficiently explain the level of firm cross-functional integration after ERP implementation.
- **Proposition 2:** Certain qualities and behaviors of external consultants promoting higher level of cross-functional integration.

Adopting Organization Environment:

- **Proposition 3:** There are differences in organizational setting and attempt toward ERP project implementation which cause different level of cross-functional integration after project implementation.
- **Proposition 4:** An appropriate way of conducting project management is able to boost cross-functional integration after ERP implementation.

3.1.4 Research Methods

The research questions are related to the *decision* or *set of decisions* which were made on different phases in ERP project, as a result, to understand why those decisions were taken and how they were implemented, the most suitable research strategy is *case study methodology* (Yin, 2003). In addition, ERP critical success factors are the actions which are contemporary events and such events may vary from firm to firm which makes the causal links between the interested situation and its context is too complex to find the answer by using quantitative strategy, therefore case study strategy is the right approach for this research. Moreover, as the events are uncontrollable, conducting an experiment is impossible (Yin, 2003). Last but not least, ERP systems are identified as enterprise-wide systems that not only involved heavily on technological aspect, but also related to changes in social aspect of the firms (Vries & Boonstra, 2012) (Elbanna, 2007), as a result, the only possible source of information is through interview with the persons who were part of such event (Yin, 2003). Therefore, the study is proceeded to collect data from the *unit of analysis* as described in the following section.

Unit of Analysis

In order to ensure *a literal replication* and/or *theoretical replication* (Yin, 2003), interviews are conducted in order to compare multiple case studies within manufacturing industries. To limit the scope the study focuses on the results of ERP on supply chain integration area. The study starts with the interview with 4 ERP experts who have been working with system as either implementors or ERP users for more than 14 years so as to get the definition of ERP success in terms of cross-functional integration.

Next, ERP implementors and ERP users are invited for individual interview to give the insight on their ERP implementation cases and the implementation result. The reason of having two groups of participants is to guarantee research reliability and able to apply *triangulation* (Yin, 2003). Furthermore, to ensure reliability, multiple cases of ERP project implementation are compared and contrasted. The research is covered both success and unsuccessful cases which become very useful for data analysis. In addition, majority of external ERP consultants whom we have interviewed have been working in ERP industry for more than 10 years, therefore they are capable of providing a lot of valuable insight of by comparing factors and result of multiple implementation cases.

Finally, fifty-one interviews from 51individuals were conducted. Twenty-nine companies in 20 various industries were mentioned. In total, the total hours of conversation are around 27.25. The following list are examples of industries that our research participants have been working for or have provided ERP implementation services.

- Agricultural
- Animal Food Manufacturing
- Automotive
- Bathroom Faucet and Chinaware
- Computer data storage
- Cosmetics
- Digital industrial
- Distribution Services
- Energy Management and Automation
- Food and Beverage
- Government
- Hospital
- Jewelry
- Oil & Gas
- Paint and Coating
- Personal Care

- Project
- Real Estate
- Retail and investment
- Utility

Data Collection Plan

The data is collected through in-depth interview because insightful information is required while the research interests are relatively clear. In addition, the interested events of ERP implementation happened in the past which related to many stakeholders which makes in-depth interview the most suitable technique (Steven J. Taylor, 1997).

At the beginning of the interview, participants are informed about the interview outline. Interview outline consists of research topic, objectives, methodology, definition of ERP success in terms of cross-functional integration and description of various level of cross-functional integration. See Appendix A. The definition of "cross-functional integration" is gained from the interviews with ERP experts is described in research result chapter. For the characteristics of firm in various level of integration is from literature review. Cross-functional integration level and characteristics of each level are described to ease the participants understanding. In case that the participants have experienced with multiple projects (which usually happened to experienced external consultants), they are be asked to rate each of the firms separately.

Each interview is conducted via telephone call which lasts from 10 mins to more than one hour. Participants are asked to rate their cross-functional integration level they have observed or experienced as referring to such implementation. The interviews are conducted in semi-structured manner. Interview questions are grouped to be appropriate for interviewees' background on ERP system. In general, ERP consultants are asked to compare and contrast companies which they think is the most and the worst successful in terms of enhancing cross-functional integration. For ERP users are asked to rate their companies cross-functional integration levels before and after implementation and what do they think are the factors contributed to such level. They also asked how implementation was done.

To ensure *internal validity*, at the end of the interview, interviewer repeats what information has been learned from the participants and also send the field notes back to participants for their revision in order to guarantee *Respondent Validation* such that misconception and own prejudices could be avoided (Maxwell, 2005; Yin, 2003). Further, the *external validity* is implemented through the comparison of analysed content between cases. In this paper, data between cases is coded and compared in order to find patterns (Maxwell, 2005). List of other examples of interview questions are in Appendix B in which the questions are asked by theme of "System Environment"

Data Analysis

During interview field notes are made and after that the interview records are transcript as text. Field notes and transcripts are reread so as to generate codes. After several interviews, codes are grouped and labeled gradually interview by interview. Codes are categorized into themes and then sub-themes are identified.

Then relationship between theme and sub-themes are identified. After around the 30th interview, patterns and relationship are started to be discovered. Once the patterns are guaranteed by the remaining 20 interviews, the study is considered to be complete. Access to multiple participants per one case, both from ERP user and ERP consultants, is possible so as to ensure the application of *triangulation* (Berg, 2006; Bryman, 2012).

The following chapter is described the research findings.

CHAPTER IV
RESEARCH RESULTS

To the best of our knowledge, existing literatures have never explicitly defined the meaning of ERP success in terms of cross-functional integration. Therefore, this study begins with the exploration of the definition of ERP success in terms of cross-functional integration. The detail of the definition is described in section 4.1

In addition, list of critical success factors is gathered and ranked as shown in Table 4.1. Terms and phrases are grouped into each critical success factor. The terms and phrases could be either positive or negative depending on whether participants referred to successful or unsuccessful cases. Frequency is captured from how often the relevant terms and phrases are mentioned during the interviews. The highest rank is given to the most frequently mentioned factor that positively resulted in higher cross-functional integration.

'Change agent' is ranked as the first factor that bring about cross-functional integration enhancement. Therefore, the focus into the detail of this success factor is proceeded. It answers the research question on why some ERP user organizations are successful in promoting cross-functional integration, while the others are not. The study discovers that the most powerful factor that differentiate successful to unsuccessful firms is 'change agents'. In other words, 'change agents' are the key drivers that differentiate level of ERP success on unifying firms' departments.

Further detail on the discovery and common characteristics of change agents are proposed in section 4.3. Section 4.4 describes how firms practically apply the two empowering factors to strengthen change agent capability and accelerate the outcome of integrated organizations. Last but not least, in section 4.5, the study explains the finding of sustainability factors that help firm sustain or even improve their high level of cross-functional integration through ERP usage. The research findings could be depicted as in Figure 4.1.

