

The Application of Extranet in the Supply Activities

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ABSTRACT

The advent of Internet has deeply changed the way we live. More than just moving our daily reading, shopping and entertaining to an on line environment, the Internet has been regarded as the catalyst for companies to reconsider their business modes and processes. A new business model: e-business, was then born. The size of this new model is remarkable and it keeps growing nowadays.

The extranet, a level of connection of the Internet, is a relatively young business to business (B2B) technology. It has gained a lot of attention from both managers and researchers, since it possesses plenty of potential benefits.

This thesis studies the particular case of the extranet applied to the supply activities occurring between the buyer and its established suppliers. The objectives, goals and outcomes that companies have when implementing the extranet are discussed as well as the factors that influence the implementation process.

A multi-case study strategy was chosen where three multinational manufacturers were selected. In order to get the necessary data, people working in the purchasing areas of these companies were interviewed.

As a result, we obtained that the extranet brings benefits to organizations, merely in terms of money savings. Furthermore, it was found that not all of the obtained outcomes were preset. As a final point, “people” was found to be a fundamental factor for the successful implementation of the extranet as well as arduous to deal with.

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-Wei Guan & Cesar Inzunza

On a personal level, a hearth warm thank you goes to my deeply loved parents. Thank you for always being there to support me. You show me what matter in life, and you give my life meaning.

-Wei Guan

Mi más profundo agradecimiento a las personas que con su amor y ejemplo me han guiado por el caminar de mi vida: mis queridos padres. También una especial dedicatoria a mis hermanas y abuelos que siempre han estado ahí para mí. Till dig också, min alltid leende lilla "güera" som har stöttat mig helt i bade vått och torrt.

-César M. Inzunza

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1. Introduction

In order to give the reader an introduction to the areas significant to our study regarding the application of extranet in supply activities, a background in e-business –a growing business model, is first provided. Then, the B2B setting of e-business is particularly discussed since it has been rapidly growing over the years. In addition, the influence of the extranet in the business activities is presented. Finally, the concepts of supply chain management and e-procurement are brought into discussion.

1.1 Background

1.1.1 The Internet and Development of E-business.

“Paper is no longer a big part of my day. I get 90% of my news online, and when I go to a meeting and want to jot things down, I bring my Tablet PC. It's fully synchronized with my office machine so I have all the files I need.”

-Bill Gates

As it is seen from Gates' quote, the Internet is a revolutionary invention that has changed the way we conduct our everyday activities. For instance, how we get our news, play, shop and conduct business are some daily practices that have been influenced by this technology. Kim and Ramkaran (2004) state that the Internet can be considered as the catalyst for the radical change from business context and business process viewpoint. The Internet can also be a way to achieve competitive advantage since it offers all process manufacturers the attractive possibilities of differentiating themselves from their competitors in a commodity market (Rao, 2002). The Internet has brought then a new model of business that is taking place: e-business¹. The size of this new model is remarkable, research conducted by Business Communications Company Inc. (bccresearch.com) said that in 2005 revenues from e-business operations were expected to exceed \$3 trillion.

Within e-business exists several different categories, Phan (2002) identifies some of these categories based on the various types of trading partners, for example: B2B (business-to-business), B2C (business-to-customers), C2B (customer-to-business), C2C (customer-to-customer), Government to Citizen (G2C) and Citizen to Government (C2G). So, how can e-business be defined then? Rao (2002) defines e-business as connecting critical business systems directly to the organizations' customers, employees, intermediaries, vendors and suppliers, through intranets, extranets and the Internet –although no single definition of the term has become accepted as the universal norm (Clegg et al., 2001).

According to Rao's (2002) definition of e-business, we can see that besides Internet, there are two other connection methods: intranet and extranet. The intranet is a private network used exclusively within a company or organization. It uses Internet technology, but does not necessarily function through the Internet. A company may use an intranet to

¹ <http://www.cio.com/research/ec/edit/b2babc.html>. “The ABCs of B2B” by Elana Varon CIO Magazine. evaron@cio.com.

facilitate communications among its members and deliver information and services to employees (Vlosky et. al 2000). The extranet is a collaborative network that links businesses with suppliers, customers or other partners that share a common goal (Watson and McKeown 1999). Extranets can facilitate the sharing of information, decrease operating costs, save time and resources, improve customer service, and generally improve business-to-business relationships (Vlosky et. al 2000).

1.1.2 The Business-to-business (B2B) Setting of E-business

It has been mentioned before that the Internet has brought the opportunity to do e-business in settings like Business-to-Business (B2B) and Business-to-Consumer (B2C). B2B is of special interest since it far exceeds B2C e-commerce both in the volume of transactions and rate of growth. Datamonitor (datamonitor.com) –a research company, predicted that global business-to-business was to reach \$5.9 trillion by 2005². Along with B2B e-business, B2B technologies and applications have evolved during the time. According to Medjahed *et al* (2003), B2B applications refer to the use of computerized systems –web servers, networking services and databases, to conduct business among different partners. B2B applications were among the first ones to take advantage of the advances in computer networking. Although these applications have been around for a while, they reached their full potential with the emergence of the Web (Medjahed *et al*, 2003).

B2B technologies is not a very new thing, they have existed for at least as long as the Internet. During its existence, the former have been through a period of evolution. The first form of electronic communication between companies was EDI (Electronic Data Interchange). It was the computer-to-computer exchange data and it allowed companies to form closer ties with its customers and suppliers (Chan and Davis, 2000). The problem with EDI has been that the expense, complexity, lack of flexibility, and limited functional scope of its implementation has generally limited EDI use to large enterprises with large transaction volume and an ability to incur in large investments (Kallioranta and Vlosky, 2004). So, even companies that can afford to have this system do not realize the full potential savings because many of their business partners can not afford to install it. Due to all these inconveniences organizations moved onto a different technology: the extranet (Chan and Davis, 2000). Extranets enable companies to create proprietary and customized information flows between themselves and their business partners. In addition, they are considered to be more economical than EDI systems (Kallioranta and Vlosky, 2004). Extranets also provide more flexibility since they can assist companies in doing other forms of communication –email, multimodal marketing, products and company profile, among others (Chan and Davis, 2000).

² <http://www.thewhir.com/features/security-spending.cfm> “E-Business Growth Demands Security Spending” by Rawlson O'Neil King, *theWHIR.com*

1.1.3 Extranet in B2B Business Models

Dai and Kauffman (2004) identify two types of B2B e-commerce business models: one is to use the extranets to connect the buyer and its suppliers with a closed network. And the other one is to create an open network for buyers and suppliers which is called electronic market. When the extranet is applied to B2B activities, companies can use it to make or save money by: managing inventory more efficiently, adjusting more quickly to customer demand, getting products to market faster, cutting the cost of paperwork, reigning in rogue purchases and obtaining lower prices on some supplies³. Therefore, the extranet can enhance supply chain efficiency by providing real-time information regarding product availability, inventory level, shipment status, and production requirements (e.g. Radstaak and Ketelaar, 1998). All the advantages offered by the extranet stimulate managers to rethink business strategies, how services are delivered and how the company is connected with customers, consultants, contractors and suppliers (Chan and Davis, 2000).

1.1.4 Supply Chain Management

Lambert and Cooper (2000) point out that there is a significant shift of modern business management paradigm. And the shift is that businesses and organizations no longer compete as autonomous entities, but rather as supply chains. In fact, Lambert and Cooper (2000) are not the only authors that have this kind of argument. Souza et al (2000) even state that “competition is no longer one company against other companies, but one supply chain against other supply chains.”

According to Presutti, Jr (2003), a supply chain “encompasses all activities associated with the flow and transformation of goods from the raw materials stage through to the end user, as well as associated information flows. Supply chain management is the integration of these activities through improved supply chain relationships to achieve sustainable competitive advantage”. From the definition we can see that a variety of business activities are involved in the supply chain. Such as raw material purchasing, material storing and transportation within the company, final product or service distributing and so on. On average, firms invest 70% of sales revenues in supply chain related activities from the very beginning of material purchase to the distribution of final products or service to customers. The author also mentions that the management of supply chain requires that all the links should be strong and well integrated, since there are many organizations and activities involved (ibid).

The supply chain management is crucial in traditional business, and it also plays a significant role in e-business (Swaminathan and Tayur, 2003). According to Keenan and Ante (2002), during the period from 2002 to 2007, \$223 billion can be potentially saved with reducing the transaction, production and inventory costs by cooperating supply chain partners over the Internet. Extranet, as one way of utilizing the Internet, can be applied to manage the whole range of operational activities within supply chain,

³ <http://www.cio.com/research/ec/edit/b2babc.html>. “The ABCs of B2B” by Elana Varon CIO Magazine. evaron@cio.com.

including inbound transportation, inventory and outbound transportations (Lancioni et al., 2003).

1.1.5 E-procurement: A Way to Take Advantage of the Extranet.

A way of taking advantage of the benefits provided by the extranet is e-procurement. According to Davila et al (2003), more than 60% of organizations who have e-procurement software are corporations, among those, 71% are Fortune 500 size. E-procurement has even been considered as the most important element of successful operational performance for big companies (Davila, 2003). Companies believe that there are many benefits associated with the application of e-procurement systems. These benefits have been well estimated by supply chain management literature (Presutti Jr, 2003). According to Davila et al. (2003), the main advantages of using e-procurement are: reduction of administrative cost, reduction of material cost, shorten the order fulfillment, lower order cycle time, better inventory level and preparing companies for enhanced technological cooperation with business partners. The popularity and large number of benefits associated with e-procurement give us the motivation to study it further.

1.2 Problem Discussion

After having taken a look at the global scenario on e-business, extranet and supply chain management, we will now talk about some aspects about previous studies that are related to our subject. A large number of the reviewed studies have focused on investigating how companies are using extranet or describing the benefits which can be gained through the implementation of it along the whole supply chain. For example, studies by Vlosky et al. (2000) examined how the extranet impacts business practices and relationships from an organization perspective. Anandarajan et al. (1998) concluded how the extranet has been used by one specific company to significantly reduce operating costs through a case study.

We became specifically interested in the supply activities taking place between the buyer and its already chosen immediate supplier(s). In other words, the present supplier-buyer interface of the supply chain. The motivation for studying what mentioned before lies on the importance that it has. Presutti Jr. (2003) states that purchasing is the key link that sets the foundation to the others in supply chain. He also states that purchasing of goods and services have a great potential impact on competitiveness and profitability since it is where most of the expenditures on supply chain activities exist.

Our study is also motivated by Volsky and Kallioranta's (2004) argument. They say that "there is a gap in research regarding factors influencing successful extranet implementation." Although few researches have been done to find out factors that influence extranet implementation, it does not mean that this issue is not important. A study conducted by Clegg et al. in 1997 shows that 80 to 90 percent of Information Technology investments did not meet their objective of performance, mostly due to non technical reasons. They also found that change management, range of human and organizational issues, the role of managers and end-users are critical factors affecting IT implementation (Clegg et al, 1997).

Based on the above statement, our study will focus on investigating the application of extranet within the company's supply activities, and identify the factors influencing successful extranet implementation. In addition, there is increasing recognition in recent years that the procurement function has much strategic relevance with the competitiveness of manufacturing firms (Pujawan and Goyal 2005), thus our interest to focus on this type of companies.

1.3 Research Problem

The purpose of this study is to get a better understanding of the application of extranet in the supply activities of companies within the manufacturing industry. In order to explore this we have stated the following research problem:

How can the application of extranet in the supply activities taking place in the manufacturer-supplier interface be characterized?

In order to solve this problem, first we need to find out what does the supply activities look like, then investigate the motivation and expectation for companies to implement extranet in supply activities. We are also interested in examining the outcome of applying extranet. Finally, we will look at the factors which influence the implementation of extranet in supply activities. Hence, the following four research questions are presented:

RQ.1: How can the supply activities taking place in the manufacturer-supplier interface be characterized?

RQ.2: How can the goals and objectives for implementing extranet in the supply activities taking place in the manufacturer-supplier interface be characterized?

RQ.3: How can the perceived impact of extranet in the supply activities taking place in manufacturer-supplier interface be characterized?

RQ.4: How can the internal and external factors that influence the implementation of extranet in the supply activities be characterized?

2. Literature Review

2.1 Introduction

In this section, literature relevant to the areas that concern our study will be presented, with the specific purpose of building the theoretical base for this study. As it was mentioned in chapter 1, we are especially interested in the supply activities taking place between the buyer and its current supplier(s). Moreover, the influence that extranet can have on the mentioned activities is as well of our interest. The procurement comes to our attention at the first place since it is the process which links buyer and supplier together (Novak and Simco, 1991). Then, industrial buying behavior is considered since it looks at how industrial organizations (e.g. manufacturers) acquire industrial goods and services (Baptista and Forsberg, 1997). Finally, we will deal with more than the buying process by taking a look at some certain stages of supply chain management. According to Giunipero and Brand (1996), the purchasing activity is one of the corporate functions that are affected by the changes occurring to SCM. And they point out that purchasing has already been evolved to SCM in many cases. So we feel that a better understanding of supply activities can not be obtained without taking a look at the area of SCM. Therefore, literature concerning the following three areas will be reviewed: procurement, industrial buying behavior and supply chain management.

As a first step we will look at the definition of procurement, the activities of the procurement process and the categories of procurement. Secondly, literature concerning the industrial buying behavior, specially, the buying process and buying situation will be discussed. Then, we will take a look at the supply chain management where the supply activities are involved. Finally, the goals and objectives of adopting extranet, as well as the internal and external factors that are affecting the implementation of extranet in supply activities, are illustrated.

2.2 Procurement

According to Novack and Simco(1991), procurement is a complex process that is difficult to define at a times. In a narrow sense, procurement can be seen as the act of buying goods and services for the company. In a broader perspective, it is the activities of obtaining goods and services for the company. To formalize the definition, procurement can be defined as “all the activities necessary to acquire goods and services consistent with user requirements” (Novack and Simco, 1991).

2.2.1 Procurement Process

Research made by Novack and Simco (1991) identify some activities for the procurement process which are applicable to goods and service industries. These activities are:

1. Identify or reevaluate needs.

A procurement transaction is initiated to response a user’s need which can be a new or existing one. The user is usually an individual person or department within the firm. In

some circumstances, the user's need should be reevaluated because they change. It makes no sense to buy something that the company does not need.

2. Define and evaluate user requirements.

Some requirements must be represented by several measurable criteria after the needs have been determined. By using these criteria, the staffs that are responsible for the procurement task are able to communicate user's needs with potential suppliers.

3. Decide to make or buy.

Before making the decision to buy from external suppliers, the buying firm may also need to consider whether to buy or make the product or service. However, even if the buying firm chooses to make it themselves, they still need to purchase some type of inputs from other companies.

