

**ERP SYSTEM IMPLEMENTATION AND GREEN SUPPLY CHAIN PRACTICES:
SUCCESS AND FAILURE CASE STORIES**

by

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Abstract

Green supply chains are supply systems where decision-making emphasize the environmental impacts of the operations processes (Lee and Kim, 2011). A supply chain will become greener if it is able to control its impacts on the natural environment and take action to fix them, when needed. The implementation of Enterprise Resource Planning (ERP) systems, which allow for a more integrated environmental approach, has the potential to enhance supply chains toward greener approaches. However, this path is never easy as ERP implementation is a complex and daunting task. This study aims to fill a literature gap by identifying the ERP environmental functions that drive green supply chain practices and exploring how salient organizational factors impact their implementation. It focuses on the perspectives of individuals implementing and using ERP systems, who were interviewed regarding their experiences with ERP systems within the selected focal companies. This research uses a descriptive and exploratory qualitative research method to explore this important, but yet scarcely explored research topic. This study offers a preliminary theoretical explanation for implementation failures of ERP systems and provides practical insights on how to overcome such failures toward the successful implementation of green supply chain practices.

CHAPTER 1: INTRODUCTION

Background of the Study

For more than three decades, organizations around the world have been implementing Enterprise Resource Planning (ERP) systems to have a unified database and communication platform within their organizations and to synchronize their operations processes (Rajagopal, 2002), in order to transform their legacy systems and to keep pace with the current business trends (Dwivedi et al., 2009; Hsieh and Wang, 2007). The adoption of ERP systems especially aims to achieve synchronization across the business units and standardized business processes (Hakkinen and Hilmola, 2008), especially within supply chains (Akkermans et al., 2003). These are also desired functions that pave the way for the organizations and supply chains to develop and implement environmentally friendly business practices (Darnall et al., 2008).

Nevertheless, ERP implementation requires significant organizational effort and implementation failures are not rare. Organizations have spent extravagant amount of financial investment to facilitate their ERP systems implementations, seeking to enhance their supply chain integration with their upstream and downstream supply chain partners, and across their global hierarchies (Monczka et al., 2011). It has been reported that over 172 companies invested the average cost of \$7.1 million for their ERP system implementation projects (Panorama Consulting Group, 2013). Furthermore, ERP system implementation is considered to have high level of complexity and thus is laborious. The average time of 1.483 years to complete (Panorama Consulting Group, 2013). The combination of high level of capital investment and human resources investment make the ERP software vendors selection phase even more crucial and challenging (Kumar and Hillegersberg, 2000; Jacobs, 2007). Moreover, many organizations fail to implement ERP because they underestimate its complexity and costs. Specifically, often

in times when a company could not realize their ERP implementation failure early enough to avoid extensive budget modification (Bingi et al. 1999), due to the fact that modifications of the original plans usually occurs during the implementation projects, leading to the result that approximately 90% of ERP system projects were held up and/or required alternative funding planning (Wang and Chen, 2006). Target Canada's massive failed case of ERP implementation can be considered as classic example of the inability to assign resources and to set up clear coping strategies for ERP system implementation's uncertainties (Blue Link, 2018).

The ERP implementation is usually displayed as grueling process because it does not only require full visibility of internal processes, but also a comprehensive understanding of its supply chain capabilities (Kashyap, 2011; Davenport and Brooks, 2004). Companies requires well-developed implementation plan or procedures to prevent over-spending of resources (i.e., money, labour, and time) on ERP implementation without realizing the promising benefits that have been demonstrated by their vendors prior to implementation projects (Bingi et al., 1999).

To fully utilize ERP system's capabilities, the ERP implementation project must not be seen simply as a technical-based attempt (Huang and Palvia, 2001) to get rid of the outdated systems, but more of a complexed business-driven effort which required massive organizational changes and contingency planning, in which not only technology, but people and organizational culture should play the central roles (Aladwani, 2001). When it comes to the implementation of ERP environmental functions, key factors might be even more salient due to the lack of direct financial benefits for the organization and its supply chain (Negahban, 2008). Hence, due to the high complexity, high costs and the high likelihood for failure of these efforts, there is a need for empirical research to investigate possible factors and line of actions that can guide organizations through successful implementation ERP environmental functions toward greener supply chain

practices.

As the topic of GSCM and ERP system has been raised but not been thoroughly executed, and the majority of ERP research studies conducted to date are quantitative in nature, and there is a very limited number of qualitative studies that explore richer and more detailed accounts of the critical challenges in ERP implementations (Mishra and Mishra, 2011), this study uses a qualitative exploratory multiple-case study design, which is aligned with the study's inductive objectives (Seawright and Gerring, 2008) to answer the research question: **What are the factors that contribute to the success and failure of ERP environmental functions?** Specifically, this study explores the implementation process of ERP environmental functions that directly target the adoption of green supply chain practices. The study offers two in-depth case studies to explore the complexities and challenges of the implementation of ERP environmental functions and how decision makers can overcome these challenges while adopting green practices in their supply chains. The study identified critical factors and patterns of behaviors from individuals within companies coping with organizational changes, which occurs during ERP implementation and post-implementation phases.

Statement of Problems

For more than three decades, ERP systems implementation have posed many challenges despite ongoing organizational efforts (Bingi et al. 1999; Kumar and Hillegersberg, 2000; Allen Sr , 2005; Wang and Chen, 2006; Blue Link, 2018;). The much higher level of implementation complexity than anticipated has led companies to spend extensive investment of time, cost and labours (Allen Sr , 2005; Wang and Chen, 2006; Kashyap, 2011). When companies come to the most unwanted decision to terminate the implementation projects midway, it usually too late to

minimize the financial and time loss. Even when that decided to “bite the bullet” and continue with the implementation, they usually are unable to figure out the actual culprits that caused implementation difficulties, (Bingi et al., 1999; Allen Sr , 2005). According to a research by The Standish Group (2013), only less 9% of ERP implementations projects are deemed as being successful. Even when the projects reached its mot optimal result, only 41% of the business needs were met during post-implementation phase (Momoh et al., 2010).

These statistics indicate that ERP implementation projects are much riskier than anticipated. The high failure rates demand that organizations look closer into the critical factors affecting the ERP implementations (Peci and Važan, 2014; Stanciu and Tinca, 2013), which is the main rationale behind this study.

Purpose of the Study

The purpose of this study is to explore critical challenges of ERP implementation toward greener supply chain practices. Specifically, the study will focus on the following:

- (a) To understand the motivations under which organizations decide to implement an ERP solution for green supply chain practices;
- (b) To explore what critical factors influence ERP implementation for green supply chain practices;
- (c) To identify what coping strategies are used to deal with issues or challenges during an ERP implementation for green supply chain practices;

(d) To propose recommendations that may help improving ERP implementation and its impact on the environmental performance of supply chains.

Significance of the Study

This study offers practical insights for organizations and supply chains planning to implement ERP system, or struggling mid-implementation phase, by providing diverse perspectives from the ERP implementation project stakeholders, about initiating their coping strategies to overcome ERP system implementation challenges and to achieve positive results on supply chain's environmental performance. These coping strategies may impact the successful outcome of ERP system implementation project (Arthur, 2016).

Specifically, the findings of this qualitative study may provide supply chain professional with a more detailed and intuitive understanding of the top-management strategies for adapting changes of ERP system implementation onto companies' current GSCM practices, and how to incorporate human factor to achieve the successful outcome of a software implementation project. Texture descriptions yielded from participant's experience may help supply chain professionals to get their expectation and contingency planning for implementation projects clear and straight. In addition, the findings of this study may be helpful for the process of generating change management procedure to adapt current business processes to the new ERP system and incorporate better communication, as well as better conflict management among the stakeholders of ERP implementation project.

Definition of Terms

ERP Implementation: An ERP implementation is the installation of ERP systems into organization's information systems. It can be categorized into 5 main categories: (1) ERP first-time implementation projects; (2) ERP upgrade projects; (3) ERP rollout projects (d) ERP migration projects; and (e) ERP consolidation projects (Menon, 2016).

Senior Leaders: The group of highest level of management personnel within an organization, who are decision-makers (Pavur, 2010; Johnson, 2015).

Project manager: According to definition of the Project Management Institute (PMI), project manager is “appointed by the performing organization to lead the team that is responsible for achieving the project objectives” (PMBOK® Guide – Sixth Edition, 2017, p. 555).

Project team member: PMI defines the project team member is “individual who support the project manager in performing the work of the project to achieve its objectives” (PMBOK® Guide – Sixth Edition, 2017, p.556).

Key users: Leading users who use ERP for performing business activities on a daily basis (Johnson, 2015).

ERP Third-party Consultants: ERP System consulting specialists from ERP software vendors that focus on technical and business functional resources of the ERP system.

Organization of the Study

The following portions of the study is arranged in five subsequent chapters. Chapter 2 provides background knowledge of the extant literature for ERP implementation; the definition and development of ERP system; ERP software implementation in regard of green supply chain management; major ERP systems providers; current studies, and implications on critical challenges. Chapter 3 focuses on the methodology, which defines and describes the rationale and execution of the research methodology choice and data collection methods. Chapter 4 presents the ERP implementation case stories of the two case organizations. Chapter 5 presents data collection's findings, and the textual descriptions of each theme group. Base on chapter 5, Chapter 6 presents the discussion of this study, in which research summary, theoretical contribution and managerial implications are provided. The final chapter 7 conclude the research by reemphasize the significances of the research and the relevance of the findings in indentifying the critical factors and coping strategies in ERP implementations. Ideas for future research will also be provided.

CHAPTER 2: BACKGROUND OF ERP SYSTEMS AND ERP ENVIRONMENTAL FUNCTIONS

Overview of ERP system

ERP systems aims to support better decision-making process by serving as a central point of synchronized databases across business units (Chopra and Meindl, 2007; Vollmann, 2005). There are many definitions provided for ERP systems along the years after it was created. This study view ERP systems using the definition of ERP provided by Wallace and Kremzar (2001, p.5):

“An enterprise-wide set of management tools that balances demand and supply, containing the ability to link customers and suppliers into a complete supply chain, employing proven business processes for decision making, and providing high degrees of cross-functional integration among sales, marketing, manufacturing, operations, logistics, purchasing, finance, new product development, and human resources, thereby enabling people to run their business with high levels of customer service and productivity, and simultaneously lower costs and inventories; and providing the foundation for effective e- commerce.”

One of the ERP system’s objectives is to ensure efficient flow of communications and information-sharing across the business units within an organization (Gable et al., 1998). This study specifically look into the ERP implementation phase and issues arises during post-implementation phase. ERP implementation challenges have been the focus of many studies in the extant literature due to it high level of complexity, high cost and labor intensiveness. The

implementation phase and post-implementation phase are the focus of this research as they are phases where most of the failure culprits are concentrated. The reason may be because during these phase, many activities which require intensive change management are conducted (i.e., key user training, system configuration, customization and testing).