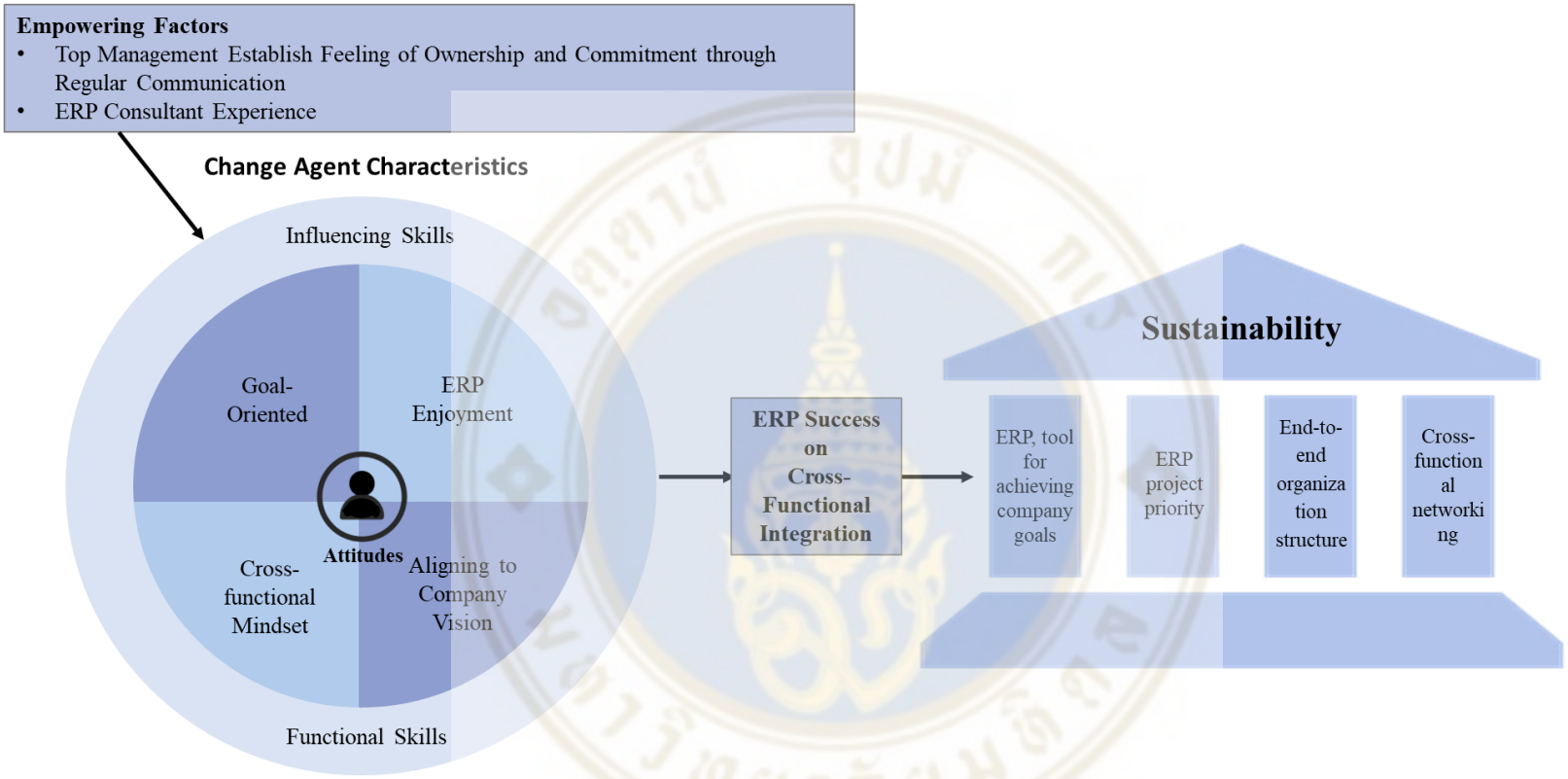

Figure 4.1 Finding Results of the Qualitative Analysis

4.1 Definition of ERP success in terms of cross-functional integration

To allow interviewees to have the same understanding of ERP success in terms of cross-functional integration, the study begins with acquiring such definition from ERP experts. Based on ERP expert, such definition is when firms achieve the following characteristics after ERP implementation;

- The visibility of same dataset by all stakeholders throughout the supply chain which encourages fact-based decision making and avoid bias.
- Smooth operations after go-live are mandatory. The whole end-to-end process could be posted to the system smoothly without errors.
- In full integration environment, each department is able to transfer and interpret information with each other with minimum effort (Ketokivi, 2012).
- Flexibility on activating new functions after all stakeholders have realized their necessity.

4.2 List of critical success factors to enhance cross-functional integration

From qualitative research, list of critical success factors is gathered and ranked as shown in Table 4.1. Terms and phrases are grouped into each relevant factor. The terms and phrases could be either positive or negative depending on whether participants referred to successful or unsuccessful cases. Frequency is captured from how often the relevant terms and phrases are mentioned during the interviews. The highest rank is given to the most frequently mentioned factor that positively resulted in higher cross-functional integration. 'Change agent' is ranked as the first factor that bring about cross-functional integration enhancement. Therefore, the focus into the detail of this success factor is proceeded in the following sections.

Table 4.1 List of critical success factors to enhance cross-functional integration

Rank	Factors	Positive terms and phrases	Frequency	Negative terms and phrases	Frequency
1	Change agent	Talented individual; E2E business improvement team; opinion leader; expertise in own area; real project driver regardless of position; cross-functional mindset; end-to-end vision; Enjoy ERP system; curiosity on ERP settings; very knowledgeable; trusted by others in organization; being friendly; high feeling of ownership; goal oriented; team spirit; achiever; follow company objectives/KPIs; working vigorously; support ERP consultants in convincing others employees; hire new manager with great past experiences to bring in best practice on business processes; bold	13	Closed mindset; Lack of project drivers	5
2	Top management	Management direction clearly promotes integrated firms; showing appreciation to project team; promise career advancement; able to encourage involvement of key users; Convey vision to middle management; Put project success to employee KPIs; Enforcement using policy, auditing, and regulations;	11	Silo leaders; Direction from management is not toward integrated organization, making each function just simply automate current own process; Put pressure on employees; Politic among top management	15

Table 4.1 List of critical success factors to enhance cross-functional integration (cont.)

Rank	Factors	Positive terms and phrases	Frequency	Negative terms and phrases	Frequency
3	ERP consultants	Skilful in system design; Design system in integrated way; Highly experienced in the same industry; Establish good relationship with users; Get along well with other ERP consultants; having team spirit; Suggest win-win solutions to both group of logistics and financial and accounting modules; Able to depict client's process end-to-end and able to give recommendation	11	Closed mindset; Different mother-tongue, hard to communicate; Think only to complete the project but not want to deliver more; Not getting along well with other ERP consultants;	12
4	Test	Comprehensive test; Key users develop test script on their own to ensure that knowledge gained from ERP consultants is sufficient;	10	Test cases are too simple; Exception test cases are forgotten	6
5	Enterprise-wide communication	Strong communication strategy; dedicated team for communication	5	No preparation before ERP consultants are on-board	5

Table 4.1 List of critical success factors to enhance cross-functional integration (cont.)