4. Identify type of purchase.

The type of purchase will determine the complexity and the amount of time needed to carry out the procurement process. There are three types of purchases: (1). A straight re-buy or routine purchase which is the most common case of industrial procurement. Buyers usually have a lot of experience on dealing with this kind of situation. (2). A modified re-buy may be caused by some recent changes of internal and external situations. It requires a change of existing supplier or input. (3). A new buy which results from a user's new need, where no experience is available at hand.

5. Conduct market analysis.

Knowing the industry environment where the buying firm competes in will help the procurement professionals to determine many critical issues like the number of suppliers, the bargaining power of suppliers, and which method of buying might be the most effective –one-negotiations, competitive bidding, among others.

6. Identify all possible suppliers

This activity involves the identification of all the possible suppliers. One important thing to this activity is the inclusion of some new suppliers that the buying firm has not used before into the pool of possible suppliers.

7. Prescreen all possible sources

After revising the user's requirements it is possible to identify which ones are demands and which are desires. Demands refer to those characteristics that are critical to the user while desires allude to those features that are not as critical. With this activity it is possible to reduce the number of potential suppliers to the ones that can satisfy the user's demands.

8. Evaluate remaining supplier base

After reducing the number of possible suppliers, all the left suppliers have the potential to meet the user's need. Now it is the time to decide which supplier(s) can best meet the user's needs.

9. Choose supplier.

This activity requires the final decision of which supplier(s) will be chosen. This activity decides the relationship between the buying company and both, selected and non-selected supplier(s).

10. Deliver product /performance service

This activity occurs with the attempt to satisfy the user's needs. The end of this activity also triggers the recording of transaction data for the next activity.

11. Post-purchase/Make performance evaluation

Once the products have been delivered or service has been preformed, making an evaluation about the supplier's performance is quite necessary. A few questions should be asked, such as has the supplier really satisfied user's needs with a reasonable price? Was the product delivery on time? The evaluation is also a control activity, if the supplier's performance did not meet user's expectations, the causes must be identified and proper corrective action should be taken (ibid).

2.2.2 Categories of Procurement

According to Gebauer et al. (1998), procurement "encompasses all activities involved in obtaining material and services and managing their inflow into an organization toward the end user". Procurement is positioned between an organization's internal users' needs of material to carry out their tasks and external suppliers providing goods and service. One of procurement's functions is that it has to bridge multiple gaps with the objective to keep the balance of participants' goals and manage external and internal relationships simultaneously (Gebauer et al., 1998).

Gebauer et al. (1998) also distinguish three categories of procurement according to the types, users, and the value of goods purchased.

- Procurement of raw material and production goods.

This type of procurement usually happens at a high frequency and is characterized by large purchasing quantities and specifications. Just-in-time (JIT) delivery is often regarded as a critical factor.

- Procurement of maintenance, repair, and operating (MRO) supplies.

Procurement of MRO supplies refers to the buying of some low cost unit with low volume, but the buying frequency is relatively high. One example of MRO purchase is the acquirement of office supplies.

- Procurement of capital goods and maverick.

Procurement of capital goods and maverick procurement deal with the purchasing of goods of high value but low frequency, such as get a new workshop. In some cases, it can also be the procuring items outside the regular purchasing process just because of emergency requirements.

2.3 Industrial Buying Behavior (IBB)

According to Johnston and Lewin (1996), the interests in understanding organizational buying process began to increase dramatically in the late of 1960s. In 1967, Robinson, Faris and Wind published their famous book <<Industrial Buying and Creative Marketing>>, in which they presented a model of “the industrial buying process” and the “buygrid framework”. Five years later, Webster and Wind (1972) published their “general model for understanding organizational buying behavior”. One year after that, in 1973, Sheth introduced his "model of industrial buyer behavior." These three works together built the conceptual foundation for the study of organizational buying behavior (Johnston and Lewin, 1996).

Many other authors tested or extended the three original models mentioned before. For example, Wind and Thomas (1980) categorizes the IBB into three major areas: the buying center, the buying process and factors affecting the organizational buying center and process. Anderson et al. (1987) empirically explored Robinson, Faris, and Wind's (1967) theory of buyclasses in order to determine whether a large number of companies' purchases fit the description of buy-class framework.

The works done by Robinson, Faris and Wind (1967), Webster and Wind (1972), and Sheth (1973) were regarded as the three original models in industrial buying behavior (Johnston and Lewin, 1996). Therefore we will review each of them, but only examine the contents which relate to our study target –supply activities, such as buying process and buying situations.

2.3.1 Robinson, Faris and Wind (1967) Model

2.3.1.1 The Buygrid Framework

The buygrid conceptual framework developed by Robinson, Faris, and Wind (1967) consists of eight buyphases and three buyclasses, which are presented in Table 2.1

Table 2.1 Buyphases and buy classes

BUYPHASES	BUYCLASSES		
	New Task	Modified-Rebuy	Straight-Rebuy
1. Anticipation or recognition of a problem (Need) and a General Solution			
2. Determination of Characteristics and Quantity of Needed Item			
3. Description of Characteristics and Quantity of Needed Item			
4. Search for and Qualification of Potential Sources			
5. Acquisition and Analysis of Proposals			
6. Evaluation of Proposals and Selection of Supplier(s)			
7. Selection of an order Routine			
8. Performance Feedback and Evaluation			

Source: Adapted from Robinson et al. (1967, p14)

According to Robinson et al (1967), a short description of these eight phases is presented below:

Phase 1: Anticipation or recognition of a problem (Need)

There must be a trigger which sets the procurement process in motion. The triggers may come from the buying organization in the form of problem recognition, or they may come from a potential supplier who anticipates a need within the buying organization. Phase 1 consists of two parts: the recognition of a problem and the awareness of the solution. Problem recognition has several sources: self inventory runs low, customers' new requirements that lead to the redesign of product, a new contract signed by a salesman and so on.

Phase 2: Determination of the characteristics and quantity of the needed item.

The decision maker in this stage must decide how the problem is to be solved in a specific way. They need to narrow down the problem area so that more precise analysis is feasible. Here are some sample questions that should be solved before the organization move to the next buying phases: What application requirements must be met? What types of goods and services should be considered? In what quantities?

Phase 3: Description of the characteristics and quantity of the needed item.

This phase is an extension of phase 2 and translates the needs into a specific solution which can be communicated to others. Descriptions such as source selection, price validation must be detailed so that they can be the basis for action of people both inside and outside the buying organization.

Phase 4: Search for and qualification of potential sources

At this stage, the buying organization shifts from search for alternative ways to satisfy a need to search for the alternative suppliers. Alternative sources are screened and evaluated. Sometimes, the searching just requires identifying a preferred source from a reference list. On other times, the searching may require an extensive seeking to find appropriate suppliers and consideration of which supplier(s) are qualified. No matter under which situation, the result of phase 4 is that the buying organization has decided which suppliers will be regarded as the potential vendors.

Phase 5: Acquisition and analysis of proposals.

After the potential vendors have been selected, the buying organization requests the specific proposals. In a standardized purchase, this phase just involve checking a catalog or call the suppliers to get information about prices or delivers. However, in the complex cases, the interaction between buyer and supplier(s) may involve a series of counter-proposals and new offers, this activity lasts over months. In many cases, phases 4 and phase 5 happen concurrently, so they become undistinguishable.

Phase 6: Evaluation of proposals and selection of suppliers

Various offers from potential vendors are analyzed and weighed. When the buying organization accepts one or more supplier(s)' offer(s), negotiations concerning prices, terms, delivers or other aspects of the offers are conducted.

Phase 7: Selection of an order routine.

The procurement process is completed until the item is actually delivered and accepted by the buying organization. So there are some remaining activities that should be directed and monitored. External activities involved in the order routine are: forwarding the purchase order to vendor(s), reporting securing status, receiving, inspecting and approving of invoices of payment. Order routine also includes two types of internal activities: reporting the status to using department and inventory management.

Phase 8: Performance feedback and evaluation.

An evaluation occurs after the purchased items are used. By reviewing questions like “How well the purchased product solved the problem and how well the vendor himself performed”, the buying organization knows how to handle procurement problems more effectively in the future (ibid).

2.3.1.2 Characteristics of buying situations

Besides the eight buying phases, Robinson, Faris and Wind (1967) also define and characterize the three buying classes which can also be called buying situations. There are three buying situations: new task, modified rebuy and straight rebuy. Each type of buying situation can be characterized according to newness of the problem, information requirements and consideration of new alternatives.

- New tasks:

A requirement or problem that has not arisen before, a lot of information is needed. This situation happens infrequently. However it is very important to decision makers, since it sets the pattern for more routine purchasing later on.

- Straight rebuy:

The buying organizations have much relevant buying experience, so little information is needed. Although the price, delivery time and many other aspects may be different from time to time, a new source of supply does not need to be considered.

- Modified rebuy:

A modified rebuy may be generated from a new task or straight rebuy. The buying alternatives are known, but they changed. So some additional information is needed.

To summarize, the three basic types of buying situations can be characterized as shown in Table 2.2

Table 2.2 Distinguishing Characteristics of Buying Situations

Type of buying situations	Newness of the problem	Information Requirements	Consideration of New Alternatives
New Task	High	Maximum	Important
Modified Rebuy	Medium	Moderate	Limited
Straight Rebuy	Low	Minimal	None

Source: Adapted from Robinson et al. (1967, p25)

2.3.2 Webster and Wind (1972) Model

The fundamental statement of Webster and Wind's (1972) model is that: "organizational buying is a decision-making process carried out by individuals, in interaction with other people, in the context of a formal organization" And the organization is influenced by some internal and external factors. Thus, the four categories of variables: individual, social, organizational and environmental, which determines the industrial buying behavior. Within each category, there are two kinds of variables: task variables that are related to the buying problem directly, and non-task variables that extend beyond the buying problem.

When it comes to our study's interest: the buying process, Webster and Wind (1972) identify the following five stages which must be performed to solve the buying problem:

- (1) Identification of need.
- (2) Establishment of specifications.
- (3) Identification of alternatives.
- (4) Evaluation of alternatives.
- (5) Selection of suppliers.

2.3.3 Sheth (1973) Model

Sheth (1973) presents a complex model that contains a large number of variables and complicated relationships among them. He perceives that the industrial buying behavior contains three aspects: psychological world of the individual involved in buying decisions, conditions which precipitate joint decision among individuals, and the process of joint decision making. His model intends to explain and predict supplier or brand choice in industrial buying behavior and emphasize that it is necessary to research the psychological factors of individuals within the organization (Sheth, 1973).

2.4 Supply Chain Management

2.4.1 Definition of Supply Chain and SCM

A widely used definition of supply chain is: "the set of entities involved in the design of new products and services, procuring raw materials, transforming them into semi-finished and finished products, and delivering them to the end customer" (Swaminathan and Tayur, 2003). A supply chain is "an integrated system which synchronizes a series of inter-related business processes in order to: (1) acquire raw materials and parts; (2) transform these raw materials and parts into finished products; (3) add value to these products; (4) distribute and promote these products to either retailers or customers; (5) facilitate information exchange among various business entities (e.g. suppliers, manufactures, distributors, third-party logistics providers and retailers)". The aim of the

supply chain is to enhance operational efficiency and profitability –thus the competitive position of an organization and its supply chain partners (Min and Zhou, 2002).

The term SCM has been used to refer to the attempts to integrate suppliers, logistics functions and transportation providers to efficiently and effectively manage the Supply Chain (Wisner and Tan, 2000). More concisely, Supply Chain Management is defined by the Global Supply Chain Forum (GSCF) as: “The integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders” (Lambert and Cooper, 2000).

A large number of researches have been conducted in the area of SCM hence leading to a great progress in the understanding of its essence. In addition, many different fields (e.g. operations management, organizational theory, logistics and transportation, purchasing and supply, marketing, among others) have contributed to the enrichment of the SCM literature (Paulraj and Chen 2004). We had gone through some of the literature concerning SCM, a presentation of these reviewed articles is given in the following section.

2.4.2 The SCM Literature

Tan (2001) reviewed more than 100 articles that were published in top journals along two separate paths: purchasing and supply perspective, as well as transportation and logistics perspective. He also states that these two separate paths eventually merged into a common body of literature: SCM. The former perspective relates to the functions of purchasing and supply management of the industrial buyers, whereas the latter perspective evolves from the functions of transportation and physical distribution of the wholesalers and retailers. In general, he found that most of the recent literature on SCM addresses the purchasing and supply perspective (Tan, 2001).

2.4.2.1 SCM: More than a New Name for Logistics

In order to compare the concept of SCM to a contemporary understanding of integrated logistics management, Cooper, Lambert and Pagh (1997) developed a new conceptual framework. The general structure of the framework is firstly presented, followed by a detailed discussion of each element of the structure. The three interrelated elements the authors identified are: supply chain structure, business processes and the supply chain management components. In addition, the model is applied into a firm’s scenario to illustrate the interrelationship of all the elements involved. The authors put a particular emphasis on the integration of the business processes and functions across the supply chain at both levels: intra and inter-organizational.

2.4.2.2 Characteristics of SCM and its Implications to Purchase and Logistics.

Cooper and Ellram (1993) present in their article a model that contrasts the SCM and the traditional channel approach. They see SCM as to be between fully-integrated vertical systems and those where each member of the channel operate independently from each other.

Two of the characteristics that the SCM approach includes are: inventory management approach and the speed of physical and information flows within and between entities (speed of operations).