The ERP systems is one of the most widely adopted information systems in the world (Esteves and Bohorquez, 2007), despite the fact that implementation failure rate is much higher than success rate. Organizations expect ERP system to improve their supply chain performance and create competitive advantages. However, those promising objectives would only be met if the implementation project is carried out successfully (Lucas et al., 1988). Since ERP implementation is considered to have high level of complexity and is rather highly costly, where substantial organizational culture changes are involved (Gable et al., 1998); it demands organization to have flexible mindset and high level of commitment to carry out a consistent strategic management plans to cope with changes in various critical factors: technical, human and business factors (Ifinedo, 2008).

Critical Success Factors in ERP

More than four decades ago, Rockart (1979) first introduced and studied the topic of critical success factor for information system adoption His research provide tremendous support for organizations struggling to figure out their critical requirements for information systems, as well as the critical challenges that would be happening when the organizations implement information system. These critical factors if are satisfied, will lead organization to successful implementation (Rockart, 1979) and would turn the implemented ERP system into the organization's best practice.

ERP Environmental Functions and Green Supply Chains

According to Silvestre (2016), green supply chains are the ones that consider both economic and environmental implications of their decisions at the same level of importance. To achieve enhanced green supply chain management (GSCM) often includes the integration of information flows across business units within the organization should be the central priority. This information involves the input and output of material, production processes, and reports provided by upstream and downstream supply chain partners (Hsu and Hu, 2008; Ansari and Moghadam, 2016). GSCM also has close linkage with supply chain sustainability outcomes (Silvestre, 2016). For example, the triple bottom line approach to sustainability (Norman and MacDonald, 2004) require focal companies and supply chains to implement business processes that are aligned with an equal consideration to the economic, environmental and social dimensions, which is called sustainable supply chain management (Silvestre, 2015). GSCM is an important step toward the sustainability of supply chains as an integrated management systems (Darnall et al., 2008).

Companies are under increasing pressure to document their environmental impacts of their production processes as a part of GSCM initiatives. The ERP systems offer a range of environmental functions that allow manufacturers to keep pace with this industry trend. Specifically, ERP system support the centralization of international procurement information and keep track of supplier's environmental standards (Trowbridge, 2001). There have been studies focusing on the evolving relationship between ERP implementation and green supply chain management. For example, Hervani et al. (2005) create a framework for green supply chain designs and evaluations, while critical factors to achieve green supply chains are studied by Zhu et al. (2008). Zhu et al. (2005) examine connections between the pressure of

governmental regulations and firms' economic and environmental performance under context of green supply chain. In the same way, Al-Mashari et al. (2003) point out that by successfully applying ERP environmental functions, the transformation of supply chain systems can grow within and beyond the organizational scope. However, although these studies advanced research on the topic, there is a need for an in-depth understanding of critical factors of the implementation of ERP environmental functions that impact the adoption of green supply chain practices.

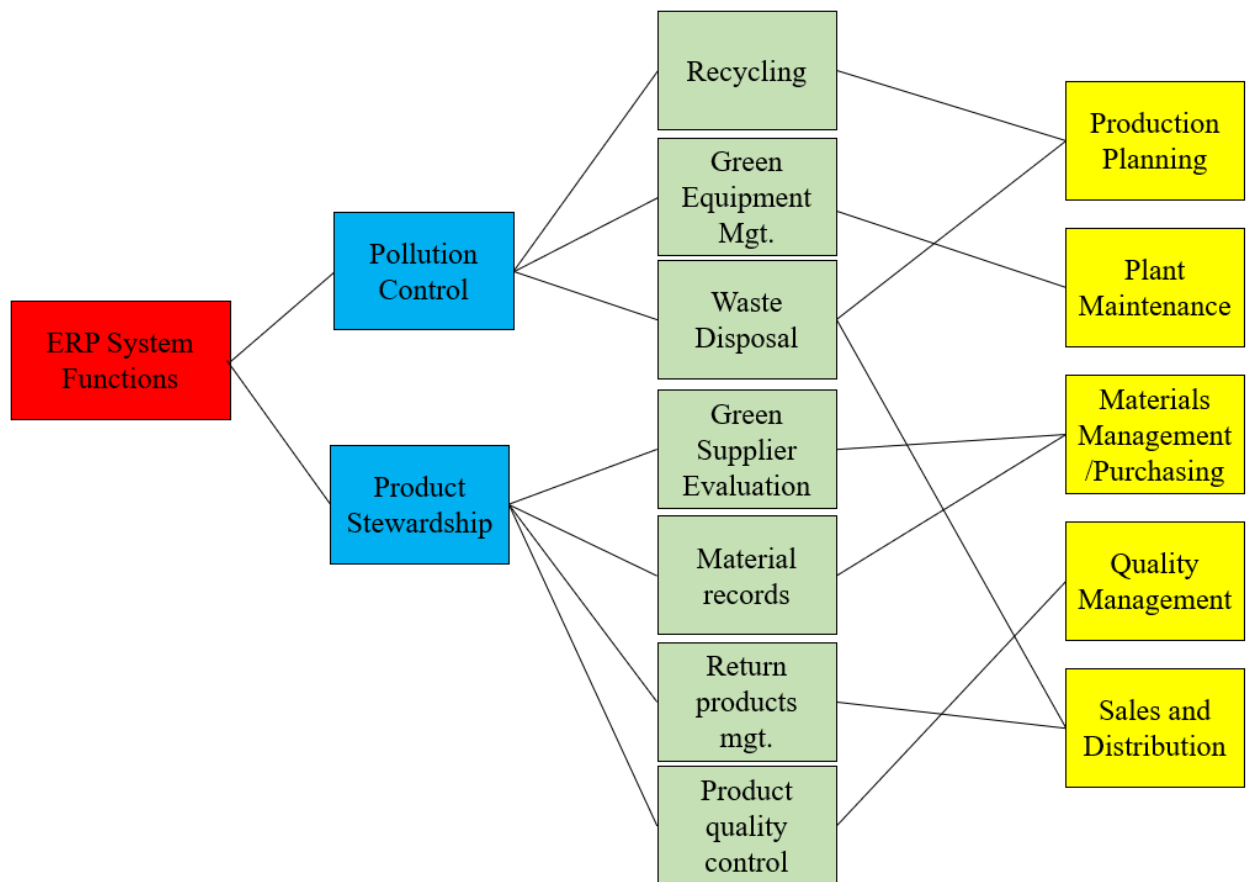


Figure 1: Mapping ERP environmental functions to ERP system modules

According to the Natural Resource-Based View (NRBV), production based on economic objectives may have significant consequence for the environment (Hart, 1995), and these factors

have been increasing the pressure on supply chains. For a supply chain, product stewardship and pollution control must be embedded within their daily business process and goals (**Figure 1**). Pollution control accentuate the capability generated from production and operation processes, where supply chains can realize their goals by minimizing the pollution that they generate (i.e., initiatives as lean management), and can also reduce cycle time, by removing unnecessary steps in production operations (i.e., waste reduction). Pollution control processes emphasize the importance of in-process pollutants and wastes reduction by modifying production's system operations, relying on in-process recycling materials and equipment substitution, product redesign or reformulation (Hart,1995). Information systems implementation could also be involved in pollution control strategy as it indirectly serves as a tracking tool for minimizing wastes and emission minimization (Darnall et al. 2008).Therefore, ERP environmental functions associated with pollution control can be identified for example as “recycling”, “waste disposal” among others (**Figure 1**).

Product stewardship are strategic capabilities that allow supply chains to be proactive in their environmental production process, specifically in raw materials input evaluation and suppliers management, which are aimed at internally reducing the negative impacts of the supply chain on the environment. According to Hart (1995), product stewardship thus refers to the ability not only to incorporate all business units within the organization, but also to obtain the perspectives of GSCM stakeholders into the decision- making process, especially on product design, research and development. It focuses on minimizing the life cycle environmental cost of products by designing reusable products and packaging, and avoiding usage of toxic substances (Hart, 1995) and can be associated with ERP functions such as “returned product management”, “green supplier grading scales”, “green products quality control”, among others (**Figure 1**). The

adoption of information systems would also be included in product stewardship because the information system aids in supply chain downstream process, which include product distribution, scraps and reworks (Gholami et al. 2013).

In this study, these two strategic capabilities, pollution control and product stewardship (Hart, 1995) will be adopted as a foundation to define and categorize the ERP environmental functions that are designed to improve supply chain environmental performance.

As shown in **Figure 1**, there are seven preliminary ERP environmental functions being grouped in two categories (pollution control and product stewardship). This categorization would help firm know what the ERP system has to offer in terms of green supply chain strategic management. However, in terms of system engineering, standard ERP system usually contains multiple modules, while ERP environmental functions may lie in more than one module in the system. Therefore, ERP environmental functions are identified and grouped into each modules they are belonged to. Specifically, there are five ERP system modules that directly related to GSCM: Production Planning, Quality Management, Materials Management/ Purchasing, Plant Maintenance, and Sales and Distribution.

Summary of literature review

In summary, this chapter provides a review of the fundamental literature related to critical success factors in ERP implementation through the theoretical lenses of GSCM and NRBV. Implementing an ERP system accelerates the unification of the business units within a supply chain. There has been evidence in the extant literature regarding critical factors of successful ERP implementation, but factors related to the relationship between ERP implementation and green supply chain management have barely been discussed. From the

reviewed literature, this study categorized ERP functions that closely caters for GSCM practices and is aiming to discover the exclusive critical success factors and coping strategies that allow the ERP implementation to enhance supply chain environmental performance.

CHAPTER 3: METHODOLOGY

Research Design

This study employs a qualitative exploratory research method. While the majority of ERP research is quantitative in nature, qualitative research provides richer and more detailed accounts of the critical challenges in ERP implementations, which highlights the importance of conducting qualitative research in the area (Mishra and Mishra, 2011). Exploratory research is conducive to identifying rich insights and perceptions across different role groups involved in the process of making decisions, implementing and using ERP systems.

The definition of a qualitative case study is “intensive, holistic description and analysis of a single instance, phenomenon, or social unit” (Merriam, 1998, p. 21). The exploratory case study approach incorporated in this research use underlying assumptions from extant literature to study the problem (Goulding, 2005), aiming to investigate a phenomenon by focusing on a smaller and heterogeneous samples, in order to gather detailed and intuitive data of participant experiences on the phenomenon (Mishra and Mishra, 2011; Yin, 1994; Menon, 2016).

More specifically, the chosen methodology possesses applicable characteristics that aligned well with this research’s purposes: to enable in-depth understanding of participant experience that would lead to rich textual description of the researched; and to come up with hypotheses after data collection, rather than testing them (Gerring, 2007).