Rank	Factors	Positive terms and phrases	Frequency	Negative terms and phrases	Frequency
6	IT infrastructure and IT human resources	Good IT infrastructure and highly skilled personnel in IT department; IT personnel willingness to learn from ERP consultants during implementation	5	Lack of basic IT infrastructure; IT staffs who need to support users after go-live lacks of motivation and not skilful in ERP	3
7	Key users and end users	Fulltime users and dedicated users; Get promotion if successfully contribute to ERP project	4	Unmotivated and see ERP as additional tasks; See only problem of own function; Closed mindset; Lack of basic computer literacy skills; Not knowledgeable in own nor across function; If key users weak in business process; the project turns to be IT driven project	11
8	Business consultant	Have strong process background from the same or similar industries; Bring in past experience or recommendation; ERP implementor partnership with business; consultants and recommend their clients to improve organization (i.e. reorganization) before starting ERP project; Be part of the ERP implementation mostly as the mediator between ERP consultants and ERP user organizations	3	*Not clearly mentioned by participants*	

Table 4.1 List of critical success factors to enhance cross-functional integration (cont.)

Rank	Factors	Positive terms and phrases	Frequency	Negative terms and phrases	Frequency
9	Project management	Highly skilled project management (i.e. convincing skills) can reduce stress of project members)	3	Time constraint causing stress to project team	3
10	Organization culture	*Not clearly mentioned by participants*		Respect in seniority, stop young key users from giving direct feedback; Politics in organization deteriorates the implementation and key users' motivation; Decentralized structure cannot reach consensus in business requirement easily causing project delay and demotivation; Family-owned business and some government sector have uncleared role and responsibility. Their employees tend to avoid accountability or expressing their options.	10

4.3 Change agents are the most important key to promote cross-functional integration

Referring to the research questions, CSFs have been applied into many projects implementation which could lead to project success, however it does not guarantee the enhancement of cross-functional integration or process improvement. This conclusion is affirmed by a statement from one of the interviewees who has more than 20 years of experience in ERP field.

"From my experience, almost 100% of companies could go-live on-time and smoothly, but only 60% of them that really have improved their processes, the rest of 40% is just changing from what they are doing on paper to be digitalized as they the implementation aims to solve only current problems." (Participant 011)

The quote has affirmed that success in terms of project management does not guarantee higher cross functional integration. Instead, the patterns from the data analysis shows that successful cases of ERP implementation link to an individual or group of individuals. There are cases where participants mention about their counterparts in the implementation project that they were impressed about. Those individuals dedicate to the project implementation and are mentioned and praised to be the factor that enhance cross-functional integration. They are truly the main drivers who drive the project to success. To apply common term for referring to those individuals, given that ERP implementation is a change in organization, and those individuals are the ones who facilitate and coordinate the change. It is fair enough to call them *"change agents"* (Lunenburg, 2010). Therefore, this paper proposes that in order to actualize the best out of ERP system, organizations require the help from *"change agents"*.

Previous researches superficially describe role of individuals in ERP projects in terms of project assignment. For example, previous researches suggest organizations to select right persons who have computer skills and being expert on own business area and across-function to become key users (Maditinos, Chatzoudes, & Tsairidis, 2011). Another another group of researches focus on the role of top management in proceeding change management in ERP project implementation (Aladwani, 2001; Al-Mudimigh, 2007).

Nevertheless, below quotation supports the idea that change agents are not restricted by any particular positions. Instead, change agents could be at any level from top management, business process leader, project leader, business consultant and to key users.

"I witnessed those type of users who are not in management positions, but more like a fighter who understand organizational process very well. If any projects have these kinds of people it would ease the project implementation." (Participant 011)

In other words, this study proposes that critical success factors mentioned in previous research may lead companies to only project management success (i.e. on-time, within budget and smooth operations), but does not encourage higher level of cross-functional integration into firm processes nor into people mindset. It is actually the individuals who are "change agents" that drive the ERP project to its full functionality of unifying cross-functional departments.

While none of the prior research has stated criteria of selecting the right people based on individual characteristics such as attitudes and organization behaviours, this study suggests that there is some similarity of those personal characteristics among change agents. The characteristic of change agents can be grouped into two categories. The first set of characteristics is their intrinsic attitudes. The second set of characteristics are their skills which are visible by others in the organization.

4.3.1 Change agents' characteristics

Characteristics of change agents are categorized into two layers. The inner layer consists of change attitudes which drive their actions. The second layer is how others in organization see them as skilful persons who possess both functional knowledge and influencing skills.

4.3.1.1 Change agent attitudes

The study shows that change agents tend to possess some common attitudes. Those attitudes are (1) having cross-functional mindset, (2) aligning to company vision, (3) being a goal-oriented person and (4) usually enjoy working in ERP arena.

(1) Cross-functional mindset

For successful cases, change agents are eager to learn and understand ERP system. They would like to understand the effect of the system on their functions and its interrelationship with connecting departments. Most of the interviewees who were referred as the key factors in the implementation demonstrated that they commonly have cross-functional mindset. In other words, they seem to think beyond their own functions. They vision the effects of ERP from end-to-end. Therefore, they are willing to work collaboratively with other functions and ERP consultants in order to gain understanding on the system and how they can apply the knowledge to their jobs after go-live. Change agents are referred by either external consultants or their colleagues as the key contributors of ERP implementation. The below quotation supports the idea that change agents are willing to go beyond their scope in order to deeply understand end to end processes.

"I want to understand all interrelated parts which connected to my function. It is like my habit. When problems occurred I want to know the cause of the problem so that it will not happen again. … I can do all the steps in ERP starting from creating new company until account posting…I see that all works are interrelated." (Participant 039)

Moreover, change agents show that they work collaboratively with various functions in order to gain as-is processes and are able to connect pieces of information together. In other words, they are capable of depicting the whole processes.

"I jumped from Production to Supply Chain. At first, I did not know much about Supply Chain or my company's business much. I listened on how SAP works and talked to key users whether they have the same scenario. From that I could join pieces of information…. Making it possible for me to understand the process from sales to accounting" (Participant 021)

While previous research suggests that the most important factor to drive ERP success is top management support, from our interview, it is possible that the

project team itself could drive the success, especially when they have cross-functional mindset. The following quote affirm this idea.

"The preparation was pretty bad because nobody, even leadership did not realize that it was a really cross-functional project. Even the leadership was just looking into silo. So only the team transfer the message that only if you work together as a cross-functional team even as a company, that you would achieve and really get the best out of ERP." (Participant 045)

Nevertheless, in case of lacking of leadership can cause some delay in progressing the level of cross-functional integration which is described in section 4.3.1.

On the contrary, in unsuccessful cases, most of the external consultants normally mentioned about users who have closed-mindset and resist to changes. They see that ERP would only increase the steps of their jobs, but do not see the benefits that the organization could gain as a whole. They perceive ERP would just increase their workload or as a burden because they need to learn new things or do extra jobs in addition to their routine works. According to the following quotation, in unsuccessful cases, ERP users focus only on negative impact of their day-to-day operations.

"[In unsuccess cases] key users see only the part that they need do extra steps and feel uncomfortable because they need to learn new things." (Participant 029)

On the contrary, the attitudes of those users who are in successful cases are more collaborative to other functions and to ERP consultants. They are more responsive to project assignments and willing to give information that are beneficial to the project.

"In successful cases, ERP users are more responsible. If top management has put the target, then everybody aims to achieve the same target. It's like culture of organization. If the company already has the good culture then it is easier to implement." (Participant 029)

Change agents normally care for the performance of the company as a whole, rather than on their own function. Below quotation supports this idea. A change

agent is asked about how they observe that cross-functional integration is higher. They answer based on the benefits that company gain as a whole and how they see as improvement in different functions.