Inventory management approach deals with reducing the redundant inventory along the supply chain by having a channel-wide management of inventories. The speed of operations refers to the impact that the use of information systems like EDI or the extranet can have on the operations flow (e.g. reduced order cycle times on the purchasing side). (ibid)

2.4.2.3 Towards a Theory of SCM: Constructs and Measurements

As mentioned before, the literature of supply chain management has been contributed by many fields, including purchasing and supply, logistics and transportation, operational management, marketing, organizational theory, management information system and so on (Chen and Paulraj, 2003). By recognizing the pressing need for clearly defined constructs and conceptual frameworks for SCM, Chen and Paulraj (2003) examined over 400 articles from the diverse disciplines mentioned above in order to contribute to the development of SCM constructs with an initial set of measurements. They consolidated relevant findings and integrate them into a research framework, as depicted in Figure 2.1

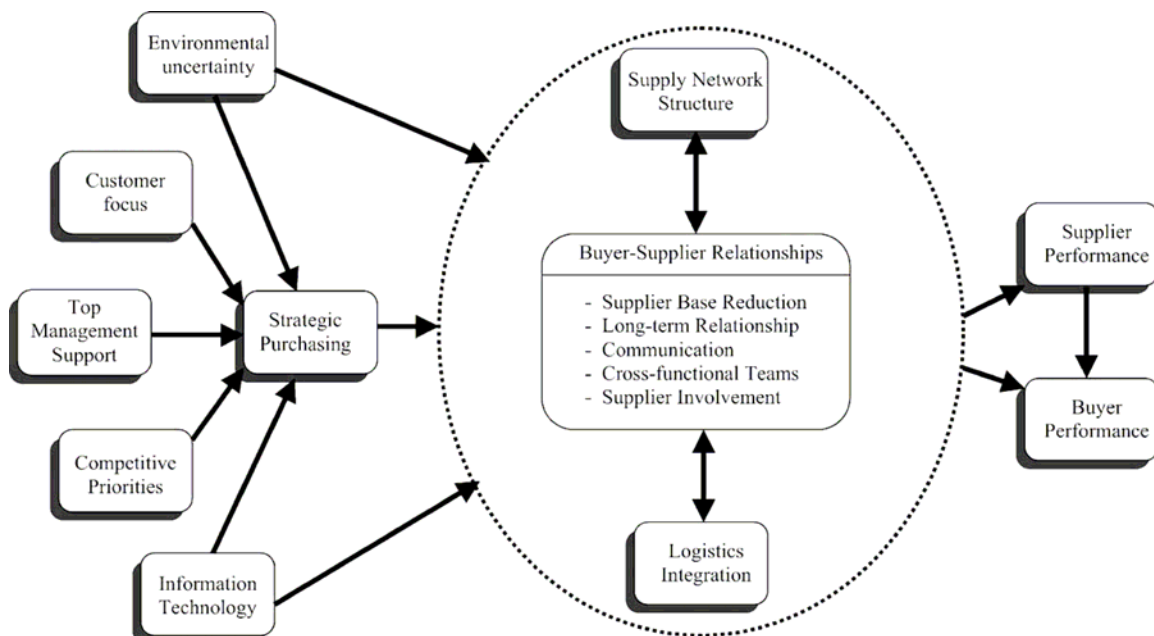


Figure 2.1 A framework of supply chain (Chen and Paulraj, 2003)

Among the numerous theoretical determinants of supply chain management, Chen and Paulraj (2003) put their attention to the buyer-supplier dyadic, since they found it to be of huge importance to the effective management of the supply chain. The buyer-supplier dyadic can be represented by a company's supply chain as shown in Figure 2.2

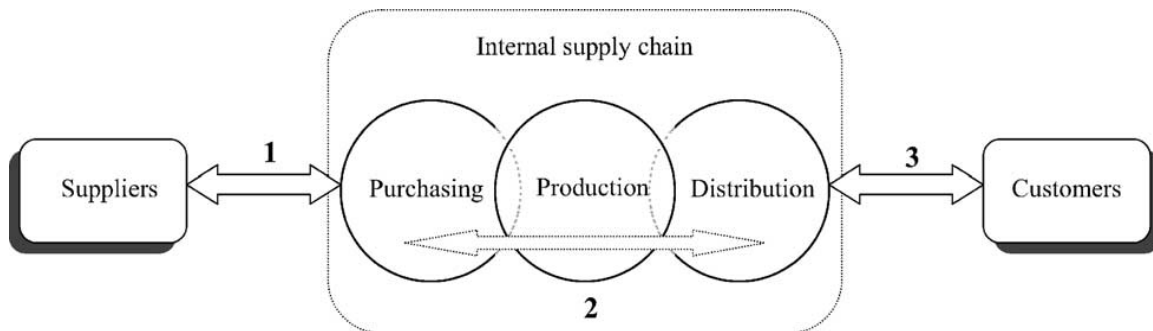


Figure 2.2 The buyer-supplier dyadic (Chen and Paulraj, 2003)

The framework showed in Figure 2.2 incorporates some key aspects of the buyer-supplier relationship including, supply base reduction, long-term relationships, communication, cross-function teams, and supplier involvement. What is more, the logistic integration is included to explore the integration of information and materials along the supply chain. The previously mentioned key aspects are also discussed by Chen and Paulraj (2003):

- Supply base reduction

Traditional buyer-supplier relationship has shift from the adversarial relationship to the use of a limited number of qualified suppliers. This action provides many benefits including short notice, reduced inventory management cost, volume consolidation and quantity discounts and increased economies of scale.

- Long term relationships

Supplier contracts become long term, increasing number of suppliers are requested to provide information regarding their processes, quality performance, and even cost structure. Through close relationships, supply chain partner are more willing to share risks and rewards.

- Communication

Frequent, genuine, and involving personal contacts are considered as effective inter organizational communication. In order to solve problems, buyers and suppliers must be willing to share sensitive information.

- Cross functional teams

Using cross functional teams is becoming a common practice in supply chain management practices. It has been identified as a critical contributor to the success of supplier selection and product design. Cross functional teams are organized either around the material being purchased or according to the suppliers' needs. Then team members can interact with their supplier counterparts.

- Supplier involvement

Study results show that supplier accounts for approximately 30% of quality problem and 80% of product lead-time problems. Extensive documents have recorded the benefits of integrating suppliers in the product development process and business strategic planning.

- Logistics integration

Effective logistics guarantee the right product arriving at the right place and time. Reducing inventory level is a typical example which requires closely coordinated exchange of information between supply chain partners. The current trend of using logistics is to extend outside the boundaries of individual firm (Chen and Paulraj, 2003).

2.4.2.4 A SCM Process Maturity Model

Tan (2001) categorizes the strategic vision of SCM into five sorts: corporate vision, strategic planning, processes, customer satisfaction and business results. Lockamy and McCormack (2004) developed a supply chain management maturity model by adopting the process view. They point out a new business approach: due to the increasing levels of competition, organizations need to build strategic alliance among the organizations that are part of its value adding network. Owing to this new business approach, companies do not view themselves as a collection of functional areas but as a set of tightly combined and integrated processes.

According to Lockamy and McCormack (2004), the process maturity concept proposes that “a process has a lifecycle that is assessed by the extent to which the process is explicitly defined, managed, measured and controlled”. Based on the maturity model developed by the Software Engineering Institute at Carnegie Mellon University, Lockamy and McCormack came up with the supply chain management maturity model which can be used to facilitate enhancing of supply chain performance.

2.5 The Extranet in Business

It has been mentioned before that the Internet technologies have influenced business practices. This influence can be exemplified through the extranet –an extension of the intranet to external business partners (Ling and Yen, 2001). The extranet’s intention is to enable more coordinated and integrated activities in the supplier-buyer relationship. (Watson and McKeown, 1999). From the buyers’ side, there is a growing number of companies that have been implementing extranets in order to drive costs down (CompTIA, 2005). The next section deals with an example of how the extranet influences business, in this case, the abilities that the extranet brings into supply chain management is stated.

2.5.1 Use of Extranet in SCM

A study made by Lancioni et. al (2000) states how the extranet can provide some opportunities in the management of the supply chain. Among these opportunities are:

- On-line vendor catalogs from which buyers can find, select, and order items directly from suppliers without any human contact.
- The ability to track shipments using a wide variety of modes including truck, rail, and air transport.

- The ability to contact vendors or buyers regarding customer service problems from late deliveries, stock-outs, alterations in scheduled shipment dates, late arrivals, and a wide variety of other service issues.
- The ability to reserve space in public warehouses for anticipated deliveries to market locations
- The ability to schedule outbound shipments from private and public distribution centers on a 24-hour basis.
- The ability to provide 7-day/24-hour worldwide customer service
- The ability to receive orders from international customers
- The ability to check the status of orders placed with vendors
- The ability to place bids on projects issued by government and industry buyers
- The ability to notify vendors of changes in configurations in products that are produced to order
- The ability to pay invoices electronically and to check outstanding debit balances
- The ability to track equipment locations including rail cars, trucks, and material handling equipment
- The ability to directly communicate with vendors, customers, etc. regarding supply issues on a 7-day/24-hour basis via E-mail
- The ability to schedule pickups and deliveries
- The ability to be more responsive to customer service problems
- The ability to reduce service costs and response time

2.5.2 Goals and Objectives for Implementing Extranet in Business

When companies implement extranets they look for benefits that are translated into objectives and goals. The main motivator for companies to implement extranets is cost saving (Angeles, 2001). Numerous successful cases have demonstrated that extranet initiatives produce great benefits (Ling and Yen, 2001), among which are: information that is easy to use, rich in format and of immediate usage. Simplifying ordering of supplies by having online catalogs of approved supplies and equipment where client departments can just visit the company's extranet to place the order (Ling and Yen, 2001). Min and Galle (1999) state that the benefits organizations seek when applying the extranet are: "cost savings resulting from reduced paper transactions, shorter order cycle time and the subsequent inventory reduction resulting from speedy transmission of purchase order related information, and enhanced opportunities for the supplier/buyer partnership through establishment of a web of business-to-business communication networks". An example of this cost reduction is the case of Texas Instruments' extranet which made them reduce its transaction cost from \$100 to \$3.5 per purchase order (Angeles, 2001).

Anandarajan et al (1998) states that the benefits an organization is trying to achieve can be grouped in three categories: operational, strategic and marketing/tactical. One example of strategic benefit can be faster trading cycle. From the operational perspective, benefits can be efficient procurement management, improved delivery times, reduced inventories and order processing (Anandarajan et al., 1998) "When a procurement extranet application has been adopted, supplier selection and bidding process may be eliminated leading to operational cost savings" (Kallioranta and Vlosky, 2004). Finally from a marketing/tactical point of view, some of the benefits that could be achieved are: tighter

relationship with suppliers (Anandarajan et al., 1998), inventory visibility, reporting tools, and delivery tracking. It may also be a way to enhance corporate image. (Vlosky et. al 2000).

Table 2.3 presents other objectives, identified by different authors, which companies seek when implementing extranet:

Table 2.3 Objectives and goals when implementing extranet (a supplier-buyer interface perspective).

Goals/Objectives	Source
<ul style="list-style-type: none"> • Sharing of Information • Improve business-to-business relationship • Reducing order cycle time 	Vlosky et. al (2000)
<ul style="list-style-type: none"> • Automate some parts of the procurement process • Reduce the cost of generating purchase orders • Improve accuracy of orders • Reduce inventory overhead 	Angeles (2006)
<ul style="list-style-type: none"> • Perceived opportunities to save costs associated with other electronic trading mechanisms • Improved transaction management and standardization of trading with smaller partners. • The ability to customize and rapidly respond to changes in the market. • An ability to share information that isn't traditionally covered by industry standard transactions – such as trading partner guides, marketing information, and more. 	CompTIA (2005)

2.6 Implementation of the Extranet

Companies must also be aware of factors that may influence the successful implementation of the extranet. Kallioranta and Vlosky (2004) state that managers should ask themselves the following questions before implementing an extranet system: How to integrate extranet into business strategy? Which parts of the value chain would benefit the implementation the most? How to make extranet a competitive advantage? Chan and Davis (2000) suggest that in order to avoid errors, testing of the extranet should be performed before actually starting out with the new system. Some other suggestions that may lead to successful implementation of the extranet are: to start implementation of

extranet with high-priority projects that produce impressive results and then gradually extend the use of extranet to other areas of the business. Grant security of the corporate data using tools like firewalls, passwords, digital certificates, encryption, and so on (Chan and Davis, 2000).

Kallioranta and Vlosky (2004) came up with a model that encompasses all the aspects to be considered in order to successfully implement an extranet system. The model is shown in Figure 2.3

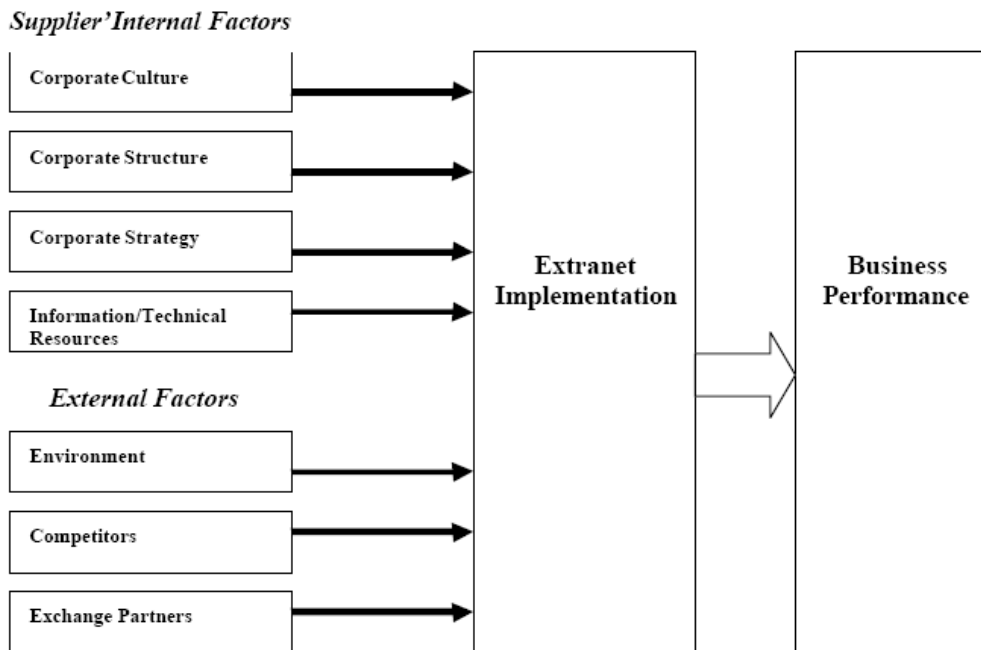


Figure 2.3 Supplier's perspective model of extranet implementation success and performance. (Kallioranta and Vlosky 2004)

Kallioranta. and Vlosky (2004) explain that the model shown in Figure 2.3 represents the following:

- *Corporate Culture* it often presents challenges in sharing knowledge with business partners as well as in the organization. In order to be successful, extranets may require a change of business culture.
- *Corporate Structure* impediments to extranet implementation include: lack of commitment (senior management and staff), management fear, and user resistance. Management must commit to processes, practices, methodologies, and standards to support the full utilization of the extranet business environment.
- *Corporate Strategy* the decision to implement an extranet should derive from integrating extranet into existing business strategies.
- *Information/Technical Resources* information resources refer to the information possessed by the firm about individual customers. Information processing skills is the ability of the firm to use the possessed information to gain insight about individual customers and then use this knowledge to customize its future interactions.

Technical resources include the level of sophistication of the corporate IT environment (e.g. integration and infrastructure). Technical skills are essential in IT application implementation, though the most important aspect in IT implementation is the process of organizing and managing IT within the firm.