Case Selection

Most researches using exploratory qualitative methodology have incorporate single case design (Maheshwari, 2008). While this case selection approach has ability to capture the

uniqueness and expressiveness of a the exemplary case (Yin, 1994), multiple-case design provide opportunities for more holistic and contextualized view (Yin, 1994), and enhance researcher's knowledge of the new phenomenon by doing cross-case analysis, leading to better chance of generating causality relationships between the identified themes and researcher's assumptions (Miles and Huberman, 1994).

Nevertheless, multiple-case study design has higher level of complexity and require more dedication in course of case selection, data collection planning, research protocol generation and data analysis. In this case being the critical success factors and accordingly coping strategies for the ERP implementation towards GSCM.

Regarding geographical scope of the study, ERP systems have been created in evolved most significantly in the North America and Europe (Jacobson et al., 2007). According to Huang and Palvia (2001), the reason for this significant growth is because North America and Europe provide essential bases for the ERP system to mature and become more complex, including advanced technology and physical infrastructure, strong economic background and benevolent software culture.

Information system adoption in western developed countries, especially in Canada and United States, have been the focus of many studies in the extant literature (Baker et al., 2007); since the systems are created to fit into western business and software culture (Dezdar and Ainin, 2011). Therefore, this research hope to provide insightful details of ERP systems adoption in developing countries, where findings from developing countries may not be necessarily applicable, with a reference case in a developed country, where ERP systems have been familiarized.

The ERP market in South East Asia is considered to be rather small as ERP systems are still deemed as unfamiliar product in modern South East Asian software culture. Therefore, it is one of the focus geographical scope of this study.

Based on the research design and reasoning, two case studies are developed: one in Vietnam and another one in Canada. The case setting is associated with manufacturing companies that have recently implemented ERP systems, but faced many challenges, especially the ones associated with the ERP environmental functions. Manufacturing companies are the focal of this study because their ERP systems are often more complex, they tend to incorporate more ERP modules into their operations than service companies, which could be one of the reason for the struggling and challenges faced during the implementation projects (Snider et al., 2009). Both companies are similar in size (large-size manufacturer) and have completed their ERP implementation projects. The researcher identified suitable case companies based on their size and ERP system implementation history. According to selecting criteria of Menon(2016), both selected companies in this research are large size, with more than 1,000 employees in their local subsidiary, and each has dual ERP support, including a local ERP system support team and third-party ERP system provider to assist implementation and warranty processes. The researcher used personal contacts to reach out to each company's representative and asked for their permission to participate in the study, and for their recommendation of suitable participant. Both companies agreed to proceed further with this study.

Data Collection

In a qualitative exploratory case study, participant selection is very important, as participants are identified as having experienced the phenomenon and are able to clearly express

their viewpoints' experience (Cohen and Crabtree, 2006). For this research, the number of interviewees is critical to any case study because of the representation of the entire organization is much needed (Vogt et al., 2012). Stratified purposive sampling was used to select participants from the case organization. Qualitative research participants were purposefully chosen by the researcher (Glesne, 1998). Purposive sampling is a technique in which participants are identified in a non-random manner, as exemplary representatives of the phenomenon being studied (Patton, 2002). Stratified purposive sampling as a sampling technique indicates that samples in each group are homogeneous (Suri, 2011). This sampling technique is appropriate for this study because of its small and homogeneous sample size, which is fitting to the purpose of gathering data from each exemplary participant group (Gerring, 2007).

This study incorporates the sampling choice of participant groups from Menon (2016), in which four participant group were selected to join the study. Participant role groups are crucial in this research as the diverse population would provide opportunities for data triangulation and stratified data collection planning (Krueger and Casey, 2008). This research added third-party ERP consultants as the fifth group to complete the sampling selection. Multiple interviews were conducted across five different ERP implementation participant role groups: (1) senior leader, (2) project manager, (3) project team member, (4) key user and (5) third-party ERP consultants. These five participant groups are five main stakeholders of most ERP implementation projects. The purpose of participant team roles was to gather information from industry professionals who had in-depth knowledge and understanding of critical challenges in ERP. Participant project team role groups are useful to produce data of interest to researchers and are normally made up of professionals who work in different roles in the same industry (Eskerod and Huemann, 2013).

Participants were asked to offer their company's ERP implementation motivation and history, their opinions of critical success factors in ERP implementation and coping strategies used during ERP implementation and post-implementation phase.

This study used semi-structured interview guide based on an interview questions list developed to guide the interviews. Semi-structured interview design allows freedom of expression in participant responses, initiate meaningful and intuitive conversations relevant to the study (Hesse-Biber and Leavy, 2010).

In-person interviews is set as this research data collection method. Each interview is planned to last for approximately 30-60 minutes each, depending on the number of questions that each participant might have enough knowledge and authorization to answer. Additionally, in-person interviews enhance opportunities for the researcher to analyze relevant non-verbal expression of the participants, which is fitting with the explorative nature of this research (Royes, 2015).

Interviewee Selection

The sample represents five ERP project team roles, specifically including senior leaders, project managers, project team members, keys users (Menon, 2016), and third-party ERP consultants. The selection criteria for participant in this research is that the participants possess implementation experience in ERP projects, meaning that the participants have work through case-company's ERP implementation projects in the past. The case-company's representatives also supported in the process of selecting and facilitating suitable participants for interviews.

According to Marshall et al. (2013), the sample size, or in this case, the number of interviews should be appropriate to reach the point of data saturation. In qualitative research, data saturation is the point when new pattern or expression no longer arises from the collected qualitative data; sample size, or interviews process could be ended at this point (Morse, 1995; Kerr et al. 2010). Therefore, the number of interviews conducted for this study is based on the point of data saturation.

Triangulation of Findings

The current study used perspectives from the five ERP project role groups—senior leader, project manager, project team member, key user, and third-party consultant—and triangulated collected data from the five mentioned participant groups in two case companies to obtain diverse experiences of the ERP phenomenon (Vogt, et al., 2012). Triangulation in qualitative research refers to the interweaving of different perspectives from multiple interview sources, which fits into the explorative nature of this study (Vogt et al., 2012). Literature showed the use of triangulation as a method, which is appropriate for qualitative studies through it holistic and explanatory framework (Denzin, 2012; Kaczynski, et al., 2014). The current study is, hence, used triangulation to analyze the perceptions between five ERP project role groups.

Instrumentation and Measures

The instrument is the tool used to collect data in a specific research method (Krishnaswami and Satyaprasad, 2010). Silverman (2011) suggested that interviews are one of the main data collection techniques in qualitative research. For the current study, an interview guide was developed to simplify and arrange questions logically and sequentially so that responses could be elicited from participants (Garcia and Gluesing, 2013). The final interview

guide consisted of semi-structured interview questions, as outlined in Appendix, was used to collect the data needed for the current study. There were 17 interview question in total, covering different dimension of an ERP implementation projects and dimensions related to GSCM, including: case-company overview, ERP implementation motivations, ERP implementation barriers or challenges, coping strategies and recommendations (see Appendix A).

The responses from subjects were categorized according to the participants' ERP project team roles. The interviews were digitally recorded using two digital audio recorders to minimize the risk of data loss in the event of mechanical failure of a recorder. During the interviews, participants' comfort was maintained as they were encouraged to take breaks stop the interview when needed (Davis, 2016). The participants are allowed not to answer questions if they feel uncomfortable to do so.

Interviewing Process

The interviewing process was conducted according to the following process:

The interview request was initiated through the company's contact point requesting interested participants to contact researcher. Each prospective participant received an informed consent form to review the interview confidentiality terms as well as ethical considerations. Upon a participant's acceptance of the terms and confirmation of the interview data and time, an acceptable public place was secured for interview. Each participant provided their signatures and returned the informed consent form to the researcher. Note-taking and digital audio recorder were used at the meeting place to minimize the risk of data loss in the event of the mechanical failure of a recorder.

Each participant met the researcher separately at the designated public place. After initial introductions, the participant review interview's objectives with the researcher. Before obtaining permission to start the interview from the participants, and the participant was informed that the interview would be audio-recorded. The participant's current job title and years at the current organization were captured to ensure that the sample criteria are met. The researcher asked all the study questions from the interview guide with same orders for all interviews. Once the participant reached the last interview questions, the participant was asked if he or she would like to share any further information. When the participant had nothing further to share or add, the researcher thanked the participant for his or her cooperation and giving his or her time to the study, thereby closing the interview.

Description of the Sample

There was a total of 18 interviews. The Canadian case company contributed to 06 interviews and a total interviewing time duration of 334 minutes. The Vietnamese case company contributed to 12 interviews and a total interviewing time duration of 228 minutes. Details of number of interviewees for each participant group, interview codes and time duration of each interview are showed in **Table 1**.

Company	Participant Group	Number of Interviewees	Interview Code	Interview Time Duration (minutes)
Canada	Senior Leader	1	SLCA	60
	Project Manager	1	PMCA	92
	Project Team Member	1	PTMCA	60
	Key User	2	KUCA1	45

			KUCA 2	50
	Third-party Consultant	1	TCCA	27
	Total # of Interviews	6	Total Time	334
Vietnam	Senior Leader	1	SLVN	30
	Project Manager	1	PMVN	30
	Project Team Member	2	PTMVN1	27
			PTMVN2	39
	Key User	5	KUVN1	25
			KUVN2	24
			KUVN3	21
			KUVN4	22
			KUVN5	16
	Third-party Consultant	3	TCVN1	16
			TCVN2	22
			TCVN3	16
	Total # of Interviews	12	Total Time	228

Table 1: Description of Interview Samples

Exploratory Analysis

During the data analysis process, the researcher assessed the participants' responses based on the frequency of responses shared between the four ERP project role groups, identified themes by generating queries, and explored visual word clouds from verbal comments and documentation (Alam, 2005; Dul and Hak, 2008). A theme represents a patterned meaning or response with respect to the research question within the dataset (Braun and Clarke, 2006).

Identifying themes using thematic analysis to report patterns or themes, and to interpret the research topic's various aspects has been gaining increasing popularity (Boyatzis, 1998; Braun and Clarke, 2006). Examining similarities and differences is another important step in the analytical process, and was useful in the current study to triangulate the viewpoints of the five ERP project role groups (Vogt et al., 2012).