"I think it was very successful because I see that Accounting department can close their month-end faster and they can go home earlier than before. Other related functions can also go home earlier." (Participant 039)

(2) Aligning to company vision

About half of our research participants are ERP consultants. Most of them have stated clearly that direction from management is a crucial factor. In order to see business transformation in eliminating departmental silo, the target should be stated clearly in the project objectives. Having a clear direction from top management about the future of integrated firm are frequently mentioned in most of ERP CSFs researches. However, it is crucial for firms that wish to enhance cross-functional integration to be able to identify their change agent and be able to convey those direction to them.

"Project objectives must become company agenda. Clear direction from top management and their support is required. Steering committee should spend time on the project detail and provide the right people. Right people are those who have vision. Vision is when project team know what to deliver in order to serve above project objectives. From business process owner and operation staffs should have the vision." (Participant 030)

In successful case, change agents are the main project drivers, regardless of their positions. Change agents frequently mentioned about their company visions and what they have done so as to achieve those visions as affirmed by below quotation.

"[My company] invests a lot on innovation, billion a year. Management direction is clear, that we want to be competitive and the only way is to reduce cost and because we want to [achieve company mission]. The company always want to know cost of production. My boss will set KPI first such as reducing cost then I will check all cost factors such as ingredient unit, packaging, production, and procurement." (Participant 018)

Despite that fact that many literatures mentioned that full-time participation of key-user is crucial, in case that change agents have alignment to company vision, they are willing to work overtime in order to achieve company's KPI. One of the interviewee who is referred by external consultants as the main contributor has mentioned about the time of implementation that herself and other key users need to stay late at night. This change agent is well-aware of project objectives; therefore, she is willing to dedicate her effort to achieve the goal.

"The company did not commit to give any reward. It is company's KPI. It is at company level, not my individual target. Actually, I don't really know what will happen if we not success, but we all need to push it forward because it is company's KPI. I was surprised that there were no issues during go-live and how we could make it in such a short time" (Participant 007)

(3) Goal-oriented

In addition to the behaviour of aligning to company vision, change agents showing strong sense of duty to achieve such vision. Change agents do not just wait for issues to be closed but they rather set deadline for open topics and try to close the issues by themselves. Even when the topics are beyond their responsibilities on the project, they try to bring stakeholders together or seek for solutions and/or conclusion. One of interviewees who are ERP consultant mentioned that most of the projects have some weaknesses and reach about the same level of cross-functional integration after ERP implementation. However, there was one factor that make one project different from the others. The consultant mentions about one project that has a contributor who at that time was Head of Accounting Department who shows a strong project commitment. He has described her behaviour as follow.

"I find that most of the project could have been done better, but there's one project I think is the most successful because the highest position in Accounting is very powerful. She tries to understand how the system works, what scenarios she wants to test. She is bold enough to call up everyone for a meeting to understand why data is entered in such manner. She called up meetings with her subordinates. In meetings, she is also willing to confront in order to reach conclusion." (Participant 006)

Project management in ERP user organization can also take role of change agents. When it is lack of support, change agents strive to close the issues by themselves which may result positively to the project. It works very well when the change agent also has cross-functional mindset.

"[As project manager] it is the main responsibility of my roles to oversee cross-functional integration. I need to see overview of the project. I need to draw landscape by myself which documentation is not that well and IT not strong. So, I need to call in each department to draw diagram and see the flow of information how it runs across organization such as sales, accounting, etc. About 20 systems. How reports are generated." (Participant 030)

After implementation, change agents could still play an important role in adapting ERP to new business cases.

"I act as project owner, appointing all IT units and other department and let them talk together. I call meeting when our business case changed. For example, customers want items to be sold not on standard weight but to use actual weight, how [another application] interface with SAP in terms of generating billing and stock keeping method. (Participant 018)

(4) ERP enjoyment

It is evidenced that some of the change agents have preference in information technology landscape. They find enjoyment in working with ERP system and would like to explore deeply on how the system works and explore system structure. Mostly it is because of their own curiosity which make them would like to understand more about the system which is not just restricted by their assignment to the project.

"What I studied was Logistics and Supply Chain that's why I started internship in Sourcing at the beginning and then I came to the functional role for the business. I really felt ERP is the right thing to do. It's hell a lot of fun for me. And there's a huge opportunity to learn things, to grow yourself, even self-studying and that's the reason why then I move to IT. And with all these, right, I start to really deep dive into IT and on the meantime, you completely get the mindset, an IT mindset. The reason is that I like the ERP playground, so I decided to move to IT." (Participant 045)

"I am good at using the [ERP] program and I already have the knowledge on finance and accounting. I find that [understanding the system] is enjoyable. (Participant 039)"

The enjoyment on using ERP system usually comes as a complement to their functional knowledge. The functional knowledge may come from their educational background, responsible functions or their assigned role in the project. They find interesting aspects on such systems and would like to learn more about the system even on voluntarily. The study finds that several of the interviewees later decided to change their profession to deep dive into ERP arena after their have discovered their strength and enjoyment during the assignment as project members. They want to understand ERP in greater details and find that the system is interesting. On the contrary, many external consultants similarly give that same feedback that in unsuccessful cases, users do not even have computer literacy skills and find that learning and using ERP is their burdens.

4.3.1.2 Change agent skills

In addition to attitudes, there are certain skill sets which are possessed by change agents. Firstly, change agents are commonly described as competent employees. Secondly, in addition to their functional competency, change agents commonly apply certain tactics to influencing other stakeholders for their collaboration.

(1) Functional knowledge

External consultants similarly stated that for successful cases, users possess good level of functional knowledge. This finding is partially in align with previous researches which stated that key users in ERP project must not only understand the processes of their own functions, but also the cross-functional processes, including all exception cases (Sammon, 2008).

"The more success company users know what they want and know their jobs well. The unsuccessful one the collaboration from users are just 70% and top managements are more putting threat instead of motivation." (Participant 002)

In addition to the prior studies, those who could be considered as change agents, must be recognized by others in their organization as competent colleagues. In

other words, they must be perceived by others in the organization as skilful and therefore their opinion is trustworthy to other project stakeholders.

"They are normally well recognized as competent individuals. In case that we offer solution a or b, if the person thinks that a is a better option, then the rest of their colleagues tend believe in their judgement." (Participant 029)

Repetitively, the importance of knowledgeable people assigned to ERP project is mentioned. Not only key users, but also the knowledge of project management that is important as stated by one the participant.

"Project manager of customer side also important. Having project manager who is from business side is more preferable than from IT function. Customer project manager must know-well of business practices and be able to get buy-in from their people than myself." (Participant 023)

It is also evidenced that the knowledge about ERP system that change agents could gain during implementation can complement their functional knowledge and make them become valuable assets to the firms. The following quote support this idea.

"If you would not have this team today, then you would have to stop the ERP processing. So that's why without this team, so it would take 1-2 years of effort to automatizing that we could leave without them. So, it's nearly impossible not to have them, based on the knowledge they have." (Participant 045)

In some cases, it may not necessarily that functional knowledge must be available in the individual prior the project implementation, but it is the willingness to learn, educational background, and ability to converting tacit knowledge into visible end-to-end processes. Change agents are referred and impressed by their expertise. Or in other success cases, company sees the gap of the level of knowledge they currently have, comparing to what they want to become. Then they close the gap by hiring external business consultants who will then play role of change agents.