- *Environment* the macro environment includes legal, political, regulatory, social, cultural, economic, and technological factors. In order for a company to implement an extranet with its business partners, the macro environment needs to support electronic communication. There also needs to be institutional and legislative support and social acceptance and trust for electronic communication and electronic business to take place.
- *Competitors* extranets should not be implemented just because competitors are doing it. On the other hand, extranet adoption should not be ignored if competitors are using extranets to collaborate with their exchange partners.
- *Exchange Partners* companies need to identify potential partners with whom extranet connections would be beneficial and profitable. Those business partners can be classified based on their importance to the company. Strategic partners are crucial to company's success; major partners are important but less critical; minor partners are not critical; transactional customers have the least value for the company. It is also important to make sure the extranet partners are motivated and on the same technology trajectory.(ibid)

After identifying some of the available theories that are relevant to our research, we will now present the frame of reference.

3. Frame of Reference

In this chapter, the frameworks for each research question will be constructed. Based on these frameworks, a frame of reference for this study will be then presented. Research questions (chapter 1) and their related theoretical areas (chapter 2) are served as the basis for the development of the frame of reference.

3.1 Supply Activities

As the formulation of the research problem suggested, it is firstly necessary to identify what does the supply activities look like to then consider the application of the extranet in the former one. It was not possible to find a specific or direct theory that deals with or clarifies the concept of "supply activities". However, RQ1: "How can the supply activities taking place in the manufacturer-supplier interface be characterized", serves as a restriction of what supply activities will include. Having this in mind and the possibilities of the extranet within the context of supply activities, will allow us to confine into what will serve as the base for our framework. Moreover, it is important to state that in the context where the application of the extranet will be studied suggests an operational perspective rather than a strategic one.

In order to clarify more on what supply activities are, we will revise and then extract from the three areas –procurement process, industrial buying behavior (IBB) and supply chain management (SCM), the activities that will serve as the base for supply activities.

3.1.1 Procurement

Having in mind our definition of supply activities and the application the extranet can have on them, we select the model of Novack and Simco (1991). From the eleven activities of the procurement process that the authors identified, just two of them are relevant to our study since they are dealing more at the operational level. In addition, the processes identified by Novack and Simco (1991) were found to be the most detailed and complete one within the reviewed literature. The mentioned two activities are further explained below:

Deliver product/ performance service: in this step, the manufacturer receives the ordered product(s) or service(s).

Postpurchase/make performance evaluation: in this activity is where the manufacturer evaluates the performance of its supplier(s). The latter allows the firm to make valuable feedback of the positive and negative aspects of the process.

It is significant to add that the procurement process will be constrained –for the purpose of this study, into the first and the second category of procurement mentioned in the literature review. These two categories are the purchase of raw material and production goods as well as the procurement of MRO (maintenance, repair and operating) supplies.

3.1.2 Industrial Buying Behavior (IBB)

Regarding the Industrial Buying Process, the theory from Robinson, Farris and Wind (1967) is selected because of the validity of it. This theory has gained much support from many other researchers (e.g. Crow, Olshavsky and Summers, 1980; Bellizi, 1981; Johnston and Spekman, 1982; Mattsson, 1988). And it is one of the most cited models in the area of Industrial Buying Behavior (IBB). Thus it is a strong model that has indeed achieved a high degree of recognition. The two phases mentioned in the Robinson, Farris and Wind (1967) theory that are related to our study are:

Selection of an order routine: in this phase several activities at the external and internal level take place. Some examples of the former are: receiving, approving of invoices of payment and forwarding the purchase order to supplier(s).

Performance feedback and evaluation: this phase is quite similar to the second activity of the procurement process of Novack and Simco (1991) mentioned in section 3.1.1. Therefore it is not necessary to reexamine it.

Robinson, Farris and Wind (1967) also mention the three buying situations: new tasks, straight rebuy and modified rebuy. Among these three, just one of them is relevant to our study: straight rebuy. The reason is that straight rebuy is more likely to occur in the scenario we are looking at in our study –the extranet applied within the interface between the manufacturer and the already chosen supplier(s). Straight rebuy implies a more routine purchasing and could be handled over an extranet. On the other hand, a situation where a product is purchased for the first time is not likely to happen over the extranet.

3.1.3 Supply Chain Management (SCM)

Following the same logic we did with the procurement process and IBB, we will now analyze the Supply Chain Management. First we revised Chen and Paulraj's (2003) model, which was chosen due to the validity it has since it was constructed after the review of over 400 articles on SCM. In addition, Chen and Paulraj (2003) direct their attention to the buyer-supplier dyadic relationship –due to the importance it has to the effective management of the supply chain, hence making it more significant for our study. Here are the aspects of the buyer-supplier dyadic that are relevant to our study:

Logistics integration: it refers to receiving the right product at the right time and place. A typical consequence of the latter is the reduction of inventory.

Long term relationships: it deals with the establishment of a supplier-buyer relationship where contracts become long term and sharing of information is crucial, thus leading to a win-win situation.

Communication: willingness to share sensitive information with the purpose of improving and solving problems is a requisite.

The three aspects mentioned under section 3.1.3, do not strictly refer to operational supply activities. However, the inclusion of them in this framework is attributable to the fact that the extranet can have an influence on them.

Another theory considered for SCM was Lancioni et. al (2000). The reason is that this theory –contrary to the other ones that deal more at the strategic level, includes more operational activities in the part of the supply chain we are interested on. In addition, they list the opportunities that the extranet can have on those activities.

3.1.4 The Conceptualization of Supply Activities

By revising the most relevant theories for supply activities, we obtain a list of activities that take place when companies intend to acquire products or materials –a supply activities list. However, the objective of this study is to find out how the extranet can be applied to these supply activities. As mentioned before, extranet is mostly used to handle operational activities rather than strategic ones. Therefore, some activities of strategic nature are not considered for the final list of supply activities. It is then the combination of the relevant theories found for SCM, industrial buying and procurement processes along with the possibilities of the extranet at the operational level that lead to our framework. We will then define supply activities as those activities taking place in the manufacturer-supplier(s) interface that range from the point of placing an order up to the reception and approval of the ordered product(s). Table 3.1 shows the mentioned list of supply activities:

Table 3.1 Framework for RQ1 “supply activities”

Supply activities	Source	Measurement
Place order directly to suppliers	Lancioni et. al (2000)	On-line catalogs where the buyer can find, select and order items.
Schedule deliveries	Lancioni et. al (2000)	Arrange the delivery and reception of orders.
Check the status of orders placed with vendors	Lancioni et. al (2000)	Know the current situation of the ordered item within the order cycle.
Track shipments	Lancioni et. al (2000)	Be able to know the physical location of the ordered item(s).
If applicable, notification of changes in configurations in ordered products	Lancioni et. al (2000)	The ability to communicate modifications on the ordered item(s).

Table 3.1 (continued...)		
Respond to problems that may arise, for example late deliveries, stock-outs, alterations in scheduled shipment dates, late arrivals, and a wide variety of other service issues	Lancioni et. al (2000)	Responsiveness to a wide variety of service issues. (i.e. late arrivals and stock-outs)
Receive, inspect and pay invoices, as well as check debit balances	Lancioni et. al (2000) Robinson et. al (1967)	The ability to handle financial aspects regarding the purchase order.
Receive ordered products	Novack and Simco (1991)	Physically receive ordered item(s) on planed time and place
Make post-purchase/performance evaluation	Robinson et. al (1967) Novack and Simco (1991)	Make an evaluation of supplier's performance. If necessary, causes must be identified and proper corrective action should be made.
Constant supplier-manufacturer communication	Chen and Paulraj (2003)	Continuous exchange of information between the two parties –supplier(s) and manufacturer.

The last activity listed on Table 3.1 (Constant supplier-manufacturer communication) is an activity that goes along with the other nine activities, rather than being an isolated one. The continuous exchange of information between supplier and manufacturer can be facilitated through an extranet (Tan et. al 2000). After having identified what supply activities is concerned with, it is now pertinent to further state how is the extranet related to the mentioned activities.

3.2 The Goals and Objectives of Implementing Extranet in Supply Activities

As we mentioned before, in the reviewed literature, goals and objectives as well as the impact of implementing an extranet is not explicitly differentiated. Thus for the purpose of this study, a goal will be what it is to be achieved ultimately and objectives are the small pieces that when added up will allow companies to reach their goal(s). On the other side, the impact or outcome is what it is actually obtained after the implementation of the extranet.

As we can see from the literature review, there are many authors that have studied the goals and objectives of implementing the extranet from different perspectives. The

following are common points identified by all of them: cost reduction, information sharing, order cycle time reduction and partner relationship improvement.

Table 3.2 presents the goals and objectives that will serve as a framework for RQ2 and RQ3 –further discussed on the next section. In addition, a mean to measure these goals and objectives is shown.

Table 3.2 Framework for RQ2 and RQ3

RQ	Goal	Objective	Source	Measurement
2	COST SAVING	Reduced paper transactions	Min and Galle (1999)	In percentage or number of transactions
		Shorter order cycle time	Min and Galle (1999)	In percentage or any time unit (i.e. hour, day, week)
		Inventory reduction	Min and Galle (1999)	In percentage or number of units
		Improved delivery time	Anandarajan (1998)	In percentage or any time unit (i.e. hour, day, week)
		Reduced order processing	Anandarajan (1998)	In percentage or any time unit (i.e. hour, day, week)
		Elimination of supplier selection and bidding process	Kallioranta and Vlosky (2004)	Total elimination, partial (at what extent, i.e. percentage, money) or none
		Improving accuracy of orders	Angeles (2006)	Degree of improvement (i.e. better, worse, the same)
		Reduce cost of generating purchase orders	Angeles (2006)	In percentage or money
RQ 3	ENHANCE PARTNERSHIP WITH SUPPLIERS	Quality, versatility and accessibility of information (external and internal)	Ling and Yen (2001)	Easiness, richness, adaptability and immediate or non immediate usage of information
		Establishment of web B2B communication network	Min and Galle (1999)	Existence (yes/no) and how well does it work
		Sharing of information	Vlosky et. al (2000)	Speed, security and efficiency of the information sharing
		Improve B2B relationships	Vlosky et. al (2000)	Perceived improvement of the relationship (i.e. better, worse, same)

	<p>ENHANCE CORPORATE IMAGE Table 3.2 (continued...)</p>		<p>Vlosky et. al (2000)</p>	<p>Perceived corporate image (i.e. better, worse or same)</p>
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Table 3.2 shows the goals classified into three categories: cost reduction, enhance partnership with partners and enhance corporate image. Within each category –goal, there are some specific objectives listed that when put up together will lead to the accomplishment of the former.

3.3 Impact of the Extranet in the Supply Activities

As we mentioned before, there is no intrinsic differences identified by prior literature among goals, objectives and impact of the extranet in the supply activities. For this reason, the literature we found will serve as a common base for these three terms in this study. We will also use the same framework which is presented in Table 3.2 for RQ3. However, we treat the goals and objectives as a starting point of the extranet application, and impact as final outcomes of this kind of application. Furthermore, our focus of studying will be put on finding out the differences between the buyers’ expectations on the application of extranet in the supply activities and the real achievements brought by this implementation.

3.4 Influential Factors for Extranet Implementation

For answering RQ 4 we selected the model proposed by Kallioranta and Vlosky (2004). Concerning the suppliers’ internal (organizational) and external (environmental) factors affecting the successful implementation of the extranet, Kallioranta and Vlosky’s model was the only one found that actually tries to analyze what goes around the implementation of extranet. Their model will give us the possibility to look at the micro and macro environmental factors that influence the implementation of the extranet thus providing a more complete understanding on the application of extranet. It is important to mention that Kallioranta and Vlosky’s (2004) model is built from a supplier perspective and since this study is based on the buyer’s perspective, it will be adapted in order to meet our purpose.

Table 3.3 on the following page intends to summarize the internal and external factors as well as how these can be measured.

Table 3.3 Framework for RQ.4

⁴<http://www.businesslink.gov.uk/bdotg/action/detail?r.l1=1073861169&r.l3=1073900131&type=RESOURCES&itemId=1073790713&r.l2=1073858842&r.s=sc>

					Factors	Description	Source	Measurement
					Internal Factors			
RQ 4	Corporate Culture	The values and norms that are shared by the people in an organization and that control the way they interact with each other and with stakeholders outside the organization	Hill and Jones (2001)	-Willingness to share knowledge with the business partners and within the organization. (i.e. high, medium, low)				
	Corporate Structure	It can be hierarchical or decentralized team-oriented	Kallioranta and Vlosky (2004)	-Hierarchical or decentralized team-oriented? -Commitment of senior management and staff (i.e. high, medium, low).				
	Technical Resources	The level of sophistication of the corporate IT environment	Kallioranta and Vlosky (2004)	Sophistication of IT (i.e. integration and infrastructure). Technical skills (i.e. high, poor, acceptable) and IT management performance				
	Corporate Strategy	The overall purpose and scope of the firm	Jelassi and Enders (2005)	Integration of the extranet to business strategies. As well as the consideration of procurement and supplier strategies.				
	External Factors							
	Environment	The influence of legal, political, regulatory, social, cultural, economic, and technological factors	Kallioranta and Vlosky (2004)	Suitable/supportive environment for extranet implementation				
	Competitors	A business offering a substitute or similar product to yours	Weblink ⁴	Driven by competition (yes or no, if yes, at what extent)				
	Exchange Partners Table 3.3(continued...)	Those whom it will be beneficial and profitable to establish extranet connections	Kallioranta and Vlosky (2004)	-Identification and classification of the potential partners (strategic, major, minor and transactional). -Technological compatibility and motivation				

Table 3.3 shows the description of the internal and external factors that affect the extranet implementation. In addition, the measurement column presents the descriptions of these factors narrowed into what is relevant for answering RQ 4.