Interview Data Analysis Process

The research followed a 4-step data analysis procedure. The step-by-step analysis process is illustrated in **Figure 2**:

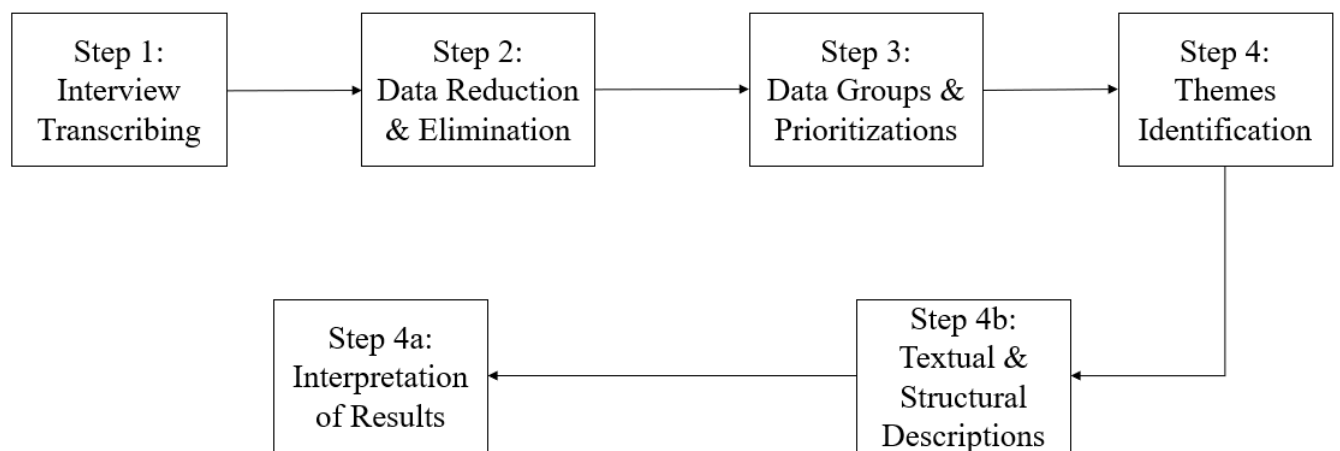


Figure 2: Qualitative Data Analysis Process

In Step 1, the researcher transcribed all interview records and loaded them into the NVivo 12 software. The software supported listing and grouping emerging expression (phrases, sentences, words) from the transcripts. During step 2, the researcher read through the data more closely to understand and eliminate any irrelevant statements from the transcript. Those removed statements contains meaningless buffer words, vague or irrelevant expression to the interview questions, and repetitive statements.

During Step 3, remaining statements as results of Step 2 were assessed. Mutually meaningful statements were grouped, categorized, and labeled. As for Step 4, the themes are identified, and being assessed against the research questions and purposes.

The research started to generate textual descriptions that follow the order of study purposes to describe and tell the stories of the participants experiences. The textual and structural descriptions are basically built from the emerging themes and patterns, validated by the researcher experience during interview process. The structural descriptions then are created based on the textual descriptions synthesis, being reflected and connected by the researcher's understandings of the ERP phenomenon..

Step 1 and step 2 of data analysis process were conducted almost parallelly with the interview process. The first reason is to help the researcher to evaluate the interviews quality and points for improvements. The second reason is to identify the point of data saturation. As each interview being transcribe and analyzed before the next interview occurred, the interview process was able to be ended when no new information occurred. The almost immediate analysis of data also provided the researcher better assessment of her own lived experience interviewing the participants, especially contemplations of their non-verbal expressions.

Assumptions

The research has several assumptions regarding the chosen qualitative approach. Firstly, because the study opts for a narrow and heterogeneous sample size, the exploratory multiple-case study is expected to yield rich and insightful understanding about the critical success factors of ERP implementation for GSCM and accordingly coping strategies. Secondly, the

researcher has trust for the participants that their responses stays true with their actual feelings and experiences (Yin, 1994) with the ERP implementation.

Bias

Researcher bias can affect the integrity of the study, and therefore conscious efforts will be made to reduce bias in the current study. This bias is due to the researcher's experience in ERP implementations with manufacturing companies in Vietnam. To mitigate this bias, the researcher took steps to ensure that her previous experience would not directly or indirectly influence the participant's responses to the interview questions. Further, researcher bias is also controlled by maintaining focus in interviews, and by recording and transcribing the interviews (Cooper and Schindler, 2011).

Ethical Considerations

The researcher is responsible for foreseeing and managing the risks that might arise from the study (Davis, 2016). The study's protocol obtained ethics approval from the University of Manitoba. During the data collection process, the informed consent form was presented to each participant explained the study's purposes. The participants had opportunities to read through carefully and could accept or decline to participate in the study.

Attributable to ethical contemplations, and to maintain participants trust, their personal identification information and organization information, as well as relevant details that may provoke participants personal privacy are kept confidential and are excluded from the report (Trochim, 2006).

Prior to each interview, the researcher ensured to provided study descriptions, allowed participants to ask questions so that they thoroughly understood the study purposes. Additionally, in order to maintain equality for all interviews, all participants were asked same questions in similar order.

Summary of Methodology

The study incorporates qualitative multiple case approach. The research design evaluated perceptions from five project role groups and documentation related to the study (Creswell, 1998; Woodside, 2010). The participant groups for this study were composed of senior leaders, project managers, project team members, key users, and third-party consultants. The selected sample size allowed manageable research study (Menon, 2016). The triangulation from five participant groups was used to understand the perceptions and also establish the themes based on the collected data from the four participant groups (Vogt et al., 2012). Participants responses were collected from semi-structure interview questions . These responses are reported in the following chapter 4 and chapter 5. Mutual and exclusive themes and patterns were identified based on grouping and categorization of relevant participants responses. The data analysis process aims to find out similarities in collected data for within-case and cross-case analysis. Finally, the study incorporates this qualitative approach to answer the research questions at most in-depth extent possible, adding to the body of knowledge about ERP implementations and the framework for future implementations.

CHAPTER 4: CASE STUDIES

VIETNAM CASE COMPANY – CULTURAL DIMENSION DIFFERENTIATE ERP SYSTEM ACCEPTANCE

This section presents Vietnam case company's ERP system implementation details, which include:

- Green supply chain management – production process mapping
- ERP system implementation history and current situation
- Case company's main challenges and coping strategies to increase user acceptance
- Preliminary explanation of company's successful ERP system implementation

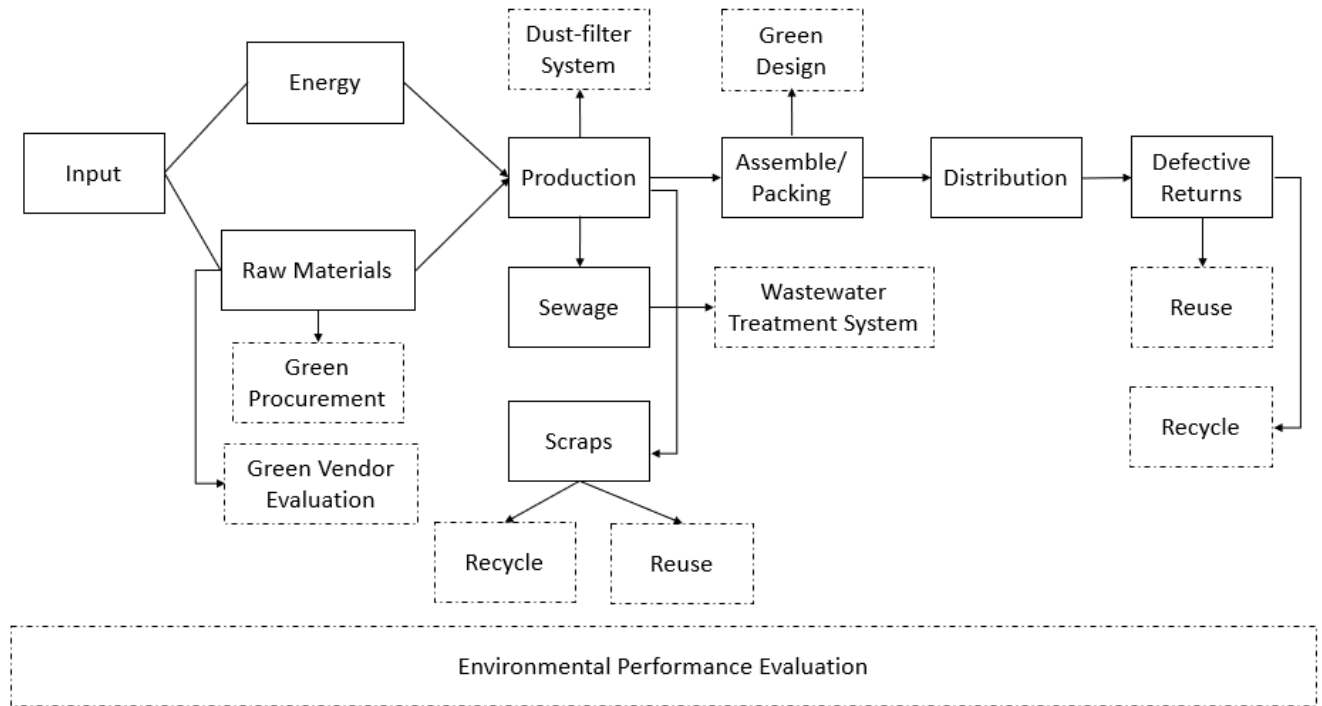


Figure 3: Green supply chain operations process by Vietnam case company

Vietnam case company's is a large-size manufacturing firm which has been adopting green supply chain practices since 2008. This manufacturer invested in their own R&D institution specialized in researching new environmental materials and substances, as well as green production systems, such as dust-filter system and waste-water treatment system. According to SLVN, the company's purpose to establish R&D institution is to "maintain company's environmental sustainability development". The company also is proactive in other green supply chain practices, including green procurement, green supplier evaluation, green product packing design and materials recycling, as illustrated in Figure 3.

A year after adopting green supply chain practices, the company started to implement ERP system from SAP vendor. The green supply chain practices, as illustrated in Figure 3, was applied into ERP system. Specifically, green procurement, green vendor evaluation, green design

and recycling process were applied to ERP standardized processes, while dust and water managing systems process were opted for customization processes.

The implementation project was expected to be completed within eighteen months. However, in reality, it took almost three year (until 2013) for the ERP systems to be ready to operate, which is much longer than anticipated. Nevertheless, all participant agreed that the system has been running quite smoothly and efficiently ever since. Participant KUVN3 said: “ I can’t imagine going back to managing all information, especially reports and calculation in Excel. It took time for me to learn using (SAP) ERP, but it was quite worth it.”

From the participant responses, it can be seen that the acceptance of these systems still depends on the fact that whether the systems can be successful in meeting the business needs and enhancing its efficiency. If the implementation of the ERP systems results in improved business performance, the acceptance of these systems is more likely to be high. Additionally, company size may determine the level of ERP implementation acceptance and overall level of resistance to changes within the company (Adam and Van der Merwe, 2011). Larger-size companies tend to have higher acceptance level, and as a result, higher utilization capability for their ERP systems (Iskanius et al., 2009), and greater chance to achieve successful implementation. The reason could be because business units within large organization tend to invest in training activities to improve employees knowledge (Koh and Simpson, 2005) and absorptive capacity of the ERP, which is one of the effective appropriation strategies for changes management.