Business consultants must know very well about that particular industries. IT should not be technical-team driven by asking employees in the organization who haven't see how other companies work. On the other hand, business consults can give advice which is not just best-practice but best practice that suits with the firm." (Participant 015)

"The company that I think is quite successful, they hire business consultants to be part of the project implementation. They apply best practice from [a well-known company of the same industry] to their operation. Some of the business consultants later join the company in top positions." (Participant 002)

In addition, some companies hire new comer to be part of the project implementation which they later become key person of the department, but this approach has limitation for only some modules such as financial and accounting because the accounting principal is more universal as compare to supply chain and logistics principal that are more specific from industry to industry.

(2) Influencing skills

Incorporating with change agent competent, there are evidences that change agents tend to apply influence tactics in order to get collaboration from other stakeholders. In success cases change agents are referred as someone who can resolve conflicts and being trusted by others in the organization. Change agents are normally described as having high capabilities in their own functions and in learning new skills. They are trusted by their peers and tend to be opinion leaders. For example, change agents are mentioned as someone who can lead meetings and steer the project effectively. They are perceived by their colleagues and external consultants on having a good knowledge and gain respect from them. It is evidence that change agents commonly use expert power as tactics to gain collaboration (Koslowsky & Stashevsky, 2005).

"She is project manager of customer side, she's very capable. At that time, she was only at her early thirties. She is able to control the meeting and lead the meeting to reach conclusion, when someone gets off the topic, she asked if the topics are

importance, if yes, she will set another meeting. She is able to bring him/her back and focus on the meeting objectives." (Participant 34)

"She is bold enough to call up everyone for a meeting to understand why data is entered in such manner. She called up meetings with her subordinates. In meetings, she is also willing to confront in order to reach conclusion." (Participant 006)

On the other hand, some change agents achieve company goals of having unifying firm by using referent power or by being "friendly" (Koslowsky & Stashevsky, 2005).

"I'm responsible as a middle person between consultants and users. I get along quite well with the users. My view, user collaboration is the most important factors. Sometimes external consultant hesitates to talk to users, so I need to be in charge. I myself supported my users a lot so they are willing to support me in return." (Participant 026)

In successful organizations tend to understand the basic of having cross-functional people within the projects or even establish the new role into organization structure. Most of the positions are the hybrid of IT and business who oversee group of interconnected functions, rather than specific function.

In other cases, business consultants are hired from a renowned international company who can gain immediate the impression of being expertise in their fields. It is evidenced that business consultants gain trust from project stakeholders by using expert power (Koslowsky & Stashevsky, 2005).

"Business consultants are part of the team and then talk to key users to reconciliation on how system can do and what they did when they worked for [name of an international company in the same industry]. They also help solving problems, but the decision makers are key users." (Participant 002)

In conclusion, the second group of characteristics are change agent skills which are (1) functional knowledge and (2) influencing skills. The importance point to emphasize is that the knowledge of change agent on functional skills must be acknowledged by their peers in order to let them effectively use their influencing skills. The most used influence tactic is through *expert power*. In other word, they must possess a good level of knowledge which make others in the company perceived them as competent colleagues.

4.4 Empowering Factors

There are two factors that can strengthen the capability of change agents. First factor is how top management establish the feeling of ownership and commitment from change agents. Another factor that could empower change agents is external consultant experience.

4.4.1 Top management establish feeling of ownership and commitment through regular communication

From the interview, it is affirmed that if top management communicate to all stakeholders about the vision of the future integrated firm, there would a higher chance of leading company to stronger cross-functional integrated organization (Rowe, Amrani, Bidan, Marciniak, & Geffroy-Maronnat, 2005; Gosain, Lee, & Kim, 2005). In ERP success cases, Top management contribute to the project by getting control and directly involving with the project since planning phase until implementation complete. Their mindsets were set that project not just as technology challenges, but also as a business challenges (Davenport, 1998; Dezdar, 2012). In addition to existing research, some practical examples done by top management of successful firms is given. The below quote supports the idea that in the firm that top management effectively gain commitment from project team would not only result in higher morale, but also encourage higher cross-functional integration if the message is clearly stated on the goal of having unified company. The top management's communication focuses heavily on why the company needs the system in which the message is simple and reflects the real problem which employees can link themselves to.

"Top management more focused on the importance of having integrated data, having all information in one database. The top management raised the point that he could not get daily sales volume, he could only get it at the end of the month or need to ask IT assist. Before go-live, many meetings were conducted with many key users, he emphasizes the importance of having SAP and to let everyone see the same target on why we need SAP, why do we need to get it through within limited timeline. He is more focus on the importance of the system." (Participant 007)

The statement is given by one of middle level manager who mentioned how top management have communicated throughout the project life cycle. The communication theme focusses on the importance of ERP system, why does the company need it and how it could solve current pain-points.

"At the beginning of success case, management let each department present their pain points of as-is process to us. I was requested to join other integrated modules. There were separated sessions for integration points." (Participant 002)

In the same project, top management gain involvement from his subordinates by assigning each department to present current functional pain-points to ERP implementors which those points are documented and consultants who participate in the session need to find the right solutions for those problems. The solutions are documented as project objectives. The departments themselves, therefore, needed to work collaboratively with the consultants in order to reach the objectives. Moreover, In the same case, there are other evidences that top management truly focuses on project communication which project objectives repetitively emphasized. He also motivates his subordinates through other mean such as inviting guest speakers. Below is the quote from external consultant who worked for the company on ERP implementation project.

"Top managements are more supportive. The communication is done very effectively. There is a department responsible especially for communication. Users in this project needed to work very hard as they need to complete both routine and project work. (Participant 002)

As a result, his subordinates follow his examples, and they themselves frequently communicate with their teams during and even after go-live.

"We need to communicate. At first, we are quite worried because steps of work are increasing, but I try to emphasize on benefits of the system. I talk with my subordinate on how they feel about the new system after 2-3 months passed, the thing that everyone agrees about the new system is its benefit on traceability and extracting out information from the system become easier and faster. And they are able see the data in multiple perspectives." (Participant 007)

From the interview, it is in alignment with previous literature that full-time effort of a project team consisting of both business and technical personnel is crucial (Dezdar, 2012; Wu & Wang, 2006). However, when it comes to limited resources, the company gain collaboration from its employees by establishing feeling of ownership through several means of communication and motivation.

"Some organization build knowledge of user by ERP training, teamwork, leadership, by training, motivation training, project management, but if small organizations or those companies that don't have this kind of budget. They might drive this feeling of ownership by KPIs." (Participant 003)

On the other hand, unsuccessful cases, top management tend to put a pressure onto project team instead of motivation.

"The unsuccessful one the collaboration from users are just 70% and top managements are more putting threat instead of motivation. At [company name], go-live was not successful, the most important user in Accounting resigned because pressure put by top management." (Participant 002)

Thus, when it is lack of guiding and motivation from top management, it becomes a painful obstacle to the consulting service providers. Implementors inform us that when it is lack of top management guiding, contribution from users are low. Users tend to be fearful in making mistake and revealing functional information. Therefore, enhancing cross-functional integration in this kind of environment seems to be impossible.