3.5 Emerged Frame of Reference

The different frameworks presented in the preceding sections result into a frame of reference where this study will be based on. This emerged frame of reference is presented in Figure 3.1:

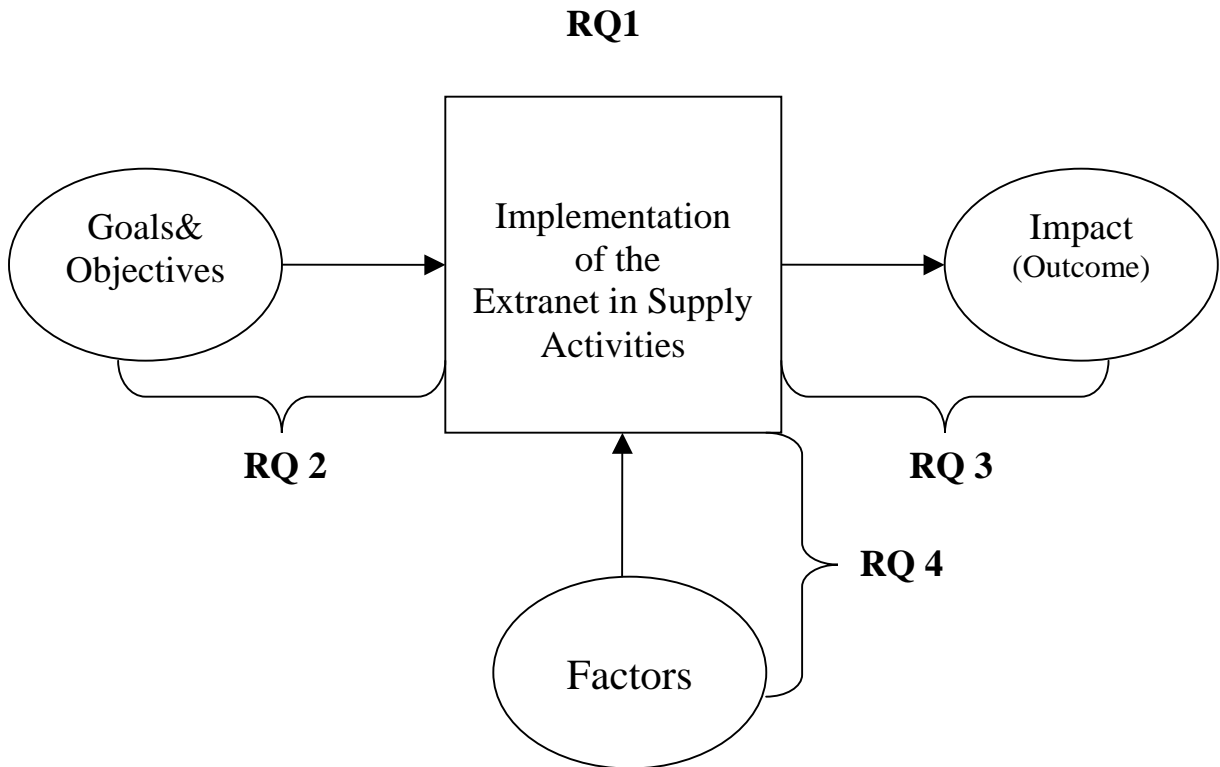


Figure 3.1 The emerged frame of reference

First of all, the process we are going to study is supply activities. When deciding on implementing the extranet on the supply process, companies have some goals and objectives that are meant to be achieved. The extranet, when applied to the supply process is seen as to have an impact –in the form of an outcome. In addition, the implementation of the extranet is influenced by internal and external factors in the organization and the environment. The model presented in Figure 3.1 will look then at the whole scenario and try to give understanding to the presented research problem. Moreover, it is important to keep in mind that the type of extranet we are looking at in this study is constrained to that extranet where the manufacturer is connected with its already chosen supplier(s). The latter, at the same time, implies a certain type of purchase which is straight rebuy.

4. Method

In this chapter we present and justify the choices on methodology, which includes research purpose, research approach, research strategy, data collection, sample selection and data analysis. Finally, validity and reliability of this study will be discussed in order to control research quality.

4.1 Research Purpose

There are three options for research purpose: explanatory, descriptive and exploratory. Explanatory study aims to establish causal relationships between two variables (Saunders and Lewis, 2007). However, our study's objective is to understand what variables are relevant rather than finding the causal relationships among them. Therefore, explanatory is not suitable for our study.

When considering the descriptive study, we found that it is necessary to have a clear idea of the phenomena prior to the collection of data, since descriptive study focus on the accurate description of the variables in the problem model. However, this study is more interested in finding out the relevant variables under certain real life contents rather than providing deep and accurate description of these variables. Based on this consideration, we do not think the descriptive is the best research purpose for this study.

Finally, after revisiting our research problem and questions, we think that exploratory study is appropriate. The reasons for this decision are: first, according to Saunders and Lewis (2007), exploratory research is a valuable method to find out what is exactly happening, and it is particularly useful when you are not sure of the precise nature of the problem. Second, it has an advantage which is flexible and adaptable to change. The study focus can be broad at the beginning and becomes progressively narrower with the development of study. This flexibility allows us to change our direction when new data or insights appear. Last but not least, after reviewing the relevant literature it was not found information concerning how similar problems and research issues have been solved in the past. Hence our research will be dealing with an aspect not found in the reviewed literature, more concisely: supply activities. To summarize, the research purpose for this study is exploratory.

4.2 Research Approach

Research approach is divided into two categories. The first category is deductive and inductive, and the second category is qualitative and quantitative.

According to Saunders and Lewis (2007), deductive approach develops a theory or hypotheses and tests the hypothesis with a research strategy. In inductive approach, we would collect data and analyze them, finally develop a theory as a result of data analysis

(Saunders and Lewis, 2007). In this study, the deductive approach is adopted. We have found relevant theories and models for our research questions. Therefore, we plan to test whether these theories and models work with the real situations that we have selected. By combining the original theories and the real facts, we could make some modification or improvements on the theories as our conclusions and findings.

Second, the qualitative and quantitative approaches refer to the method one selects to treat and analyze the collected data (Saunders and Lewis, 2007). Qualitative method is used to study a small sample but in depth. The objective is to create a better understanding of the specific problem studied. The focus of a quantitative study is to generalize, describe and explain. It concerns on comparisons and trial. A higher level of formalization is used and generalizations are looked for (Saunders and Lewis, 2007). This study is more concerned with understanding the meaning of some phenomena rather than attempting to quantify these phenomena through data collection and analysis, so we decide to adopt the qualitative approach.

4.3 Research Strategy

According to Yin (2003), the alternatives for research strategy are: experiment, survey, archival analysis, history and case study. Each strategy can be used for all three research purposes which are explanatory, descriptive and exploratory. And each of them follow their own logic to collect as well as analyze data (Yin, 2003).

When to use each strategy depends on the conditions of the research. Yin (2003) points out three conditions: (1) the type of research questions, (2) the extent of control over behavioral events and (3) the degree of focus on contemporary events.

Table 4.1 Relevant Situations for Different Research Strategies

Strategy	Form of research questions	Requires control over behavioral events	Focuses on contemporary events
Experiment	how ,why	Yes	Yes
Survey	who, what, where, how many, how much	No	Yes
archival analysis	who, what, where, how many, how much	No	yes/no
History	how, why	No	no
case study	how, why	No	yes

Source: Adapted from Yin 2003, P5

A decision of research strategy selection can not be reached without considering the objectives and characteristics of this study. After revisiting our research questions, we find that all of our four research questions belong to “How” and “Why” questions. According to Table 4.1, the possible research strategy on our list could be experiment,

history and case study. But in this study it is not possible to control behavior events, then the experiment can be taken out of our list. This study is also designed for investigating contemporary events, for that reason, history strategy is deleted. Thus, we have ended up with case study as being the most appropriate research strategy. Another aspect that strengthens this decision is Yin's (2003) argument on case study. He says that "case study tries to illuminate a decision or a set of decisions: why they were taken, how they were implemented, and with what result". When it comes to this study, we attempt to illustrate where the extranet can be used, why it is used, how it is used and what are the results of adopting the extranet.

Besides Yin (2003), some other authors suggest different criteria which can be helpful when choosing a research strategy. Saunders and Lewis's (2007) argument is one of these methods. According to Saunders and Lewis (2007), an experiment aims to study causal links between two variables, so we think it is not the best research strategy for this study. The survey strategy is often used with the deductive approach and it allows the collection of a large number of data in an economical way (Saunders and Lewis, 2007). However, as we mentioned before, this study is going to investigate the deep reality of certain phenomena, the data analyses will not be based on a large quantity of data. So survey is not suitable for this study. Last but not least, compared to survey strategy, case study is more suitable to deal with more variables at the same time. In our study, we need to examine a lot of variables for all of the research questions. Take the model used for R.Q.4 for example; there are seven factors that should be considered.

Prior to data collection, there is another decision to be made: whether single case study is more suitable for our study or multiple case study is. According to Yin (2003) a single case study is suitable for "when it represents the critical case in testing a well-formulated theory". This statement implies that if there is a single case meeting all the conditions for testing the theory, then the single case study can be adopted. However, the theories or models we found is not a hundred percent match of the research questions that we want to find out, so we think multiple case is a better choice to single case study.

4.4 Sample Selection

After choosing a research strategy, the next step is to select the sample. We have mentioned that a multiple case study strategy is used, so at least two samples are needed.

Considering the access to data, three companies from China and a Latin American country are selected as our samples. There is a higher possibility to have good contact persons within these two countries.

According to Yin (2003), it is of great importance that the selected cases are relevant to the purpose of the study, and that the respondents have sufficient information on the studied phenomenon. Following Yin's (2003) advices, we put forward three criterions working as the filters for screening the case base. These criterions are: 1) the selected company must compete in the manufacturing industry, 2) the selected companies must

adopt extranet in their supply activities and 3) the interviewee must have high involvement with the application of the extranet.

Based on the discussion above, we finally chose GITI Tire, a multinational steel manufacturer located in a Latin American country (the real name of this company will not be used since confidentiality was requested by the interviewee) and Wuyang-Honda Motorcycle, to be our cases of study. For practical reasons, we will use the names of GITI Tire, MSM and WH respectively in the following chapters to represent the three companies.

The three mentioned companies were also selected on the basis of finding much more similarities than differences among them. The chosen organizations are appropriate to our research problem since we are dealing with world-class manufacturers that use the extranet in their supply activities. Moreover, the similarities that we are expecting to find among these three companies are due to their similar characteristics. They are three companies that have subsidiaries located in different countries. The three organizations face important challenges within the industry they compete in –for instance greater competition that results on looking for new sources of competitive advantage. They also seek for being more efficient and effective in their processes. We also expect to find slight differences since they are located in countries that are very different from each other and the countries' culture may be influential.

The information from GITI Tire was gathered through interviewing the purchase flow manager of the company, this person has been in that position during seven years. It was chosen to interview this person since he is familiar with the purchasing activities and participated in the whole process of extranet implementation. For practical purposes, we will be referring to this person as PF manager in the upcoming chapters.

With respect to other case study –MSM, the Buyer in Standard MRO supplies is the person interviewed. This person has been holding this position since she started in the company (about a year and three months). She is familiar with the extranet since she uses it everyday. In addition, this person has been involved since the extranet started. She will be referred as BM in the upcoming chapters.

Finally, the information of WH was collected from a purchase manager, who has been working in that position for two and half years. She works as the head of the purchase department, so she is quite familiar with what to buy and how to buy. What is more, she knows the suppliers very well since handling the management of suppliers is a big part of her job contents. And the most important thing is that she has experienced the different ways of working in the purchase department: without extranet and with extranet. She also took part in the extranet implementing project as a key member, so she knows the goals and results of implementing extranet as well as the problems they met during the implementation process. Therefore, we feel that she is a good option, capable to provide the right and relevant information to us. We will refer to this person as purchase manager in the upcoming chapters. Table 4.2 on the following page summarizes the information of sample selection.

Table 4.2 Companies, industries and informants included in this research

Company	Industry	Respondent
GITI Tire	Tire Manufacturing Industry	Purchase Flow Manager
MSM	Steel Manufacturing Industry	Buyer in Standard MRO Supplies
Wuyang-Honda	Motorcycle Manufacturing Industry	Purchase Manager

4.5 Data Collection

When the sources of evidence are decided, we still need to decide what method to use for the data collection. According to Saunders and Lewis (2007), there are two types of data: primary and secondary data. Primary data is collected for the researchers' own purpose and secondary data have already been collected by other researchers, for other purposes.

Yin (2003) identifies six sources of collecting data for case study: documents, archival, records, interviews, direct observation, participant-observation, and physical artifacts. Yin (2003) continues by stating that all the six sources have their advantages and disadvantages, there is no single source considered more superior than the others. Actually, a good case study should use as many sources as possible (Yin, 2003).

The data collection techniques employed in this study are: semi-structured interview and the analysis of documents. Both primary data collected from interview and secondary data collected from documents is used. Semi-structured interview is in an open-ended nature, but it follows a certain set of questions (Yin, 2003). It provides a better flexibility. We will have a framework of questions, but questions are not fixed. We can delete some questions in a particular interview, at the same time, additional questions can be asked within another organization. The semi-structured interview can be done through face to face talking, phone calls, video conference. Due to the fact that the selected companies lie in China and in Latin America, the interviews are conducted through phone calls which is the most convince method. Besides interview, administrative records and documents are valuable sources for getting data.

4.6 Data Analysis

Yin (2003) points out that the analysis of case study evidence is one of the most difficult aspects of doing case studies, since the strategies and techniques have not been well defined. There are five specific techniques for analyzing case studies: pattern matching, explanation building, time-series analysis, logic models, and cross-case synthesis. The first four can be applied to both a single and a multiple case design. More important, every case study should consider these techniques (Yin, 2003).

Miles and Huberman (1994) recommend a three phases method to conduct the data analysis. These phases are: data reduction, data displaying and conclusion drawing.

- **Data Reduction:** The objective of this stage is to organize the data so that the conclusion can be drawn and verified. For this reason, the selects, abstracts, simplifies, focus, and transforms of data should be carried out.
- **Data Displaying:** When the unnecessary data is excluded, the rest of the data should be displayed in an organized, compressed way. The reason for doing this is that it is easier for the reader to read and easier for researchers to draw conclusions.
- **Conclusion Drawing:** This is the final analytical activity for researchers. Here, the researcher has to decide the meaning of things by noting regularities, patterns, explanations, possible configurations, causal flow and propositions.

This study followed the three steps for data analysis, and both within case and cross case analysis will be carried out. First of all, we adopt the multiple case studies to collect data. Then we reduce these data and only keep the one that is relevant and significant –this means, the data that matches or mismatches our frame of reference was kept. Within each case, the empirical findings for each research question included in this study are compared to the literature featured in our conceptual framework. Then, a cross case comparison is conducted. Finally, we draw conclusions and verify our findings with the theories mentioned in former chapter.

4.7 Quality Standards: Validity and Reliability

According to Yin (2003), it is possible for researchers to judge the quality of any given design by certain logical test. There are four test that have been used very commonly to examine the quality of any social research which are construct validity, internal validity, external validity and reliability.

4.7.1 Validity

Saunders and Lewis (2007) state that “validity concern with whether the findings are really about what they appear to be about”. Construct validity is especially significant in case study research. In order to overcome this problem, Yin (2003) recommends three case study tactics to increase the construct validity: (1) use multiple sources of evidence (2) establish chain of evidence (3) have key information review draft case study report. Yin (2003) also points out that the internal validity is used for causal studies only and not for descriptive or exploratory studies. Therefore, we do not take internal validity into account in this study. The external validity concerns whether the research findings can be equally applicable to other research settings, such as another organization (Saunders and Lewis, 2007).