Despite the positive current feedbacks, Vietnam case company used to cope with variety of implementation challenges. In fact, most Vietnamese companies experience more hardships regarding ERP implementation. ERP is a rather unfamiliar phenomenon in Vietnam, hence,

Vietnamese companies usually have difficulties doing market assessment and selecting suitable ERP system vendors (Le and Han, 2015). In addition to ERP newness in Vietnam, extremely high capital investment requirement, together with unanticipated quality issues of ERP implementation have been consequential contributors to ERP system avoidance and ERP implementation failures. Many adopted companies on ERP have carried successful and adequate experiences with local and international vendors. The biggest challenge of ERP implementation faced by Vietnam case company is the struggle to adapt to new software culture. Specifically, the company had experienced implementing ERP system with two different vendors, both implementing SAP. The first vendor was international software provider. Their team include third-party consultants from India, Russia and United States. While the combination of foreign experts with high level of international implementation experience instantly gained more “trust” and “authority” from users, as agreed by participant KUVN3 and KUVN5, the third-party consultants were not able to communicate directly with Vietnam case company’s project team, and they had to seek support from hired translator, who did not possess sufficient knowledge of either ERP system or case company’s business processes. Miscommunication also caused trouble for the case company during business process re-engineering. Because green supply chain practices were customized by case company’s R&D institution, third-party consultants were not able to understand correctly the complexity and purposes of the self-created green systems, which is the main reason why it took longer than expected for the implementation to be completed, as case’s company had to eventually terminate the implementation project with foreign vendor and opted for a Vietnamese vendor.

In terms of training, participant PMVN added that in order to have skillfully trained ERP end users, it is crucial for the third-party consultant and internal project team to provide user

manuals that include adaptable transaction screenshots. The Vietnamese participants especially stressed that their training manuals was being “robotically translated”, the system language was not aligned with Vietnamese language and their green supply chain language in particular. This would appear to be only minor discomfort at first, however, in reality for Vietnam case company, inability to understand training manual correctly had caused “dominos effect” of miscommunication as the key users was giving their end users wrong instructions.

It is worth mentioning that for Vietnam case company, cultural difference is not only about language difference. Miscommunication also caused trouble for the case company during business process re-engineering. Because green supply chain practices were customized by case company’s R&D institution, the third-party consultants were not able to understand correctly the complexity and purposes of their self-designed green systems, which is the main reason why it took longer than expected for the implementation to be completed. According to Molla and Loukis, (2005), the divergency of culture perceptions is based on the inherent understandings of participants contributing to an implementation project. Specifically, in this case, the ERP software culture resonates with the perceptions and knowledge of the western ERP project members, including the ERP vendors, external project managers and third-party consultants; while the local culture resonates with the behaviors and acceptance of the internal project team from the east, including senior leaders, internal project managers, project team members and key users. In fact, it has been asserted by Srite and Karahanna (2006, p.680) that “national culture impacts the cultural values an individual holds, which in turn influence technology acceptance”. That means national culture could be one of the factor that direct the level of acceptance for ERP implementation.

For Vietnam case company, their first try with a foreign software vendor was identified as a “failure”. That is why prior to their second SAP – ERP implementation project with a domestic vendor, their top management had agreed to “be more open-minded and willing to compromise and transform current business process to the largest extent possible”, as stated by SLVN. The case company also took longer preparation phase for change management. Project team meetings with stakeholders were held to communicate top management decision of extreme transformation across business processes. “Our users have to be ready to take in all the upcoming changes before the changes actually arrive”, added by PMVN.

Extreme transformation and compromise for Vietnam case company also means minimal customization. As claimed by PMVN:

“We're specifically not wanting customization. Anything is not necessarily needed to be create outside standardized system will not be approved. Customization is only our last resort, because once an unnecessary customization is approved, countless more will follow. Then the system will expand uncontrollably, and we cannot afford having it shut down for troubleshooting in middle of our productions.”

Regarding this matter of flexibility of business process reengineering, companies often have unstructured processes that have emerged over years. Thus, in most companies, implementing an ERP system requires complete or partial business process reengineering, which affects not only the procedures but also the organizational structure of companies. It is observed that almost companies mainly concentrate on day-to-day survival instead of long-term strategies.

Consequently, it is critical for companies to retain flexibility, by then, there is no need to rush for ERP to achieve any benefit against flexibility.

Moreover, ERP implementation may create conflict with current business practices, which can, in turn, lead to the loss of competitive advantage of companies. Therefore, effective change management and patient preparation phase will most likely be determinant for the success of following implementation and post-implementation phases.

CANADA CASE COMPANY- HOW MUCH CUSTOMIZATION IS ENOUGH?

This section presents Canada case company's ERP system implementation details, which include:

- Green supply chain practices and ERP system implementation history and current situation
- Case company's main challenges
- Preliminary explanation of company's failure of ERP system implementation and recommendations

Understanding the complexity of ERP system implementation

The Canada case company is a large-size manufacturing firm. The Infor- ERP system of Canada case company was implemented for almost 20 years, way before the company's decision

to transform their production processes to be greener, which is in 2015. Participant PMCA disclose that the design of their current ERP system has been expanding to an “unmanageable extent”. As for the implementation history, their ERP system was planned to be completely implemented within 12 months, however, the implementation process actually took double the time to be completed. The preliminary reason to this could be because leading ERP vendors generally have trouble in offering customization to companies. The ERP vendors often aim at developing the main target market from large enterprises. Thus, when companies require customization, the vendors take time to understand the business of companies and to design software packages.

The case company’s green supply chain practices consist of green product packaging and recycling. Up to this point, both of these process and environmental report generation are managed “outside ERP system”, as confirmed by PTMCA. In fact, “only 10%, I presume, of the ERP system capacity is being utilized in our company. We had a three software in total: a self-coded system to manage our finances, another one that we named [name] to generate reports, and ERP system”, as stated by PTMCA. When being asked about the reason for extensive number of management software, PTMCA said “our customization is expanded to the extent that their complexity and intertwining are too overwhelming to be handle in ERP system, even when we regularly upgraded our ERP.”. As mentioned by PMCA and PTMCA, the company is undergoing a selection phase for new ERP system, aiming for a complete transformation of their business process by completely replacing the current self-coded software and customization as these customization has reached a level of “being unsolvable”.

Recommendation for ERP System Customization process

Less customization and more out of box were also regarded as important for future implementation success (PMVN, SLVN, and TCCA). SLVN remarked:

“One thing about ERP implementation, is the more standardized you can be, the smoother it goes. So, you take SAP out-of-the-box, and implement it without trying to modify it, it will be much more successful.”

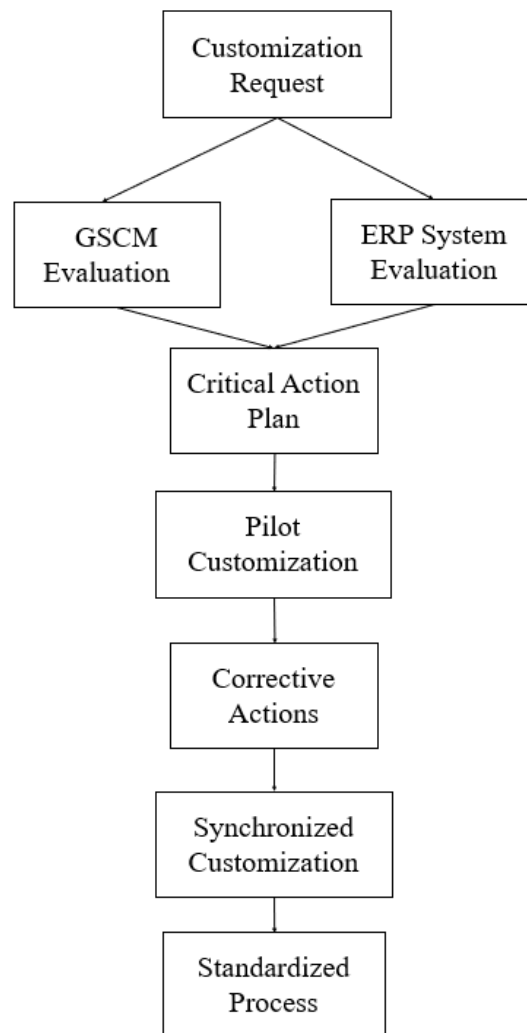


Figure 4: System Customization process

A point worth mentioning is that during interviews with Canada case company, most of them agreed that the company has not been incorporating any customization approval procedure or customization testing. Therefore, a standard and strictly applied procedure for creating new customization is much needed for the case company. The study proposes a procedure as illustrated in **Figure 4**. The procedure includes seven steps, in which request for green supply chain customization in ERP system has to be submit directly to green supply chain department in charge before sending to ERP support (or IT) department. Both green supply chain practices and ERP processes have to be reevaluated closely prior to approval. After approving the requested customization, action planning will be created jointly by green supply chain and ERP personnel in charge, in which length of customization project and person in charge in testing the customization has to be explicitly specified. Testing process will be a reoccurring process until the customization is completely corrected. Then the customization will be synchronized across branches or subsidiaries of the organization, with appropriate training manuals and training process. This way, the risk of uncontrollable customization will be minimized.

CHAPTER 5: RESULTS

Presentation of Data and Results

This section presents the collected data and results of the empirical study. Besides demographics and other information, each interview question aims to obtain responses and highlights of all five incorporated participant groups. The participants are expected to answer the interview questions to the deepest and most trustful extend of their knowledge. To enable the alignment of the analysis with the research question, data findings were triangulated among interviewees. The results of the in-depth case studies revealed three mutually exclusive emergent themes: motivation to implement ERP, critical factors and coping strategies, as presented below.

Emergent Mutual Themes

Theme 1: Motivation to Implement ERP

Across all ERP project role groups, participant responses to interview questions related to the primary motivations to implement an ERP system produced 04 basic reasons (one interviewee was not aware of the motivation behind the ERP implementation). **Table 2** provides results for the theme of organizational motivations for having ERP system implemented in both case companies. The results derived from counting the frequency of the motivations being mentioned by each participant. No mentioning for the related motivation is interpreted as a dash in the table.

Motivations	Senior Leader	Project Manager	Project Team Member	Key User	Third- Party Consultant	Total
Operational decision to synchronize the business processes into one integrated system	2	1	2	4	4	13
Tracking and/or sharing environmental information	1	1	1	2	3	8
Achieve process standardization	—	—	—	—	2	2
Benchmark against competitors	1	1	—	—	2	4
Unaware of organizational motivations	—	—	—	1	—	1
Total	4	3	3	7	11	28

Table 2: Motivations for Implementing ERP - Reported by 05 Project Role Groups

Participants overwhelmingly agreed that the motivation to implement ERP was an operational decision to synchronize the business processes into one integrated system. Other motivations included achievement of process standardization and benchmark against competitors. In contrast, some participants answered that they did not know where the decision

came from, and that management would be better able to answer the question. Thirteen participants commented on the importance of the organization's Operational decision to synchronize the business processes into one integrated system. Participant SLCA stated:

“Well, we need synchronize data. ERP system has been implemented in many countries, and in Canada the market for ERP systems has always been populated, I think for us it would be timely decision to replace our legacy system and move on with the trend of having one single platform for process integration.”