"[In unsuccessful case,] users do not take ownership. They tend to play safe by not giving information. They think that if they give too much information, then they need to responsible for their statement. They find it is better to stay silence. They afraid of somebody will blame them afterward." (Participant 029)

On the other hand, in case that change agents met criteria of having preferable characteristics, but in the situation of lacking top management support, cross-functional integration still achievable, but in later stage after go-live.

"In the beginning, even leadership they did not realize that this is a really cross-functional project, even the leadership was looking into silo. So only the team transfer the message that only if you work as a cross-functional team, even as the company, is when you can get most out of ERP." (Participant 045)

We were not stable for one year. We have release (fixing configuration) every week-end. We enhanced the system like hell. Now we have it quarterly. So, the key users are support half of their time and owning the ERP projects. (Participant 045)

4.4.2 ERP consultant experience

It is in accordance with previous research that highly experienced consultant can give a good advice to the implementing firms. If the knowledge of the consultant is limited, their capabilities in actualizing business requirement becomes more difficult (Kakouris & G. Polychronopoulos, 2005; Caldas, 2001). Therefore, to get most out of the system, when hiring consulting firms should ensure that they possess both technical skills and experience in implementing the system, especially in similar industries. Moreover, the ability of transferring knowledge to ERP users is also an important qualification which companies need to consider when hiring consultants (Maditinos, Chatzoudes, & Tsairidis, 2011; Ifinedo P. , 2008; Dezdar, 2012).

"Consultants can support us a lot as we may forget some business scenarios. If consultants have experienced in the same business before they can give good advices on which way it would be the most efficient." (Participant 039)

Level of knowledge of consultants may affect project success. Experienced consultants can give better suggestion to change agents and allow them to compare pros and cons between options and let them convince their colleagues. Many of participants who are in position of project management such as project managers or directors commonly stated that consultant experience is very crucial. The number of implementation cycles results in level of ERP consultant capability to understand ERP system thoroughly and able to suggest the best solutions that fit with their client business requirement. Level of consultants are ranked according to their years of experience and

how many implementation cycles they have been working for. The higher level, so-called senior consultants, the higher salary and therefore higher cost to the project. Therefore, it is very crucial from project management to manage their resource well enough to achieve customer requirement within defined budget.

"Level of consultants are the factors that cause different level of ERP success. Solutions given by junior consultant who experienced only 1-2 projects is different from those who are senior consultants." (Participant 023)

"Highly experienced consultants learn from their previous implementations. They are able to suggest more options to the client, and therefore, cost higher. It is very important for me on how I organize project structure." (Participant 024)

On the contrary, inexperienced consultants may lead to the delay of actualizing cross-functional integration in which the firm may take some time to realize that the provided solutions have room for improvement. A participant tells us that level of cross-functional integration in her company was lower after ERP implementation.

"For me, cross-functional integration is not something that happen immediately after go-live, there were something that we ignored, there are something that we needed to fine-tuned. The implementers do not know what are important because key users could not explain. And implementers do not understand our process well enough." (Participant 001)

4.5 Reach Sustainability

From the in-depth interviews, it is in accordance with the previous studies that the continuous improvement of ERP projects can help organization actualize the real benefits of the systems on unifying cross-functional departments (Hendricks, Singhal, & Stratman, 2007; Davenport, 1998; Ketokivi, 2012; Gupta, 2000) (H.Davenport, Harris, & Cantrell, 2004; Willis & Willis-Brown, 2002). Nevertheless, more insight is gained on how organization have practically done to sustain or even improve cross functional integration through ERP system overtime.

4.5.1 ERP, tool for achieving company goals

The companies that could sustain or improve level of cross-functional integration through ERP system by vastly use the system as a tool for extracting data for further analysis of company performance. In case that some data is not available in ERP, successful firms interface data from other applications back to ERP systems. Furthermore, successful companies align their operational management strategy with the use of ERP systems. Numbers of continuous improvement projects that required information technology are developed around the ERP systems.

"My boss will set KPI first such as reducing cost then we will see all factors such as ingredient unit, package, production, procurement. If SAP alone does not work then we need another software which company is willing to invest." (Participant 018)

4.5.2 ERP project priority

In addition, in success cases, the participants mention on how companies put priority to ERP projects so that they can sustain the momentum of integrated firm. After the initial implementation of ERP systems. Organizations tend to enhance or activate more of ERP functions in order to fulfill company goals. They said that ERP is the backbone of the organizations and most of information technology projects are developed around this system. In order to get promotions and for enjoyment, employees are willing to join ERP projects more than doing their routine jobs. The result of being able to complete ERP project is more tangible in the eyes of top management.

Employees who can make it through ERP projects are qualified for higher positions. With the approach, it encourages people to work extra. In a success case as quoted below, employees are motivated to be part of ERP project assignments.

"The thing is that in [my company], this project is the most visible based on the high funding that it needs. Huge focus from leadership teams onto this team. And each of the key users has a unique position. So, there's a huge visibility and after the project there are some kind of promotion given for these people." (Participant 045)

4.5.3 End-to-end organization structure

After implementation, successful organization have improved their cross-functional integration by reorganize their firm structure in align with ERP processes or by end-to-end responsibilities. Some units are set up to cover right from the beginning of the process until the end. The performance of the unified unit is easily to measure. All team members are obliged to understand and able to perform the whole end-to-end process.

"Team are aligned to modules, in the end it split based on these ERP modules on how business and IT functions people support the project itself. Many teams don't exist before the ERP implementation. The whole team know wing to wing and knows how it works on the ERP." (Participant 045)

4.5.4 Cross-functional networking

In order to ensure the continuous improvement of cross-functional integration, successful organizations tend to carry-on the network of ERP expertise within the organization. While the unsuccessful cases face the problem of change agents decided to leave the company as they claimed to be overworked and having no counterpart in other departments. For example, two of the interviewees who have characteristics of being a change agent in successful ERP user organizations have commonly the same problems of being overworked. They both are the first contact persons for ERP query in each of their firms due to their capability in both functional and ERP knowledge. They explain their stress after go-live that and what they wish to

change is to have another person who is keen on connecting process as they could not cover all of the questions that flowing in. The below quote supports this idea.

"What I wish to ask for change is to have at least one expertise per module who work as main contact person so that we could work together." (Participant 039)

On the contrary for success cases, companies tend to avoid the turnover of change agents by keeping teamwork environment and be able to keep the momentum of continuous improvement. The following quotations support this finding.

So, it was the team and the leadership of the ERP team that bring the message clearly to business that everything ties together. After go-live, the cross-functional team overlook the item life cycle. This is something that never having before, but with ERP it forces to some kind of this team to establish in the organization." (Participant 045)

In other success case, change agents become internal advisors who knows the process and the system thoroughly. The success case has divided the process into two major areas of Logistics and Accountings. Each of the area is overlooked by each change agent who working closely together.