We decide to use more than one source to obtain data such as interviews, documentations, and websites. Concerning the main data collection method –semi-structured interview, we came up with a few measures to increase its validity. First of all, the selection of informants is handled very carefully. Only the person who has been considerably

involved in the supply activities or the extranet implementation process will be interviewed. Secondly, our interview guide will be checked by our supervisor and get feedbacks from him. Due to the supervisor's long time experience, his recommendations are definitely helpful for us to improve validity. Thirdly, before the interview is conducted, we will send e-mail in advance which covers the key issues we are going to discuss to avoid misunderstandings. The respondents can prepare for the interview and when necessary, they can also search for relevant information before the interview. Finally, the nature of the semi-structured interview, allow us to do probing when talking to the interviewees. Concerning the external validity, three case studies will be carried out. By doing this, we can check whether the findings or conclusions we draw from the one case can be applied to the other two cases.

4.7.2 Reliability

Reliability deals with if a later investigation follows the same procedures of earlier studies, the later study should reach the same findings and conclusion (Yin, 2003). Four factors can be great threats to reliability. They are participant error, participant bias, observer error and observer bias (Saunders and Lewis, 2007).

We plan to increase the reliability of this study by letting the respondents to choose the most suitable date and time for them to do the interviews. We hope the interviews can happen when the respondents are not in a hurry and they have the neutral motivation to answer our questions. Open-end questions are used in order to let the respondent express their meaning by their own words rather than led by us. Concerning the observer bias, the two authors of this study decide to interpret the data individually and then compare the results. When differences occur, we will discuss together and find out the reasons. Last but not least, the recorder will be used during the interviews to record our conversations. The objective of doing this is to help us recall what was going on in the interview and check what the respondents exactly said.

5. Data Presentation

This chapter presents the data collected from the three selected companies through semi-structured interviews. In the methodology chapter, three manufacturing companies were selected for this study. Two companies are located in China, and the third company is located in a Latin American country.

5.1 GITI Tire (China) Investment Company Ltd.

GITI Tire was established in 1993 as a joint venture with the local Anhui government for the production of diagonal tires. GITI Anhui subsequently became a wholly-owned subsidiary of GITI Tire in 1997. GITI Tire is nowadays China's largest manufacturer and supplier of top quality tires. The company is headquartered in Shanghai and it distributes its products through an extensive sales network in China and exports to over 80 countries around the world.

5.1.1 General Information

The main products of GITI Tire are all-steel, alloyed steel and diagonal tires under various brands. So the primary materials to purchase can be classified into three categories:

The first one is material rubber which includes nature gum and synthetic rubber. It is the most important purchase object and it is also the most valuable. It accounts for 70% of the total purchase expenditure. Material rubber is purchased every month.

The second category is chemicals. This category consists of several kinds of chemicals that will be used in producing tires. Examples of the former are: sulfur and thickening agent. Generally speaking, chemicals are purchased every three months.

The last category is carbon black. Carbon black is one of the items that is quite necessary in the process of tire production. Every month GITI Tire needs to purchase it.

The materials mentioned before are not purchased through extranet. Since the information systems of GITI group and suppliers are not compatible with each other. So at the present stage, GITI can not use extranet to purchase all the raw materials except tire cord and steel wire.

The production base of GITI Tire is in China, so basically, most of the suppliers come from China. Only a small part of nature gum is bought from foreign countries like Malaysia. All the suppliers of GITI group are in the chemical industry.

According to the company, they have vertically integrated some strategic raw materials like nylon cord and steel wire to mitigate supply risk and quality control. It is in this part

where the extranet implementation comes. The extranet is shared with three suppliers and it has been going on for 3 years. According to the interviewee, the company purchases nylon cord and steel wire frequently –every three days.

5.1.2 The Supply Activities

The supply activities that are followed by GITI Tire can be described as having three phases: order making, order fulfillment and receiving. Furthermore, each of them can be divided into several steps respectively. The mentioned phases are presented below:

- Order making: by knowing the lead time and quantity of each kind of material, GITI Tire can submit the purchase orders online directly to the selected suppliers through extranet. Usually, these selected suppliers are those who have signed long-term contracts with GITI Tire. The scheduled delivery time is also decided at this phase.
- Order fulfillment: this phase happens once the order has been transferred to the suppliers. Based on the details of the orders, suppliers start to prepare the ordered products. When necessary, some changes to the orders can be made and delivered to suppliers. When both buyer and supplier have a common decision, the new order is formed. Finally, the production and delivery should be arranged according to the new order's requirements.
- Receiving: when the purchased material is delivered to GITI Tire's plants or warehouses, they will check the quantity and test the quality by choosing some samples. According to the results of the test, the ordered products will be treated with the following status: A) accepted, B) accepted with concession –quality is not very good but still can be used for the manufacturing of some tires, price reduction will take place though; and C) rejected and returned.

According to PF manager, the activities conducted before the adoption of the extranet in supply activities were pretty much the same as after the extranet was used. So the three phases were also followed, but the most significant difference was that a huge amount of manual working and paper transactions were needed before since almost everything regarding purchase was done offline.

5.1.3 Goals and Objectives for Implementing the Extranet

According to the PF manager, the main goal set by GITI Tire was to reduce costs by achieving paperless purchasing and shorter order cycle time. PF manager also adds that inventory reduction, reduced order processing, improvement of accuracy of orders and reduction of the cost for generating purchase orders are other objectives that lead to the ultimate goal of saving costs. On the other hand, improvement of delivery time and the elimination of supplier selection and bidding process are not seen as objectives that lead to achieve cost savings.

PF manager says that GITI Tire did not perceive enhancing partnership with suppliers as a goal for the extranet implementation. The reason for that –adds PF manager, is that they believe business-to-business relationships can be improved by lower price, better product quality and longer payment period. These, he says, can not be improved only by information technology, and more precisely the extranet.

PF manager also states that to enhance corporate image was not identified as a goal for the extranet implementation in the supply activities. The reason for this is that only very few suppliers were expected to participate in the extranet and all of them have already established long time and trust worthy relationships with GITI Tire. What is more, GITI Tire has other means to enhance their image, such as marketing plans and building their reputation by making the payment to suppliers on time, among others.

5.1.4 Impact of the Extranet in the Supply Activities

According to PF manager, GITI Tire has achieved the established goal of cost reduction by decreasing paper transactions down to zero and by reducing the order cycle time. Before implementing the extranet, they had to fill in 17 types of forms and now paper work is completely eliminated. PF manager also mentions that the time spent into the mentioned activity was thirty hours per month. The PF manager says that the extranet allowed them to use less than three people in the supply activities. Therefore, the extra people could be reallocated to other areas, he adds.

One fact that is worth mentioning is that although GITI Tire did not perceive enhancing partnership as a goal of implementing extranet, the communication network and information sharing between the company and its suppliers were indeed improved.

Finally, PF manager states that GITI Tire feels satisfied with the obtained outcome since the main goal –cost reduction by paperless transactions and shorter order cycle has been fulfilled. Thus, the expectation on the extranet implementation in the supply process was met.

5.1.5 External and Internal Factors that Influence the Implementation of the Extranet

PF manager states that some internal factors that hindered the implementation of extranet in supply activities were the bad habits carried out by the purchase department staff. Overall, PF manager adds that the most important influential internal factors are employees' attitude towards information technology and the change of their working habits. Moreover, PF manager perceives that the willingness to share knowledge with the business partners is low for GITI Tire. On the other hand, he states that the IT resources of the organization are good.

From the external perspective, he says that the environment was favorable when implementing the extranet and that the initiative of adopting extranet was also driven by competition. PF manager thinks that with the emerging of different information technologies, the base of alternatives for IT solutions is becoming bigger while the costs of purchasing IT products and services are decreasing. So he thinks this kind of trend is a favorable factor that affects the implementation of extranet. The PF manager also adds that GITI Tire knows that there are some big companies within the tire manufacturing industry that have extensive IT applications –not only extranet technology, in their business operations. So to keep up with the pace of the information systems applications within the industry is necessary. Moreover, GITI Tire felt that the IT limitations from suppliers hindered the extranet implementation, since some of the suppliers' computer systems were not compatible with the systems that belonged to GITI Tire. This was then the reason for why GITI Tire could not bring more suppliers to its extranet. Therefore, PF manager perceives that exchange partners is an influential factor.

Although there are some internal factors that have negative effects on the implementation of extranet in supply activities, GITI Tire was able to overcome the difficulties and achieved their goals. PF manager points out some of the significant reasons for their success. First, they regard training as the most important method to change employees' attitudes. By providing a serious training, the employees realized the benefits of using extranet and the importance of using it, since the application of extranet is considered as a part of the IT strategy. Second, GITI Tire launched some bonus-penalty rules to encourage the acceptance and participation of this extranet project. The performances of employees are assessed by the company, and then the outstanding staff will be offered cash or promotion awards, while the staff of low performance might be punished. Third, the senior management of GITI Tire is very supportive in the project which is a great expediter for implementing the extranet. The last one is to let the employees to experience the benefits of the extranet by themselves. The employees feel that the usage of extranet decreases their workload to a quite large extent, so they found out that the extranet can not only bring benefits to the companies but also directly to themselves.

5.2 Multinational Steel Manufacturer

Multinational Steel Manufacturer or MSM –as it will be referred in this study for practical reasons was founded in the 1940s. MSM has a work-force of more than 50,000 people all over the world and a yearly turnover of approximately USD 20 billion. MSM is a group comprised of many companies however our sample of study will be those ones that produce steel pipes, steel sheets and other variations of steel. The group negotiates contracts with suppliers at both global and local level. Almost all the products and services the group requires to purchase –from raw materials until pencils and computers, are done through an extranet.

For this study, we looked at one of its units which is located in a Latin American country. Thus all the information to be presented is related to this specific unit.

5.2.1 General Information

MSM produces steel sheets and tubes as well as other variants of steel. The products and services the different steel companies of the MSM group require are pretty much the same –minerals, coal, spare parts for machines, rubber seals, among others. Thus the decision of having just one entity in charge of purchasing the products and services that all of the steel companies necessitate. Moreover, they can have greater bargain power over suppliers.

As we mentioned before MSM purchases the large majority of the products and services it requires, from raw materials down to pencils and computers, through the extranet. They do this in two different ways: most of the purchasing –approximately 70% of the orders, is held on an extranet where the supplier receives the order directly from the warehouses and can see product details and schedule deliveries. The rest of the purchasing is held through another extranet –which we will call extranet 2, where a bidding process takes place. The buyer sends the order requests through extranet 2 to a certain number of suppliers. Finally, the buyer receives the quotations from suppliers and selects the best option according to time and “rating”. “Rating” is a number that the buyer gives to every supplier which reflects how accurate the latter are with respect to the delivery time they promise to have. MSM started to use the extranet to handle its supply activities in June 2007, extranet 2 started in April 2006.

BM is part of a team who is in charge of buying what they call “Standard MRO (maintenance, repair, and operating) supplies”, which according to BM are those MRO supplies that have a name, a brand, in other words a formal organization is behind them. Many of these standard MRO supplies are negotiated at a global level (i.e. ball bearings from SKF or Timken). BM and her team use approximately 1000 different suppliers at both global and local level. These suppliers are mainly from the mechanical, construction and chemical industry. Other examples of products that BM purchases are: O-rings, rectangular and rounded seals, cement, sand and lamps.

So, what are concretely the supply activities that take place within MSM then? In order to give an answer this question we have to take a look at the following section.

5.2.2 The Supply Activities

When MSM needs to acquire products or services, the series of activities that take place can be divided into the three following phases:

- Order request: from the MRP (material requirement planning) MSM knows which products they require as well as the quantity, time and place they need them. When the inventory levels reach the reorder point, it automatically sends a purchase order through the SAP system up to the extranet. The supplier then receives the purchase order as a pdf file, downloads it and start the process of fulfillment of the order. The latter is in the case of the goods and services that are handled by contract

–approximately 70%. This acquisition of goods and services through a contract implies a direct connection of the buyer with the supplier. Having a contract is something that MSM attempts to do with the critical supplies –those that without them the process could not take place, and active supplies –those purchased 3 or more times in a year. For the rest of the purchasing that is not handled by contract, a purchase request is sent to extranet 2 and a bidding process –as explained in section 5.2.1, takes place. Once the supplier with the best offer is chosen, a purchase order is put up on the extranet. The forthcoming activities are exactly the same as the ones followed by the purchase orders that were not initially handled on extranet 2.

- Order fulfillment: during the process of fulfillment of the order, the buyer is able to know at any time the status of its order. By using a tool called “fast track” the buyer can see the location and status of its order. The extranet also serves as a mean of communication between the buyer and the supplier. For example, the supplier can notify the buyer through the extranet that the order will take a little more time to arrive at the warehouse than what it was expected.
- Reception and Invoicing: when the order is received at the warehouse, it is verified that it is consistent to what was ordered and the system generates an entry number. This entry number is put up on the extranet and the supplier can have access to it. The supplier gets the entry number and start the process of invoicing on the extranet. MSM types on the extranet all the information necessary for the invoice and the system checks that the information provided by the supplier matches what it is contained in the purchase order. Only when this is verified and approved, a bar code will be released on the extranet. The supplier will then paste this bar code on the invoice and send it by regularly mail to the financial department. According to BM, the reason for why they still send the invoices in paper and not electronically lies on audit matters. The supply activities end with the performance evaluation of the suppliers.

Before the use of the extranet for the supply activities, BM explains that the process they followed was similar to the actual one. The main differences are highlighted below:

- Order request: before the extranet, MSM had another portal where the supplier could also see the purchase orders they had. There was not extranet2 where they could do a bidding process.
- Order fulfillment: the main differences here were that they could not exchange information with each other and there was not “fast track” where the buyer could see the status and location of the order.
- Reception and Invoicing: here was where the biggest change was made. The finance department had to receive in its mailbox the purchase order with a stamp from the warehouse indicating that they had receive it. The supplier sent the invoices to the financial department via regular mail with a stamp from the warehouse –that indicated that they had received the product(s). According to BM, the big problems

were that they had not saved records and many invoices were rejected due to mismatches in currency, amount of money, number of pieces, among others.

5.2.3 Goals and Objectives for Implementing the Extranet

When MSM decided to have a single entity to handle the purchasing of the steel companies of the group they were forced to standardize purchasing procedures and support them with a single IT backbone –where the extranet is a fundamental part.

According to BM, MSM started to use the extranet for the supply activities because they wanted a tool that helped them to manage more effectively the process of purchasing. MSM buys a large quantity of products and they found that the best way to do so was through an extranet. This would give the buyers more time to negotiate better contracts and leave the operational part of purchasing to the extranet.