Participant PMCA added “because our companies have multiple branches, it would be easier to have all subsidiaries operated on the same system, and that was what really drove our top managers to this decision.” Participant PMVN addressed this as:

“It was definitely operationally and business driven. I could understand that for most of our employees, it would be challenging to move off from the old system we had been using, but because our corporation is growing at a much faster pace, any tool or support that we need to do the job as efficiently as possible will be adopted, we had to to fall in line and implement the solution that would be best practices for our operations.”

Achieving standardization of operations process was another theme which was highlighted by senior leader participant SLVN. According to SLVN, “first and foremost, this ERP implementation was about helping to achieve some measure of standardization across operations process between our subsidiaries.” Benchmarking against competitors was crucial, according to PMVN, who added:

“[Competitor Name] is much larger with more complicated business processes but they managed to implement ERP successfully. That’s why we decided to benchmark ourselves against them. It could be said that we learn from them as well, but we would prefer to say that we are competitively learning to bypass our competitors.”

Tracking supply chain environmental impacts and sharing those recorded information with upstream and downstream supply chain partners are considered as a GSCM-oriented activities influencing company to implement ERP system. Specifically, SLVN said:

“Because we are manufacturing company, tracking our overall environmental impact, especially chemical content of our products, are needed to achieve our goal of becoming environmental-friendly.”

PMVN and PMCA both agreed that their customers occasionally acquire them to share information for environmental impacts of their production lines in report from. PMVN added:

"We do a lot of reports, environmental reports and such. We need a lot of a lot of output from the system to help people make decisions. But again, using Excel is not that kind of modern real-time access to data that people crave. So far, we have received positive feedbacks from our customers for how environmentally compliance we are with our products.”

Theme 2: Critical Factors Influencing ERP Implementation towards green supply chain practices

Four key critical influencing factors have been identified during the interviews as critical for the implementation of ERP towards GSCM practices. They are: A) Environmental

Consciousness; B) Business-driven and not IT-driven; C) Top management commitment; and D) Green supply chain compliance information, as detailed below:

A) Environmental Consciousness

Manufacturers are under increasing pressure to document their impact on the environment as a part of GSCM initiatives. Government environmental regulations and policies could be one of the main attributors for the increased attention to green supply chains. These regulations increase demands for manufacturing companies to record the environmental impacts of their supply chain operations. Additionally, people concern and awareness on increasing responsibility for environmental preservation has been gradually growing higher, activities that facilitating environmental compliance will foster positive image and add values for organizations in views of their customer base, thus, enhancing organizational competitive advantages (Chen, 2011). This is confirmed by the study's findings, as noted by PMVN:

"Today's consumers are more environmentally conscious than ever before and expect the same level of commitment to eco-friendly. I can see that happening gradually from our regular customers. As we are specialized in manufacturing, our innovation and production are majorly based working with chemicals and other substances. It has been our motto to be cautious and mindful of the impacts that our production lines may have on the environment and to be active in researching and developing solutions to reduce our wastes, emission and to innovate our products to be greener."

TCCA also added:

“During our ERP selection phase, we learnt that we could use ERP software to track our level of waste and carbon footprint, thereby having standardized environmental compatibility metrics. There's going to be fewer errors because there's fewer people involved in it.”

While TCVN2 highlighted: “Certain process manufacturing ERPs even support eco-friendly supply chain strategies via environmental sustainability dashboards and accounting templates.”

In addition, pursuing a positive and environmentally-friendly image, by initiating environmental protection strategies, and keeping environmental impact records transparent and accessible can increase customer’s trust and loyalty towards manufacturers, and as a result ensure greater financial benefits for the manufacturers (Yang et al., 2011). Echoing with the extant literature statement, SLVN pointed out:

“Adopting greener and leaner production, as well as using ERP as a tool to support that, is our prioritized strategy to enhance our relationships with the environmentally-conscious customers, suppliers and investors.”

B) Business-driven and not IT-driven

Participant TCVN1 observed that it is better “having the business really, not just driven by an IT project, but also having the business in every stage of the project.” Participant PMCA supported the argument by stating that:

“It was going to be the single largest software project that we would ever undergo, that is why it had to align well with our business objectives. The ERP systems is where we were going to spend the most of our time and money. That’s why it has to be a business-driven change.”

C) Top management commitment

ERP systems implementation involves not only technical adaptation strategies, but also management strategies (De Toni et al., 2015) to tackle resistance to changes. As noted by KUVN3: “ERP implementation is a long and grueling investment. Project commitment needs to come from both side, us and third-party consultant. Our project took longer partially because many consultants resigned from their positions in the midst of project. We had to re-communicate our process knowledge for the newcomers, which was labor-intensive and time-consuming.”. KUVN1 and PMCA both agreed that the third-party consultant selection process should be presented to all project team members. KUVN1 pointed out:

“As key user from production department, I think I have appropriate understanding of our current green production process. It is quite tiring that the consultant supporting me does not obtain same level of understanding. She understands the ERP system’s

standardized process, but doesn't have enough expertise when it comes to green customized process, such as ours. Communication could have been faster and more efficient if I could help interview and select the consultant during our pre-implementation phase."

Moreover, both case companies participants and third-party consultant participants agreed that receiving continuous communication via various mediums (email, conference calls, face-to-face meeting) throughout the project lifecycle plays considerable role in gaining their "trust" in each other. Clear communications are required to overcome challenges; this was observed by participants KUVN2, KUCA1, and TCCA2.

Participants KUVN2 remarked on the importance of communication. Participant KUVN5 maintained that the "key [is] in making sure to have smooth communication from the top to the lowest level."

Communication deficiency and ineffectiveness can hinder positive progression of every project (Livermore and Rippa, 2010), including ERP implementation. As noted by PMCA, managers who manage to have "consistent and transparent communication" can significantly foster level of trust and confidence in employees.

From these findings, this study claims that robust top management commitment, as well as effective communication flow enhance potential success of an ERP system implementation.

D) Green supply chain compliance information

Addressing legal and “green substances” requirements was emphasized by participants and can be considered specific to the Canadian manufacturing industry. However, these rules can be distinct for all countries due to their own unique business rules and regulations. Participant SLCA suggested:

“We're trying to minimize waste and all of its so I can see that the manufacturing order operations process is very lean. I think the understanding of the legal and environmental requirements is one of the reasons that we can maintain this stage, having the ERP system helps us making sure that we address these requirements”

Theme 3: Coping Strategies

Six key coping strategies have been identified during the interviews as critical for the implementation of ERP towards GSCM practices. They are: A) Training, B) Change management, C) Risk management, D) ERP system testing, E) Utilization of the right people, and F) Encouragement mechanisms, as detailed below:

A) Training

Persistent and immediate training would increase user acceptance and knowledge of the system (Arthur, 2016), and would as well increase their absorptive capacity for upcoming innovation beyond ERP system implementation, while the lack of appropriate and timely training can hinder ERP success (Ke and Wei, 2008). From the participant responses, both

case companies confirmed that ineffective and deficient training was one of the initial contributing factor to their delayed implementation project. Key users from both case companies overwhelmingly agreed that the lack of immediate training to get them familiar with the system “from the get-go” is contributing to their daily mistakes when operating ERP systems. One participant referred to improper training as factor contributing to the data input errors they make during environmental impact report generation. While other participants recalled having to “do their homework” by themselves, or “do a lot of self-study” during the implementation project to get familiar with the new ERP system.

Providing timely and applicable training can reduce potential post-implementation issues, according to participants KUVN3, PMCA, and SLCA. Participant PMCA noted that “considerable effort for training was provided immediately to users,” and in context, SLCA commented that users “must make sure [to] attend the training.”

Moreover, providing accessible training documents from authorized third-party consultants for key users would increase the efficiency of their peer-to-peer training. In case key users cannot provide end users with adequate solutions, the issue is delivered to IT support personnel. However, the participant responses depicted that the IT support department “was not much involved with the current business process adaptation”. The GSCM practices and relevant knowledge were not transferred to them as well. From this research findings, the training process is proved to be crucial for long-term and consistent evolvement of the ERP system for GSCM practices. Training can be provided to the key users and end users prior to ERP implementation as a contingency planning to help them emerge and be familiar with the new system, which would help to increase their absorptive capacity for new innovations and reduce potential issue during subsequent implementation phases,

B) Change management strategy

Regarding change management as a strategy, SLCA highlighted the importance of change management and indicated the importance of “figuring out the root causes and implement changes to eliminate them.”

Participant SLVN also stated that a change strategy focuses on creating “resilience” and “persistent” mindset for project team members was initiated by the project manager and leaders during ERP implementation.

C) Risk management

This was another important strategy as observed from the participant responses (PMVN, PMCA, TCVN1, and TCCA). PMVN highlighted that both green supply chain practices and ERP systems are “long-haul” and “grueling” investments, in terms of finance and human resources. The Vietnam case company took almost three years to complete implementing ERP system. During the years, the company has faced several risks, the most common one is unexpected personnel replacement (maternal/parental leaves, resignation, etc.).

Regarding the Canada case company, participant PMCA discussed people risks, especially on resourcing and skill sets:

“We tried to come up with as much contingency plans as we could for the risks we would encounter, especially from the human resources and financial investment sides, which are most risky. You wouldn’t have enough people or enough budget to carry off the project till it ends.”

D) ERP system testing

Additionally, the theme of “lots of testing” was one of the strategies used to overcome challenges, as noted by participants KUVN3 and PMCA. Participant KUVN3 emphasized the importance of testing: “When you do a lot of testing, and a lot of research with the appropriate people. Nothing was abandoned; you work on something until it’s resolved.”

Longer and more integrated testing is another recommendation for future implementations. Participant TCCA emphasized the need for more focused and integrated testing:

“Understand your scenarios and actually do a full test [integrated] of your scenarios, is crucial. I think that was one of our issues is [that] we didn’t test our scenarios as thoroughly as we should have. An end-to-end test of the scenario would be great.”

E) Utilization of the right people

Participant KUVN1 stated its importance by saying that the project “need[s] to have right teams in place, at the right times.” Another business user, KUVN5, advised: “get the people that know your business, not just as the focal point” and “make sure that they are being heard and responding to what’s coming up, it is the utilization of the right people, [at right] time, [and] at the right place, and getting them more involved.” Participant SLCA noted:

“So, we need to like the vendor. We need to know that we can get along with their people that we believe that our people are knowledgeable and are going to be able to culturally fit with us in the way that we would like to work because we're going to be together. It's kind of like a forced marriage of the vendor and their consultants and all the rest of it.”