"At the company they are two main ERP advisors who are very respectful by everyone in the company. One advisor knows in and out about logistics and supply chain processes including all fields in master data, while the other know everything about accounting and finance." (Participant 004)

CHAPTER V
CONCLUSION, CONTRIBUTION AND LIMITATIONS

5.1 Conclusion of Findings

To the best of our knowledge, existing literatures have never defined ERP success in terms of cross-functional integration clearly. This study proposes the characteristics of firms that successfully implement ERP system and able to enhance cross-functional integration as following;

- The visibility of same dataset by all stakeholders throughout the supply chain which encourages fact-based decision making and avoid bias.
- Smooth operations after go-live are mandatory. The whole end-to-end process could be posted smoothly without errors.
- In full integration environment, each department is able to transfer and interpret information with each other with minimum effort (Ketokivi, 2012).
- Flexibility on activating new functions after all stakeholders have realized their necessity.

In addition, from a comprehensive literature review in Chapter 2 the existing literatures show no explicit evidence of the linkage between CSFs and cross-functional integration. While the research result provides the list of critical success factors is gathered and ranked as shown in Table 4.1. Frequency is captured from how often the relevant terms and phrases are mentioned during the interviews. The highest rank is given to the most frequently mentioned factor that positively resulted in higher cross-functional integration.

'Change agent' is ranked as the first factor that bring about cross-functional integration enhancement. Therefore, the focus into the detail of this success factor is proceeded. It answers the research question on why some ERP user organizations are successful in promoting cross-functional integration, while the others are not. The study discovers that the most powerful factor that differentiate successful to unsuccessful

firms is ‘change agents’. In other words, ‘change agents’ are the key drivers that differentiate level of ERP success on unifying firms’ departments.

Moreover, the study leads us to the discovery of common characteristics of change agents. The first set of characteristics are intrapersonal attributes which consists of four attitudes which are:

- Cross-functional Mindset
- Aligning to Company Vision
- Goal-oriented
- ERP Enjoyment

The second group of characteristics are change agent skills which are (1) functional knowledge and (2) influencing skills. The importance point to emphasize is that the knowledge of change agent on functional skills must be acknowledged by their peers in order to let them effectively using their influencing skills, especially on the most used influence tactic of *expert power*. In other word, they must possess a good level of knowledge which others in the company perceived them as competent colleagues.

Moreover, this paper proposes that there are two factors which firm apply in order to strengthen the capability of change agents. First factor is how top management establish the feeling of ownership and commitment from change agents through communication. In success cases, top management truly focuses on project communication which project objectives repetitively emphasized. In addition, his subordinates in middle level management positions also follow his lead by conveying his message to their team members. Another factor that could empower change agents is external consultant experience. Consultants’ knowledge and experience affect project success. In other words, experienced consultants are able to give various options to change agents which allow change agents to compare pros and cons of each option and able to make constructive decision which suitable for their firms. As a result, change agents can support consultants by help convincing their colleagues at ERP user organization.

Furthermore, more insight is gained on how organization have practically done to sustain or even improve cross functional integration through ERP system

overtime. In success cases, ERP is vastly used as a tool for extracting data for further analysis of company performance. In addition, in success cases, the participants mention on how companies put priority to ERP projects so that they can sustain the momentum of integrated firm. Additionally, it is evidenced that some organization has improved their cross-functional integration by reorganize their firm structure in align with ERP processes or by end-to-end responsibilities. Lastly, in order to ensure the continuous improvement of cross-functional integration, the paper proposed that successful organizations tend to carry-on the network of ERP experts within the organization, while the unsuccessful cases face the problem of change agents decided to leave the company as they claimed to be overworked and having no counterpart in other processes. For example, two of the interviewees who have characteristics of being a change agent in successful ERP user organizations have commonly the same problems of being overworked. The detail of our findings could be found in Chapter 4.

In sum, the research objectives are fully met through the mean of in-depth interviews and from data analysis. The research questions are answered with the new perspectives of ERP implementation have been introduced in which its contribution to theory and implication is discussed in the following section.

5.2 Contributions

5.2.1 Contribution to Theory

In our study, the characteristics of firms that achieve ERP success in terms of cross-functional integration is proposed. In addition, the new aspect in the area of knowledge about ERP critical success factors and cross-functional integration is introduced. This finding leads us to comprehend the importance of individuals who drive ERP project to success and help the organization reaching higher level of cross-functional integration. In other words, we propose that only critical success factors mentioned in previous researches might lead companies to only project management success (i.e. on-time, within budget and smooth operations), but does not encourage higher level of cross-functional integration into firm processes nor into people mindset. It is actually the individuals who are "change agents" that drive the ERP project to its full potential of unifying cross-functional departments. As a result, the result of this research should be able to trigger a new dimension of further development of theory about the relationship between ERP system and organization behavior aspect.

Moreover, while previous research focus on critical success factors that should be done prior or during implementation, our research proposes factors that could lead the company to sustainability of unifying cross-functional integration after the implementation. This perspective should trigger further study about sustainability factors that could help improve organization performance through the mean of ERP usage.

5.2.2 Contribution to the Implication

5.2.2.1 Managerial Implication

The findings of this research could be applied by any firms who are about to implement or upgrade their ERP system so as to ensure that their ERP would result beneficially in terms of enhancing cross-functional integration which is the most critical element of ERP success. Certain characteristics of "change agents" are suggested both in terms of attitudes and skills in which firms can apply to find their change agents or to include as one of their preparation plans to build up required functional knowledge and influence skills for their employees. In addition, in case the firms could not find internal change agents, they may consider to hire business consultants to fulfil some the gap of functional knowledge. Moreover, the study discovers that there are two factors which can strengthen capability of change agents. First factor is how top management establish the feeling of ownership and commitment from change agents through communication. Some practical examples of top management communication to their employees are given. Another factor that could empower change agents is suggested to be external consultant experience. By keeping in mind that consultant knowledge and experience affect project success, firms should consider this as factor when hiring consultants to the project. Furthermore, the in-depth knowledge about how organizations have practically done to sustain or even improve cross functional integration through ERP system overtime is revealed. Firms are suggested to get the most of this highly invested enterprise system by putting priority to ERP projects so that they can sustain the momentum of integrated firm. In addition, firms can consider to improve their cross-functional integration by reorganize their firm structure in align with ERP processes or by end-to-end responsibilities. Lastly, in order to ensure the continuous improvement of cross-functional integration, it is recommended that organizations should carry-on the network of ERP expertise within the organization as proved to be effective in those success cases mentioned above.

5.2.2.2 ERP Service Provider Implication

So as to ensure the effectiveness of ERP implementation on cross-functional integration, ERP implementation service providers are suggested to point out the importance of individuals who are assigned to the project to their clients. Also, to empower their clients, the project management of implementation service

provider should consider the importance of consultant's experience on project success and apply it when they plan project organization structure. In addition, the service provider firms can suggest their clients to get most from the ERP systems through applying sustainability factors described in chapter 4.4. ERP implementation service providers could consider to suggest their clients to maintain long-term partnership and plan ERP continuous improvement roadmap together which allow mutual benefits to both parties.

5.3 Limitations and Future Research

Like other qualitative research, while patterns are discovered between cases, the results cannot be used to generalize to the overall population. In order to gain more generality, quantitative research needs to be conducted to strengthen the findings. The future research should quantify and generalize the findings of this to a larger sample population. Future research could test the proposed findings to provide a deeper understanding of the importance of each identified factors and the strength of their inter-relationships. For instance, it would be interesting to understand the strength of relationship of empowering factors to change agent behaviour and attitudes. Another example of future research is to gain generality on the definition of ERP success in terms of cross-functional integration through quantitative research.