Moreover, BM adds that MSM started to use the extranet so they could have a more transparent process where the buyer is able to follow the purchase order throughout the whole cycle. And the exchange of information between the parties is registered on the extranet –in case a problem arises. Unfortunately, BM adds, the purchase department is a part of the company where the people involved can steal money hence the importance of having a transparent process.

Another very important aspect that MSM wanted to accomplish with the extranet was to save time. No more time spending on calls, sending purchase orders by fax or regular mail but instead to employ that time on other activities, like taking care of negotiations or customers. By having all of the participants involved (buyer, supplier and financial department) well communicated, MSM is able to avoid errors due to misunderstandings and therefore costly rejections of orders or invoices.

Based on the discussion above, BM feels that the main goal they had when implementing the extranet was to save costs. This cost saving was to be achieved by decreasing the turnaround time, improving the accuracy of the orders and invoices, improving delivery time, reducing the time that the personnel spent on purchasing; in general terms reducing the cost of generating purchase orders. BM also mentioned that enhancing the corporate image is partly to be achieved by this extranet implementation. The company wants to give an image of an IT up-to-date organization that desires to take full advantage of the available technology. Finally, BM mentioned that enhancing the partnership with the suppliers was also a goal to be achieved through the implementation of the extranet. They believed that the extranet will allow them to have more accessible information –for suppliers and buyer, leading then to the sharing of valuable information and ultimately a better relationship with suppliers.

5.2.4 Impact of the Extranet in the Supply Activities

According to BM, the feeling towards the extranet implementation is positive. Even though it has not been so long since they started with it, positive results have already aroused.

The order issuing process is completed in less than one day –compare to many days it could have taken previous to the extranet. Before, the orders held under a contract were generated automatically too. The difference then was that instead of placing those orders on the extranet, the supplier received an email. The problem was that these emails sometimes got lost due to improper registration of the email address or other types of errors. Another form of positive outcome is the case of the people in the financial department. They now can save much time by not having to thoroughly check every invoice since they have now the bar code pasted on them –which indicates that what it is paid matches what it was received at the warehouse. There are a lot of products and services that need to be bought so without an extranet BM feels that it would be practically impossible to keep up with the work load. “The process is more efficient and transparent, it is possible to take care of the work load without jeopardizing the quality of it”, she adds. The performance level which comprises the ratio between the requirements met by the delivery date (or earlier) and the total number of requirements, went up from 70% up to 87% ratio. Before the extranet, some of the purchase orders could have been lost and it took more time to send the order to the supplier. If there was something wrong with the order, the supplier would have left it “for later” –increasing in this way the cycle time. The delivery time was also remarkably improved since the extranet allowed the suppliers to see at any time the pending orders that they have. The purchase orders do not get lost anymore, like some of them did before and the suppliers are now actually delivering when they promised to deliver, adds BM.

Inventory reduction was not seen as an objective for MSM, however the more efficient purchasing process obtained through the extranet implementation led to a positive impact regarding the inventory. The extranet allows that the ordered products are in the warehouse when they are needed. Another aspect that was not considered directly as an objective but still a form of outcome was obtained for it, is the reduction of paper transactions. BM says that now the purchase orders are on the extranet so there is no need to use paper through fax or regular mail. There is no need to have them in paper in order to be processed.

Communication between the people at the warehouse, the suppliers and the financial department is also greater than before, though people are still getting used to this new tool. The financial department has reported that the rejection of invoices due to mismatches is practically zero –compared to approximately 20% of rejections that they had before. BM also states that the suppliers are able to access all the information that they are required to meet (i.e. their delivery times), after the implementation of the extranet. As a consequence, they have had more responsive suppliers which leads to an improved relationship between the two parties.

With respect to corporate image, BM mentions that MSM wants to be leader within the industry and they believe that their approach towards IT differentiates them from the competitors. The extranet has come then, to reinforce this IT image of MSM.

As we mentioned before the extranet use started in June 2007, so it is still hard to get a real measurement of the impact it has had (i.e. amount of money saved on a certain period of time). Nevertheless this particular unit of MSM believes that they will achieve the same positive results that the other units all around the world have accomplished through the extranet.

5.2.5 External and Internal Factors that Influence the Implementation of the Extranet

BM perceives that proper training and to clearly communicate the intentions and characteristics of the extranet are two important factors that influence the successful implementation of it. The interviewee feels that it is necessary to have a combined and organized training where suppliers, buyers, and everybody involved in the extranet use take an active part. BM also states that the effort of MSM of having the best IT systems with the best people and the best support is captured by the general staff, the employees are aware of the advantages IT can bring. However, some of the older people in the crew are somehow the most reluctant towards the use of the extranet. In general terms, the culture of MSM which is directly reflected in the entity in charge of purchasing, is that of a close tight to IT.

BM states that the overall strategy of MSM is to be global leaders for one of the companies in the group and leaders in Latin America for the others. To achieve that leadership they need to acquire more market and produce more. MSM feels that IT can bring control and homogeneity to the supply process. The strategy of MSM suggests a direct connection to the successful implementation of the extranet.

Some other internal factors that influence the implementation of the extranet, pointed out by BM are: the strong commitment of senior management to the implementation of the extranet; the IT infrastructure of the organization and IT management performance as well as the technical skills of both IT staff and extranet users.

For the external factors, BM points out that good technology available nowadays is a positive influence. MSM classifies its suppliers in three groups: critical, strategic and the ones that do not fit in either of the other two groups. MSM attempts to have a strong linkage –where the extranet perfectly fits in, with the first two groups, specially the critical ones.

Although MSM did not implement the extranet because its competitors where doing it, BM feels that at some point it did have something to do. The overproduction of steel in China is creating fear of their possible incursion in the American market. MSM itself has

planned to gain market in the U.S. while still keeping the own. BM also states that this in turn provokes that MSM looks for ways of being more competitive; a way of doing so is being more effective and thus have less costs in the supply process. That effectiveness and decrease in costs can be achieved with an extranet. In addition, MSM feels that be seen as a company that is closely tied to IT transmits a positive image of it and hence provides a competitive advantage. Moreover BM says that the size of the company is an aspect to be taken into account when implementing the extranet. She believes that the “small” suppliers are less willing to see that the extranet can bring benefits, what makes it harder to work with them. BM also perceives that people in her country do not usually like to change the way they are used to doing things, which also brings obstacles to a good implementation of the extranet.

5.3 Wuyang-Honda Motors (Guangzhou) Co., Ltd.

Wuyang-Honda Motors (Guangzhou) Co., Ltd. is a motorcycle production and sales joint venture in China between Honda and Guangzhou Motors Group Company. It was established in the year of 1992. It is one of the biggest motorcycle manufactures in China.

WH owns two brands: “wuyang-honda” and “wuyang”. And its products can be classified into four big categories: touring/sport touring, cruiser/ standard, sport and off-road. Within these four product families, there are more than 400 types of motorcycles. WH’s products are sold to 60 countries around the world.

In February 2006, WH invested 380 million RMB (approximately 51 million US dollars) to build a new motorcycle plant in Zeng Cheng, Guangzhou. The annual production capacity of the new plant is 1 million units.

5.3.1 General Information

As a motorcycle manufacturer, the materials that WH acquires are: spare parts and accessories. In order to produce one motorcycle, WH needs to purchase more than 400 spare parts –from big ones like metal frame, front fork and handle bar to small ones like spring and oil wire. Besides spare parts, WH also purchases some accessories with low value, for example: decorate cover, fairing and stickers.

The purchase frequency for both spare parts and accessories is very high. Usually, there are 2000 batches of ordered products that arrive at WH’s warehouse everyday. And the total amount of money spent on purchasing is about 300 million RMB every year (approximately 40 million USD).

WH has nearly 280 suppliers so far; 98% of these suppliers are from China. Most of the suppliers also compete in the manufacturing industry and produce the spare parts for motorcycles or cars.

In January 2006, WH launched the extranet application in the purchase department. The extranet is called iSupplier Portal (ISP). This portal integrates its 280 suppliers together and simplifies the purchasing and inbound logistics process to a large extent.

5.3.2 The Supply Activities

The supply activities conducted by WH can also be described in three phases:

- Order making: sales planning report is treated as one kind of input of the online Material Requirement Planning (MRP) system. So, the data will be captured by MRP automatically. At the production department, MRP calculates the request number of components according to the numbers of final products, inventory level and BOM (Bill of Material). Then the online MRP can find out the result about when and how many should be ordered.
- Purchasing: MRP does the calculation of the time of placing orders and the quantity of requested products. Then the calculation results are transferred to suppliers through the extranet automatically. Suppliers can see when and how many they should deliver to WH by logging in the ISP. Of course, only the suppliers who have already signed contract with WH have access to ISP. If there is a need to make changes about order details, WH can modify the information on ISP. At the same time, a reminding notice of changes will be sent to suppliers automatically. ISP allows the people in purchasing to check the shipping status, which is also called shipment tracking. By having this information at hand, WH always knows where these ordered products are, physically.
- Receiving and inbound logistics: after the ordered products arrive at WH's warehouse, purchase department can check the information through electronic identification code. Since every component and material has now a unique code in the system, the staff in logistics is able to scan the code with a portable scanner when they receive the ordered products. Staff in the purchase department can see the real-time information through ISP. Basically, the confirmation work is done electronically. Only when necessary, the staff will be sent and conduct the spot check. Besides, the staff in logistics knows when the required materials should be delivered to a specific place. The place could be the warehouse, production plant, even a specific workstation.

Invoices are now in electronic form also, and the payment is done once a month. Therefore, there is almost no paper transaction between WH and its suppliers when handling invoices.

Like in the case of GITI Tire, before the extranet was used, almost all communication and transactions between WH and its suppliers were done offline and manually. Therefore, a lot of human work and paper documents were needed. The supply activities that took place before the extranet's implementation were similar to the three phases stated above. These activities are discussed below:

- Purchase planning: WH developed a kind of software which could be used to translate a sales plan into a production plan. The production plan contained the required quantities of components.
- Purchase: based on the requirement of components (offline MRP), paper orders were sent to supplier by fax. If it was necessary to make adjustments to the order, WH used phone calls to make changes on ordered quantity or delivery time.
- Receiving: ordered products arrived at WH's warehouse with many paper documents. Both products and papers should be checked and then put into the warehouse. Due to the heavy workload, it was not possible for the staff to check every batch of received products on spot. The received invoice of every purchase was put in the computer system manually. The payment was done once every month.

5.3.3 Goals and Objectives for Implementing the Extranet

We have mention that the ISP was lunched in January of 2006. This initiative was taken due to WH's plan of expanding their production capacity in that same year. According to the purchase manager, the old production volume was 60 million units a year, but the desired capacity should reach 100 million units a year. So the production capacity was almost doubled after the expansion. However, WH faced some challenges when they decided to expand the factory.

First of all, producing motorcycles is a very complex process which requires more than four hundred spare parts and going through different working procedures. Besides the complex production process, WH has a wide variety of products –as we mentioned before, four hundred kinds of products. Therefore, the management of material supply and logistics is extremely complicated. Second, the traditional offline purchasing and logistics application could not satisfy bigger production capacity anymore. Since the old way of handling purchasing and logistics required an intensive input of experienced labour. And this problem could not be solved by only investing on labour hiring. A bigger production volume requires a more flexible and accurate supply support. That means a radical change of doing things was needed. Last but not least, WH planned to reduce the cost in inventory. They used to have an 8061m² warehouse and it cost a lot of money to maintain such a big warehouse. According to the design for the new plant, the warehouse was supposed to be reduced by 60%. Finally, the extranet was considered as a possible method to improve supply efficiency.

Based on the discussion above, the purchase manager perceives the goals and objectives of implementing extranet were: cost reduction and to strengthen partnership with suppliers. WH expected that the cost could be reduced by eliminating paper transaction, having lower inventory level, shorter delivery time, better accuracy of order processing and shorter order cycle time.

The purchase manager also says that WH perceived enhancing partnership with suppliers as a goal for the implementation of extranet in supply activities. WH hoped the extranet could be used as a powerful communication platform which might make the relationship with suppliers closer and tighter. In return, suppliers could be more responsive to WH's orders-related problems.

5.3.4 Impact of the Extranet in the Supply Activities

According to the purchase manager, WH is satisfied with the results of implementing extranet. They have achieved the goals of cost saving and enhancing partnership with suppliers. Out of WH's expectation, they feel the corporate image is also improved.

The purchase manager states that the cost saving was achieved by eliminating paper transactions, decreasing inventory level, having a shorter order cycle time and higher accuracy in order processing. Before the extranet was adopted, 50 or even more pages of paper files were used to complete a single order, but now there is no paper transaction at all under a normal situation. Only when unexpected problems occur, a few pages of paper are needed. The inventory level was decreased by 62%. Before, WH stored everything in the warehouse for safety considerations. Now, the application of online Material Requirement Planning (MRP) and extranet make the planning of material requirements more accurate and precise. Most of the ordered materials first arrive at WH's buffer area, and soon are transported to the production lines. So basically, some of the materials will not be put into the warehouse. Not only time is saved but accuracy is also improved. The order accuracy is as high as 98% currently, which is 20% higher than before.

All the 280 suppliers are involved in this iSupplier Portal (ISP) application. The purchase manager says that WH is not the only one who benefits from the ISP application. Suppliers feel their workload is reduced and the efficiency is increased too. So the willingness of participating in ISP and sharing information through it is high. By gaining benefits, suppliers became more responsive and cooperative.

Regarding enhancing corporate image, this is something that was not part of WH's goals and objectives for implementing ISP, says the purchase manager. However, feedbacks from suppliers show that 93% of them feel that WH has become a more reliable business partner. In addition, there are 18% more suppliers that treat WH as their critical partner after the adoption of extranet.

5.3.5 External and Internal Factors that Influence the Implementation of the Extranet

The external factor identified by purchase manager is exchange partners. With the purpose of identifying the potential partners with whom extranet connections could be profitable, WH has a comprehensive system of supplier evaluation. There are many criteria on the list and WH will put a score after each item based on their performance. The total score will decide which group the supplier should belong to. WH classifies suppliers into four groups: A, B1, B2, C based on their importance to the company.

Group A stands for the most critical one and group C stands for minor partners. A group A supplier could be moved to group C or even be abandoned, if its performance becomes worse. In the future, the number of WH's suppliers will be decreased, some low performance suppliers' contracts will be terminated, adds purchase manager.

Purchase manager does not think the decision of adopting extranet was driven by competitors, since WH made this kind of decision based on needs of its own development. The development refers to the expansion of company's scale.

The internal factors identified by purchase manger are: commitment of senior management, IT resources which includes: IT infrastructure and technical skills of staff. The purchase manager thinks the commitment is very important for WH's successful implementation of extranet. She also says that the company requested that all the senior leaders in purchasing, logistics and IT departments participated in the implementation project in person and allocated good resources –both human and financial, to this project. Even after the extranet was established, senior management still paid a lot of attention to it. Twenty five improvement plans were approved and a reinvestment of 1 million RMB was made.