F) Encouragement mechanisms

One of the most effective but rather under-rated coping strategy is to provide sufficient encouragement mechanism. From participant responses, it does not have to be financial perks only. Because the process of ERP implementation project is “long-haul transformation” and “very exhausting”, they would prefer top-management to allow them to gain their own “peace of mind” by having self-encouragement. Participant PTMVN2 preferred to reduce stress with “recognition”, “time off”, and other mitigating actions:

“We threw small get-togethers to cheer us up, every other week, to cheer us up because we were working continuously 4-5 hours overtime every day for past months. We also have team-building vacation after the project was completed, it was lot of fun and relaxation that we needed. There also food and some bonuses that were even small, keeps us going, knowing that our efforts were recognized.”

Summary of research findings for mutual themes

This study accumulated data from 18 participants and a total of 562 minutes of interviewing time, employing a qualitative exploratory multiple-case study using an interview protocol. Participants were selected from two case companies in the Canadian and Vietnamese manufacturing industry. The data collected was triangulated based on the five ERP project role groups responses and was transcribed, and coded using QDA software NVivo 12 Pro. Based on responses of participants across five project role groups, the data was analyzed and triangulated. The exploratory analysis also identified three key mutually exclusive themes based on high frequency count from participant responses during the interviews: Motivations to implement ERP systems, critical factors influencing ERP implementation towards green supply chain management, and coping strategies for successful ERP implementation.

CHAPTER 6: DISCUSSION

Research Summary

This research was designed to collect and analyze data to improve understanding of the implications for the main research question: **What are the factors that contribute to the success and failure of ERP environmental functions?** To answer the main question, the following research questions were addressed:

- (a) What are the motivations behind the decision to implement ERP?

The case study provided the motivations to implement ERP and discovered that the strongest motivation seems to be the operational decision to synchronize the business processes into one integrated system. (Erkan and Rouyendegh, 2011; Tambovcevs and Merkuryev, 2009).

- (b) What are the critical factors influencing an ERP implementation for GSCM?

Critical factors are encountered in ERP implementation and are significant during ERP implementation (Davenport, 1998; Sumner, 2000; Somers and Nelson, 2001; Finney and Corbett, 2007; Momoh et al., 2010; Mishra and Mishra, 2011; Stanciu and Tinca, 2013). The current study also expands the existing literature on critical factors by adding two green supply chain management-related factors: environmental consciousness and compliance information.

- (c) What coping strategies are used to deal with issues or challenges during ERP implementation for GSCM?

Coping strategies and contingency planning can overcome challenges in ERP implementation (Shaul and Tauber, 2013). The study findings included five mutual coping strategies, that although are not GSCM-exclusive, align well with extant literature. Additional exclusive strategies and recommendation that are related to motivations of individual case company are also found.

Discussion of Overall Results

As indicated in the extant literature, investigations of critical factors faced during ERP implementation continue to be encouraged and evolved, even though ERP adoptions are widely expanding globally (Momoh et al., 2010). The current study's findings yield rich qualitative data that is relevant to the critical factors influencing ERP implementation success, based on the perceptions from the five participant project role groups of senior leaders, project managers, project team members, key users and third-party consultants. However, when analyzing the five ERP project role groups' responses, the current study also identified new critical factors that is more exclusive to GSCM, namely environmental consciousness and green supply chain compliance information, and these were not reported in earlier research literature. The perceptions and viewpoints of project team members and key users, who were the stakeholders of the project, were fairly more concerned with critical factors and coping strategies than the senior leaders and project managers' role groups were.

Managers employed multiple coping strategies during an ERP implementation has the ability to transform the organizational software culture. Meaning that, this transformation phase depends significantly on the top-manager commitment and communication efficiency across business units within the organization. Effective coping

strategies involve the flexibility to adapt and get used to diverse changes in order to optimize ERP system implementation outcomes and initiate positive organization innovation outcomes.

Deeper level of training for ERP systems and GSCM

Diverse training models and plans can enhance the companies' own environmental sustainability capabilities (Lipmann, 1999), especially in this case, the ERP system training. Additionally, simultaneous training on GSCM compliance information, environmental sustainability and other key aspects of the GSCM practices can greatly improve the environmental awareness of the labor force (Zhu et al., 2005).

This study finding about training strategies aligned with existing literature (Zhu et al., 2008) in a way that different thinking process that should be encourage in course of ERP implementation (including increasing of positivity and environmental awareness) will be developed and corrected by properly conducted (Bofinger et al., 2011). Better decision-making, one of the main objectives for ERP implementation, would as well be achieved as a result of proper training. Companies would have opportunities to opt for optimal green GSCM practices and develop a feasible strategic plan for maintaining environmental sustainability, instead of only keeping in pace with the industrial trend (Bansal and Clelland, 2004; Gattorna, 2010). Coupled with the important role of focal companies on extending GSCM practices (Silvestre, 2015), proper training can lead to greater endorsement and deployment of ERP systems throughout the transitioning phase. These findings can be used to develop theoretical frameworks where human factors (attitudes, motivations and behaviors) play the central role in stimulating effective ERP implementation, and as a result, positive outcomes of sustainable GSCM.

Extension to Natural Resource-Based View

Hart (1995) made an assumption when Natural Resource-Based view was first introduced, that is, pollution prevention and control are more people-oriented, rather than technology-oriented. From the results founded from the study, it can also be extended that: green supply chain management, with ERP system support, is more people-oriented, rather than technology-oriented. In fact, the crucial roles of human factors in transforming organizational culture, especially for effective SCM operations, have been recognized in the extant literature. Gattorna (2010) noted that the development new SCM strategies to replace legacy SCM and improve SCM efficiency will be easier if the competency, communications and inputs the people involved in supply chain are valued by the top management. This is specifically stated by Gattorna (2010, p.7):

“What do you think is the key ingredient in modern supply chains? The technology and the trucks? Or the people who design and run them? Supply chains may seem like uncontrollable, inanimate beasts, but they are in fact living systems propelled by humans and their behavior.”

Specifically, the human factors would be administered based on the impacts of changes on competency standards, personal objectives and level of commitment (Hanna et al., 2000), the level of top-management support for GSCM (Zhu et al., 2008), and on the level of organizational resistance to changes (Ab Aziz and Mohamadali, 2015). In one way, the human factors can be crucial for successful implementation of GSCM practices. In particularly, people’s level of comfort, confidence, positivity and trust can hinder or foster GSCM practices, and as a result,

dominantly control the evolvement and performance of ERP system implementation. On the other way, companies may be failed to realize or improperly depict the importance and benefits of ERP systems for their operations and environmental sustainability outcomes, as well as the ERP system complexity and the level of dedicated resources required for the implementation projects. The implementation of GSCM practices and ERP systems in the cases explored here has been motivated mostly by the need for operational optimization and for greater innovation (Ab Aziz and Mohamadali, 2015), to add more value in perspective of companies' client base. The improper identification of critical factors influencing ERP systems implementation and insufficient coping strategies can certainly turn ERP systems into challenging barriers for supply chains to reach positive organizational and environmental outcomes toward enhanced green supply chain practices.

Managerial Implications

This study contributes to the knowledge of supply chain management researchers and practitioners in a way that it identified the critical success factors, coping strategies and case-exclusive factors that companies need to focus on while implementing ERP systems for their GSCM practices. One of the most prerequisite for a successful ERP system implementation for GSCM is the top management support. General managers, head of ERP system department and GSCM managers should be responsible to keep track of the whole implementation progress, in order to have timely actions when issues occur, especially resource allocation and conflict issues (Wang and Chen, 2006). Additionally, planning for ERP system alignment with current business process, as well as change management for employees are much required before engaging in the new information system adoption (Maditinos et al., 2012). Properly conducted alignment process will facilitate better communication flow between business units within the organization, reduce

chances of conflicts between internal project teams and external consultants, and thus, foster ERP system implementation success (Thong, 2001).

It is worth noted that effective communication and contingency planning play crucial roles in ensuring ERP system implementation success. The ERP implementation projects should be based on company's business objectives, rather than merely meeting technical change requirements (Arthur, 2016).

A cross-functional team including representatives from all business units within organization should be set up to create an internal communication platform for GSCM information to flow smoothly and consistently within the organization (Hu and Hsu, 2010), and as a result, increase people's awareness of GSCM practices, and reduce time dedicated for the ERP system alignment process and achieve better synchronization across business processes. The cross-functional teams should include peoples specialized in ERP systems, in GSCM practices (i.e., R&D, production, purchasing, sales) and representatives from other relevant business units.

Limitations

The first limitation of this study is that participant perceptions may have gradually changed over time, including the implementation motivation and key factors effecting ERP system implementation. Meaning that their reactions and feelings might have been narrated stronger immediately after the ERP implementation. The delimitation method in this study was to ask participants multiple probing questions before main questions, to gradually call back their experience and feelings as much as possible.

The second limitation of the findings was the utilization of the semi-structured interview guide, which was used as the primary instrument for data collection. The participants were able to depict their perceptions on critical success factors and raised challenges during ERP implementation. However, the participants may have been hesitant to completely express their feelings and describe their experiences. That means in this research, it is the researcher's assumption that participants are completely honest with their responses.

Recommendations for Future Research

The rather narrow sample size of this study would produce opportunities for future research to replicate the design with various supply chains in different geographical scopes to ensure that the findings have more chances to be generalized. Longitudinal case study would be ideal to examine the implementation of ERP system from the vendor selection phase until the post-implementation phase, and to avoid possible changes in perceptions of participant experiences because of changes in time. Longitudinal studies would provide richer understanding of challenges raised from ERP system implementation, and offer diverse and extensive perspectives from the implementation project stakeholders towards GSCM.

Future research could also use quantitative methodology designs such as surveys to validate many responses from the five project role groups across multiple supply chains, or to add more project role groups, to generalize and validate the results of this current study.

Summary of research discussions

In this chapter, data triangulated and analyzed in previous chapters (4 and 5) were summarized, overall results of the study were re- interpreted for a more intuitive and holistic understanding. Theoretical contributions and reemphases on systems theories and NRBV were provided. The chapter also present managerial implications to supply chain management researchers and practitioners, focusing on the success of ERP implementation under GSCM adoption. Limitations and recommendation for future research were presented to close the chapter.

CHAPTER 7: CONCLUSIONS

The primary purpose of this study was to explore the overall research question, “**What are the factors that contribute to the success and failure of ERP environmental functions?**”

Chapter 1 described the significance of the researched phenomenon and the purposes of the study. Chapter 2 provided a foundational review of the literature regarding critical factors in ERP implementation, categories of ERP functions related to green supply chain practices and the theoretical framework that guided the data analysis effort. Chapter 3 depicted important descriptions and rationale of the chosen research methodology and study design. Chapter 4 provided overview, distinctive characteristic and potential explanation of ERP implementation case story of the two case companies. Chapter 5 presented the analysis and findings of the triangulated data. Chapter 6 presented discussion, limitations, and ideas for future research study while the current chapter (Chapter 7) closes the thesis with its key theoretical and managerial contributions.