In addition, our research does not consider cultural differences between companies and different countries. There is some evidence of cultural impact on ERP implementation. In other words, implementing ERP in one country may need different approach and require different factors from another culture (Shanks, et al., 2000). Our study has access to representatives from both domestics and overseas firms in which the time is too limited for us to gain more insight on cultural impact on organization behaviour that will affect ERP implementation. Culture may be taken into account as controlled factors in order to compare cases more comprehensively.

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APPENDICES

APPENDIX A
INTERVIEW OUTLINE

Research Topic: ERP Critical Success Factors—Roles and Impact on Promoting Cross Functional Integration

หัวข้องานวิจัย: ปัจจัยความสำเร็จของระบบERP–บทบาทและผลกระทบต่อการทำงานแบบบูรณาการข้ามสายงาน

Objectives: The outcomes of this research can be used by any firms and practitioners who are about to implement or upgrade their ERP system so as to ensure that their ERP would result beneficially in terms of enhancing cross-functional integration which is the most critical element of ERP success. Moreover, it could be used as a measurement of their current ERP set up in order to seek for gaps of improvement as well as to prioritize integration effort.

วัตถุประสงค์ของการวิจัย: ผลจากงานวิจัยสามารถนำไปประยุกต์ใช้กับองค์กรหรือผู้ที่มีส่วนเกี่ยวข้องกับการดำเนินโครงการERP หรือสามารถนำมาปรับใช้เพื่อหาช่องว่างในการปรับปรุงการดำเนินงานหรือการใช้งานโปรแกรมERPต่อไป

Research Methodology: In-depth interview, multiple case studies

วิธีการดำเนินการวิจัย: สัมภาษณ์ตัวแทนจากบริษัทที่ใช้ระบบEnterprise Resource Planning(ERP) และกลุ่มผู้ให้บริการด้านการดำเนินโครงการหรือให้คำปรึกษาของระบบดังกล่าว (ERP user organizations and ERP implementation service provider and consultancy) จำนวน 60 คน

Definition คำจำกัดความ

ERP experts have described the definition of successful ERP implementation in terms of cross-functional integration as:

- "The visibility of same dataset" by all stakeholders throughout the supply chain which encourages fact-based decision making and avoid bias.
- "The visibility of same dataset" by all stakeholders throughout the supply chain which encourages fact-based decision making and avoid bias.
- Smooth operations after go-live are mandatory. The whole end-to-end process could be posted smoothly without errors.
- In full integration environment, each department is able to transfer and interpret information with each other with minimum effort (Ketokivi, 2012).
- Flexibility on activating new functions after all stakeholders have realized their necessity.

There are 3 levels of cross-functional integration described as follow;

Cross-Functional Integration Level	Indicators	Characteristics
3. Full cross-functional integration	The majority of the time manufacturing, logistics and purchasing **interact** to actualize customer requirement. The majority of the time manufacturing, logistics and purchasing **collaborate** to actualize customer requirement.	• Each department is able to transfer and interpret information with each other with minimum effort (Ketokivi, 2012) • Each department will not set up departmental goal which in the end will deteriorate organizational goals (Ketokivi, 2012) • Full visibility of material movement across internal supply chain (Stevens, 1989)
2. Intradepartmental integration	Some of the time manufacturing, logistics and purchasing **interact** to actualize customer requirement. Some of the time manufacturing, logistics and purchasing **collaborate** to actualize customer requirement.	• Poor visibility of real customer demand at manufacturing sites as customer orders are aggregated by production planning (Stevens, 1989). • Level 2 indicates some interaction and collaboration between some departments rather than the whole values chain (Pagell, 2004).
1. No Integration	The majority of the time manufacturing, logistics and purchasing **do not interact** to actualize customer requirement. The majority of the time manufacturing, logistics and purchasing **do not collaborate** to actualize customer requirement.	• Each internal supply chain element buffers inventory due to lack of trust and inconsistent demand • Each department making decision based own benefits • Poor customer service (Stevens, 1989)

APPENDIX B
INTERVIEW QUESTIONS

Theme from Propositions	Topic/ Area of Interest (CSFs)	Main Questions: ERP users	Main Questions: ERP Consultant/Professional Service Provider
N/A	General question	Which department(s) that you represented in implementing your ERP project?	How long have you been in the field of ERP implementation?
N/A	General question	Have you ever used any other enterprise software before the latest one? How functions worked together during that time? How information was sharing between departments?	Which modules are you specialized in? What is your role on the projects?
N/A	General question	How would you rate your level of cross-functional integration of your firm, before and after ERP implementation?	How many implementation cycles that you have been implemented?
N/A	General question	Do you feel satisfied with such level?	Which industries are those companies?
N/A	General question	N/A	Based on your experience, which company is the most successful in terms of increasing cross-functional integration? Which one is the worst?
N/A	General question	What do you think are the 3 main obstacle/success factors that bring about such levels?	What factors/situations, that makes you think like that? What have been missing? What went well?

INTERVIEW QUESTIONS (cont.)

Theme from Propositions	**Topic/ Area of Interest (CSFs)**	**Main Questions: ERP users**	**Main Questions: ERP Consultant/Professional Service Provider**
Adopting Organization Environment	Top Management	How much effort that top management spent on the project? Do they support in terms of reducing workload of key users? How much time did you spend on the project?	How much effort that top management spent on the project? How much involvement of the top management on
	ERP team composition, competence and compensation, Interdepartmental communication and	Are representatives from each function sitting in the same meeting room and tried to reach the conclusion together? When conflict occurred, how do you reach conclusion? How would you rate the knowledge that you have about the effect of your decision/actions on relating/connecting functions, before, during and after implementation?	How much involvement of the users on such projects? In comparisons to the projects that you mentioned.
	Change Management	Do you think trainings are sufficient? Do you learn or be more aware of cross-functional processes	How the training was done? Could you please compare effectiveness of communication in successful versus
	Project Management	How the project team was organized? What are roles/behaviours of project management team that you think is good which should have been improved?	How the project team of your client was organized? What are roles/behaviours of project
	Business Process Management or Reengineering	How much time do you spend in developing the new process? Are the processes today change from what you have done before the implementation? Are there any initiative on process improvement	Do those companies, prepare well on listing the requirement? Do they know what they want? Are the processes that you implement
	Business plan and vision	How top management communicate on plan and goal of the project?	
	Interdepartmental communication and cooperation	Were there any resistances or conflict between departments? Were there anyone in charge to solve it?	

INTERVIEW QUESTIONS (cont.)

Theme from Propositions	**Topic/ Area of Interest (CSFs)**	**Main Questions: ERP users**	**Main Questions: ERP Consultant/Professional Service Provider**
System Environment	System development and stabilization,	Which part of your adopting ERP system that you which to change? Do you think it supports cross-functional integration	Which part of your implementing ERP system that you which to change?
	Vendor/consultant support	Do consultants assigned to your project follow your requirement? Do they are part of the improvement? Do they give a	How long did you stay after the implementation? How long is your supporting period? Do you know whether thay can close quarter and year-end without problems?
		Do you think consultants play roles in helping you aware of cross-functional integration?	
N/A	Cross-checking question	Has your way of working changed after implementation? Do you more well aware in terms of the consequence of your data maintenance on the connecting department?	