The results of the study produce three main theoretical contribution. First, the findings expand NRBV by accentuating human roles during phases of ERP system implementation and post-implementation. Efficient identification of critical factors and coping strategies would turn ERP system into a powerful tool for successfully adopting green supply chain management, while poor identification of critical factors and coping strategies would turn ERP system into a barrier that hinder successful implementation of ERP system and green supply chain management practices. Second, the study findings call for a generation of standardized procedure for ERP system adaptation in context of GSCM, in which GSCM-embedded ERP

system process – GSCM and ERP system training – user acceptance would play central roles. Third, the study found two emergent critical factors of ERP implementation, which are environmental consciousness and green supply chain management compliance information. These two critical factors would be helpful building blocks for future researches focusing on the relationship between GSCM, environmental sustainability performance and the adoption of information technology as a whole.

The findings from this study present four key managerial contributions. First, the current study highlighted four main organizational motivations that led to ERP implementation, particularly that the operational decision to synchronize the business processes into one integrated system was the strongest motivation. Triangulating responses showed evidence that the decision to implement ERP was mainly an operational decision to synchronize the business processes into one integrated system. Second, this thesis identified four critical factors influencing ERP system implementation success toward GSCM. These are: Environmental consciousness, business-driven not IT-driven, top management commitment and green supply chain compliance information. Third, the empirical study highlights that a total of five coping strategies that were mutually taken by Canadian and Vietnamese focal companies helped to mitigate ERP system implementation challenges. These are: Proper training, change management, ERP system testing, utilization of the right people and encouragement mechanism. Triangulation of leading themes showed that these critical factors and coping strategies were consistently brought during the interviews and deeply discussed by the five participant role groups. Fourth, cultural background may also play a role in ERP implementation for green supply chain practices. For example, the Vietnamese focal company faced cultural differences when implementing a massive Western-based software product. Their challenge is exclusive to

cultural and language difference, while their strength is proper planning and willingness to adapt customized processes to ERP standardized system. While over-customization is the biggest challenge for the Canadian focal company, which has been coping with these challenges for the last 20 years after implementation, their relative failure to properly manage ERP system post-implementation is still ongoing and has to be resolved by getting rid of legacy systems and fully move to the more appropriate one. There is the acknowledgement that these challenges and mitigating actions are specific to each company situation and needs, although they might generate important recommendations for other focal companies going through the ERP implementation.

Overall, this research was conducted to seek support for the ERP implementation as an important driving force for focal companies to adopt green supply chain practices. However, the dynamics behind such an implementation is still poorly understood. Although organizations follow suggested frameworks and guidelines, the success of an ERP implementation effort requires planning for contingencies and complexity awareness, and is therefore never guaranteed. This research highlights the importance of focal companies to understand their internal process first, define what they need and prepare for the unique challenges and critical factors before they emerge. Understanding the contextual factors can allow focal companies to implement and use ERP systems as drivers for the adoption of GSCM practices that will foster supply chain sustainability performance.

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Appendix A: Interview Questions

Part 1: Interview Protocol

Informed consent and Ethical considerations: Discuss informed consent letter, ethical considerations and intention to harm no one. Secure signature

Discuss interview length and confidentiality terms.

Discuss interview audio recording process, including the conversational approach based on researcher's guided questions.

Review research background and interview purpose.

Define common terms: ERP systems, Barriers/Challenges, ERP Implementation, GSCM

Comments and Questions? Do you have any questions before we begin?

Part 2: Interview

Demographic and other Information

Date

Name

Current Job title

Job Responsibilities

Case Company Overview

Q1: Tell me about your role in your company.

Q2: Can you please tell me about the ERP implementation in your company?

Q3: Tell me about how ERP implementation was administered by the organization?

How long the ERP systems have been operating?

ERP Implementation Motivations

Q4: What were the motivations under which your organization decided to implement ERP solution?

Q5: How do you think the ERP systems implementation have been benefiting your organization so far?

Lean and Green (in case participant does know acknowledge Green SCM, provide definition of Lean SCM first)

Q6: What factors did you use to select the ERP project team members?

Q7: What factors relevant to GSCM (or lean SCM) do you think is critical for ERP implementation success?

Q8: How did your company share the visions or objectives of implementing ERP system for Green/Lean SC to everyone in the company who will have access to ERP?

Q10: To talk about lean and green management, does your company have any process or ERP functions target:

- waste management, recycling
- green product management (greener material, less toxic substances)
- green supplier evaluation

Q11: Which modules/functions in ERP system do you think is critical for greener/ leaner operations?

Implementation Issues or Challenges

Q12: Tell me about the issues or challenges you encountered during the ERP implementation.

Q13: Discuss how significant these challenges were to the organization during the ERP implementation.

Coping Strategies

Q14: What do you know about the coping strategies and mitigating actions used by the organization to deal with those mentioned issues arose during the ERP implementation.

Q15: Discuss how these strategies helped overcome the challenges encountered during the ERP implementation?

(G) Recommendations

Q16: What are your recommendations on how to improve future ERP implementations in your organization and the in Canadian/Vietnamese manufacturing industry?

Q17: Is there any further information that you would like to share with me that I may have missed during the interview?

Appendix B: Consent Form



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RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

Individual Interview

Title of Study: *“ERP System: Perceptions and Impacts towards Climate Change and Environmental Sustainability”*

Principal Investigator:

Anh Tran

Graduate Student (MSc)

Department of Supply Chain Management

Asper School of Business

University of Manitoba

[Redacted]

[Redacted]

[REDACTED]

[REDACTED]

Advisor:

Bruno S. Silvestre, PhD

Director, Transport Institute

Professor in Supply Chain Management

Asper School of Business

University of Manitoba

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

You are being asked to participate in a research study involving individual interview. Please take your time to review this consent form and discuss any questions you may have with the study staff, your friends, family before you make your decision. This consent form may contain words that you do not understand. Please ask the study staff to explain any words or information that you do not clearly understand.

Purpose of this Study

This research study is being conducted to examine what intuitive factors drive companies to implement ERP system and what challenge them to carried out smooth implementation process before figuring out solution to successfully finalize their ERP system.

Participants Selection

You are being asked to participate in this study because your firm has successfully implemented an ERP system. As opposed to firms who failed at implementation, your firm has obtained more diversified experiences with the system, and has been through a series of tried and error processes to reach the most optimal customization for your system. Therefore, not only you would understand more about potential weaknesses of the ERP system, but you would also have insightful opinions on how the ERP system helps your firm to advance the operations processes. By participate in this study, you would contribute to provide new insights into the ERP functions that companies can adopt to prevent and reduce wastes and carbon emissions, and yield inspirations for companies to overcome difficulties and to increase theirs fit for future ERP system implementation.

A total of 12 participants will be asked to participate.

Study procedures

- The method of data collection for this study will be individual interviews. Individual interview is discussion with people who know something about the topic of interest. It is ways of finding out people's thoughts and ideas about a specific topic.

- Participation in the study will be for one 30-minute session.
- As principal investigator, I will be conducting the interview and I will ask some questions relating to your experience with the ERP system and its linkage to lean and green supply chain management. These questions will help us to better understand a more diversified range of drivers and barriers to help companies increase their fits for future environmental ERP implementation, and how a ERP system can help companies to preserve the environment by preventing and controlling pollution and optimizing its operation processes to be leaner and greener.
- The sessions will be audio-taped and the audio-tapes will be transcribed by the principal investigator to ensure accurate reporting of the information that you provide.
- Transcribers will sign a form stating that they will not discuss any item on the tape with anyone other than the researchers.
- No one's name will be asked or revealed during the individual interviews. However, should another participant call you by name, your name will be removed from the transcription.
- The audio-tapes will be stored in locked files before and after being transcribed. Tapes will be destroyed within 30 days of completing the transcriptions and the transcriptions will be destroyed 30 days after the completion of this evaluation.
- Written report of this research project will be provided to the participants after the completion of its final draft (expect July 15, 2019)

Risks and Discomforts

There are no anticipated physical and emotional risks to participants, because participants are experts/professionals being asked to discuss operational developments in their field and the topic itself is a non-sensitive one.

Benefits

Being an interview participant may not help you directly, but information gained may help other people or firm planning to implement ERP system into their firm's operations process in the future.

Costs

There is no cost to you to attend the individual interview.

Honorarium for participation

You will be rewarded with a CAD 10.00 beverage coupon per completed study visit upon termination of your participation in this research study.

Confidentiality

We will do everything possible to keep your personal information confidential. Your name will not be used at all in the study records. A list of names and contact information of participants will be kept in a secure file so we can send you a summary of the results of the study. If the results of this study are presented in a meeting, or published, nobody will be able to tell that you were in the study. Please note that although you will not be identified as the speaker, your words may be used

to highlight a specific point. The collection and access to personal information will be in compliance with provincial and federal privacy legislations.

Audiotapes of the individual interview will be typed and used to prepare a report. The audiotapes and typed notes will be kept for 03 months in a secure locked file cabinet and office. Only the principal investigator and her advisor will have access to them and know your name.

Some people or groups may need to check the study records to make sure all the information is correct. All of these people have a professional responsibility to protect your privacy.

These people or groups are:

- Quality assurance staff of the University of Manitoba who ensure the study is being conducted properly.

All records will be kept in a locked secure area and only those persons identified will have access to these records. If any of your research records need to be copied to any of the above, your name and all identifying information will be removed. No information revealing any personal information such as your name, address or telephone number will leave Department of Supply Chain Management, Asper School of Business, University of Manitoba.

We may wish to quote your words directly in reports and publications resulting from this. With regards to being quoted, please check yes or no for each of the following statements:

Researchers may publish documents that contain quotations by me under the following conditions:

☐ Yes ☐ No	I agree to be quoted directly if my name is not published (I remain anonymous).
☐ Yes ☐ No	I agree to be quoted directly if a made-up name (pseudonym) is used.

Voluntary Participation/Withdrawal from the Study

Your decision to take part in this study is voluntary. You may refuse to participate or you may withdraw from the study at any time before the expected completion date of this research project: August 15th, 2019.

Questions

If any questions come up during or after the study contact the principal investigator and/or her advisor. Our contact information is provided on Page 01.

For questions about your rights as a research participant, you may contact The University of Manitoba, Bannatyne Campus Research Ethics Board Office at (204) 789-3389.

Consent Signatures:

1. I have read all 04 pages of the consent form.
2. I have had a chance to ask questions and have received satisfactory answers to all of my questions.
3. I understand that by signing this consent form I have not waived any of my legal rights as

a participant in this study.

4. I understand that my records, which may include identifying information, may be reviewed by the research staff working with the Principal Investigator and the agencies and organizations listed in the Confidentiality section of this document.
5. I understand that I may withdraw from the study at any time and my data may be withdrawn prior to publication.
6. I understand I will be provided with a copy of the consent form for my records.
7. I agree to participate in the study.

Participant signature_____

Date _____

(day/month/year)

Participant printed name: _____