The IT resources are perceived as being very outstanding, by the purchase manager. She states that the company invests a lot on the IT development and staff training every year. So the outstanding quality of the IT resources has a positive effect on the implementation of the extranet.

6. Data Analysis

This chapter analyzes the data presented in chapter 5 in form of three cases. The data analysis is done through within case analysis –where the empirical data from the three cases is compared against theory, and a cross case analysis –where cases are compared against each other.

6.1 With-in case Analysis of GITI Tire Investment Company Ltd.

6.1.1 Supply Activities

Based on several authors' (e.g. Lancioni et. al, 2000; Robinson et. al, 1967; Novack and Simco, 1991) theories, we constructed a list of supply activities which goes from placing an order directly to suppliers until making the post-purchase/performance evaluation.

Table 6.1 is to present a comparison between the series of activities of the supply process and the practices carried out by GITI Tire. The checked boxes (√) indicate that the correspondent activity is done by GITI Tire. While the check-asterisk (√*) boxes indicate that the correspondent activity is at some extent done by GITI Tire, though is not completely accurate to what stated in theory. Finally, the asterisk (*) shows that the activity in matter is done by GITI Tire and it is applicable throughout all the supply phases.

Table 6.1 GITI Tire within case analysis

Supply Activities		GITI Tire Supply phases
1. Place order directly to suppliers	√	Order making
2. Schedule deliveries	√	
3. If applicable, notification of changes in configurations in ordered products	√	Order fulfillment
4. Track shipments		
5. Check the status of orders placed with vendors	√	
6. Respond to problems that may arise, for example late deliveries, stock-outs, alterations in scheduled shipment dates, late arrivals, and a wide variety of other service issues	√	Receiving
7. Receive ordered products	√	
8. Receive, inspect and pay invoices, as well as check debit balances		
9. Make post-purchase/performance evaluation	√	
10. Constant supplier-manufacturer communication	*	

According to the theory, there are ten ways of how extranet can be used to handle supply activities. By comparing the theory and the practices of GITI Tire, we find that most activities conducted by GITI Tire go together with the theory. However, there are still some differences that demand our attention.

GITI's extranet can be used to place order directly to suppliers by logging in the system. People in the purchase department need to fill in an electronic form online. In that form, the information of product name, product configuration, order quantity, preferred delivery date and receiving date should be specified. After sending orders to the appointed supplier, GITI can see the status of the placed order: accepted or unaccepted, preparing and delivered. Sometimes, a few changes on the order's configurations are needed. GITI Tire is able to make these changes through extranet by updating the order specifications and sending notices to suppliers. But there is not so much that can be changed here, only the number of desired products and delivery date are changeable. And all these changes are valid until they are approved by suppliers. Some problems may arise during the purchasing phase, for example emergency stock-out, late delivery, late arrivals and so on. These problems are negotiable through extranet. GITI Tire can send requests to suppliers and wait for responses, and then new requests can be made according to the responses. Until GITI Tire and suppliers reach an agreement, the negotiation process is terminated. When the ordered products arriving at GITI Tire are accepted, GITI Tire will update the information on the extranet again in order to let the suppliers know that the products have been actually received. Making the performance evaluation is something that is always done at the end of the supply process. The evaluation results are transferred to suppliers through the extranet.

As we mentioned at the beginning, some differences between the theory and GITI Tire's practices are noticed. First of all, according to Lancioni et. al (2000), the extranet can be used to track shipments of the ordered products. In the case of GITI Tire, this application is not used since GITI Tire's extranet does not have the capability to deal with logistics issues so far. What is more, "receive, inspect and pay invoices, as well as check debit balances" is also not applicable in GITI Tire's case. The reason for this phenomenon is that the extranet is not integrated with GITI Tire's financial system yet, so the information of invoices and debit balances is not available on the extranet. There are only few suppliers who are involved in the extranet so far, in order to integrate the accounting and financing operations related to all suppliers, GITI Tire uses a separate system to handle invoices. When it comes to the last activity that appears in the list, constant supplier-manufacturer communication, GITI Tire considers that it is present throughout the whole supply process.

6.1.2 Goals, Objectives and Outcome of Implementing Extranet in the Supply Activities

The theoretical framework presented in chapter 3 for objectives and goals that companies set when implementing the extranet is the same used for the outcome or impact of the mentioned. Hence this section presents similarities and differences encountered between

theory and GITI Tire –for all the three aspects: goals, objectives and impacts. The same criteria will apply for the other two cases –MSM and Wuyang-Honda.

- Cost Saving

The first objective identified by GITI Tire is reducing paper transaction. After more than one year since the application of the extranet started, GITI Tire has almost got rid of all the paper work. Many things are done online and there is no need to keep paper documents anymore. For example: the orders, the confirmation of orders, the product catalogue, among others. Three employees are “set free” from the paper handling job and relocated to other positions.

Shorter order cycle time and reduced order processing are also seen as objectives by GITI Tire. In fact, due to the improved information speed and accuracy, the material flow has also streamlined, so the time elapsed from making an order to actually receiving the order has reduced greatly. GITI has reduced 30 hours per month in making and processing orders.

Inventory reduction is one of the eight objectives mentioned in theory. It is confirmed in GITI Tire’s case. PF manager says that since they have a more accurate order time and order quantity, they always order exactly what they want and seldom order extra material to be put in warehouse.

Improved accuracy of orders and reduced cost of generating orders are the last two objectives identified by GITI Tire. GITI Tire used to make the orders manually, people wrote everything down and typed them into computers, so mistakes was unavoidable. Then extra money needed to be paid in order to change things right. But with the application of extranet the possibility of making mistakes in the orders is getting lower, since most data comes from computer systems and writing mistakes are removed. Compared to the old ways of making orders –through regular mail or fax, the cost of making orders through extranet has decreased dramatically. Since it costs almost nothing to fill in an online order and send it to suppliers.

However, improved delivery time and elimination of supplier selection and bidding process are not seen as objectives by GITI Tire. According to PF manager, GITI Tire perceives that the delivery time is more related to the logistics operations which can not be handled by GITI Tire’s extranet so far. Moreover, the extranet was just applied to a few selected suppliers and they did not plan to use it to facilitate the online bidding process.

- Enhance partnership with suppliers

Some authors (e.g. Anandarajan *et al*, 1998; Min and Galle, 1999; Angeles, 2001) state that to enhance business-to-business partnership can be a goal to be achieved when implementing extranet. But the case of GITI Tire does not match the theory. PF manager believes that lower price, better product and longer payment period are the key factors

that influence the business-to-business relationship and all of them can not be improved by extranet solely. However, as we mentioned in the data presentation, the communication network and sharing of information was proved to be better in GITI Tire after the extranet. Due to this reason, PF manager thinks the outcome of enhancing partnership with suppliers has been achieved, though it was not set as a goal before.

- Enhance corporate image

According to Vlosky et. al (2000), enhancing corporate image can also be a goal for adopting the extranet. However, GITI Tire does not consider it as a goal for them due to the narrow application of the extranet.

To summarize, GITI Tire is overall satisfied with the results of the application of the extranet. The goal of cost saving has been achieved by getting rid of the paper work and reducing 30 hours per month for making the orders. Additionally, three employees are “set free” from the paper handling job. As a result of the streamline of the order process, the accuracy, time and cost of handling orders are all improved to a large extent. Therefore, we can say that the outcome of implementing the extranet in supply activities is consistent with what they expected and mostly in accordance to the theories.

6.1.3 External and Internal Factors Influencing the Extranet Implementation

According to Kallioranta and Vlosky (2004), there are seven factors that may influence the implementation of extranet. This includes environment, competition and exchange of partners –which are external factors, and corporate culture, corporate structure, technical resources as well as corporate strategy –which are internal factors.

- Internal Factors

In the case of GITI Tire, the PF manager points out two internal and two external factors which are listed in the theory. The internal factors are: corporate structure and technical resources, and the external factors are: environment and competitors. The PF manager also indentifies two critical factors for GITI Tire’s implementation of extranet that is not mentioned in Kallioranta and Vlosky’s (2004) model. These factors are: training –the internal one, and the technical limitations of suppliers –the external one.

The first factor mentioned in Kallioranta and Vlosky’s (2004) model is corporate culture. The PF manager perceives that the willingness to share knowledge within the organization is low, but the he does not feel the implementation of extranet is hindered by the low willingness to share knowledge. Extranet in GITI Tire turns out to work normally, so GITI Tire does not consider that corporate culture is a critical factor for successful implementation of extranet.

When it comes to the second factor indentified by Kallioranta and Vlosky (2004): corporate structure, it is validated by GITI Tire’s experience. PF manager states that GITI

Tire has a hierarchical structure which means that they have different levels of management from the top to the operational level. He also believes that the commitment from both senior management and staff is very important to the successful implementation of extranet. Without the coordination from senior management and the acceptance from staffs, the desired goals simply could not be achieved.

The PF manager also perceives the technical resources as one of the critical factors. He thinks that the IT infrastructure and the IT skills of both managers and staffs are good, which at the same time, have positive effects on the successful extranet's implementation. Due to the high level of computer and information systems' applications in many of the departments of GITI Tire, a radical redesign of the formers was not required. This advantage saved a lot of time and money when implementing the extranet. Since many employees have an acceptable level of computer skills, the adoption of the extranet did not require a heavy investment on training in this matter.

The PF manager adds that although their employees have some basic knowledge of computer and information systems, it does not mean that providing training on extranet usage is not important. In fact, PF manager perceives training as a very important factor that has close relationship with the extranet implementation. He explains that the main purpose of training is to change the staff's opinions about extranet as well as their old working habits. The adoption of extranet will change people's working flow and working contents to a great extent, being this the most difficult part for employees to get used to.

● External Factors

According to Kallioranta and Vlosky (2004), the environment is an external factor that can affect the implementation of extranet. They also explain that the environment includes many aspects, such as political, economic, social, technological, and legal. In the case of GITI Tire, they see that environment does affect their implementation of extranet and they feel that the technological trends that exist in China are favorable. As we stated in chapter 5, the PF manager feels that there are better and cheaper information technology options than before. This, at the same time, allows companies to improve their business operations.

Competitor is the second external factor that is confirmed by the case of GITI Tire. According to the PF manager, their commitment to extranet is to some extent driven by competitors in the tire manufacturing industry. Several applications of information technology (for example MRP, extranet) in GITI Tire were considered as responses to the fast development of IT application within the industry. During the implementation, GITI Tire always kept an eye on how competitors were doing, some good practices were borrowed from competitors and the final results showed that these practices did work in GITI Tire.

Exchange partner is the last factor identified by Kallioranta and Vlosky (2004). This factor is also applied in GITI Tire. Only a few suppliers were involved in the extranet, since after investigating suppliers' IT infrastructure, GITI Tire found that a lot of

differences existed between the computer systems. And these un-compatibilities led to the exclusion of many suppliers.

Apart from the factors listed in the model developed by Kallioranta and Vlosky (2004), GITI Tire came up with a new external factor: the technical limitation from suppliers. We have mentioned before that the extranet was applied in a very narrow scale –it was only applied to the subsidiary company of GITI Tire because they have similar IT infrastructure. GITI Tire felt that it was hard to integrate all of its suppliers to this extranet since most of them have different IT applications and the necessary changes are not easy to make within a short period.

6.2 With-in case Analysis of MSM

6.2.1 Supply Activities

Just as it was done with case study number one –GITI Tire, the supply activities that take part in MSM will be compared to the theoretical list of supply activities. In addition, the same criteria used on Table 6.1 regarding the symbols (\checkmark , \checkmark^* , $*$) will be applied on Table 6.2

Table 6.2 The supply activities for MSM.

Supply Activities	MSM	MSM Supply Phases
1. Place order directly to suppliers	\checkmark	Order request
2. Schedule deliveries	\checkmark	
3. Check the status of orders placed with vendors	\checkmark	Order fulfillment
4. Track shipments	\checkmark	
5. If applicable, notification of changes in configurations in ordered products	\checkmark^*	
6. Respond to problems that may arise, for example late deliveries, stock-outs, alterations in scheduled shipment dates, late arrivals, and a wide variety of other service issues	\checkmark	
7. Receive ordered products	\checkmark	Reception and Invoicing
8. Receive, inspect and pay invoices, as well as check debit balances	\checkmark^*	
9. Make post-purchase/performance evaluation		
10. Constant supplier-manufacturer communication	*	

From Table 6.2 we can see that nearly all of the activities that theory says are followed by MSM. By having a direct connection with their suppliers through the extranet, MSM is able to place an order and schedule the deliveries of them. If the supplier, during the processing of the order, has to change the time of the delivery, he can notify it to the

buyer through the extranet. According to BM, with the use of MSM's "fast track" it is also possible to know at any time the location of the order as well as the status of it.

There is however two activities that are not fully consistent to what theory says, Lancioni et. al (2000) states that it is possible to receive, inspect and pay invoices through the extranet. In the case of MSM it is indeed possible to make an inspection of the invoices through the extranet, as a matter of fact, the invoices must be "approved" on the extranet before the supplier can send it via regular mail to the financial department. But the extranet serves just as a tool that ensures that what the supplier is putting down in the invoice was actually what it was received at the warehouse. It is not yet possible to receive and pay the invoices through the extranet. Lancioni et. al (2000) also states that if it is the case, changes in configuration of products can be made on the extranet. BM says that in MSM it is not possible to notify on changes in the configuration of products. She adds that, since the purchasing on the extranet is based on a contract with products of certain specifications, it is not possible to make such changes. However, changes in the delivery time can be notified on the extranet but the buyer needs to approve those changes or negotiate them. BM also says that if some extraordinary changes need to be done, these will be handled "offline".

Finally, the list of supply activities taken from theory says that constant supplier-manufacturer communication can be carried out on the extranet. MSM is in concordance with theory; BM adds that constant communication is present along all of the supply activities that take place in MSM. One of the aims of the extranet was in fact to increase the communication between the two parties.

On the other hand there is one point where theory and what is done by MSM do not fully convene. The post-purchase/performance evaluation is not taken on the extranet but rather in the "offline" world. BM adds that it is just an internal control where MSM can see how accurate have every supplier been to what they had promised.

6.2.2 Goals, Objectives and Outcome of Implementing Extranet in Supply Activities

- Cost Saving

As it was mentioned before, authors like Min and Galle (1999) and Angeles (2001) state that cost reduction is the main motivator for companies when implementing extranets. In the case of MSM, they wanted to have a more effective supply process. A more effective supply process means less time, less cost and ultimately less money. Hence this case reinforces what the authors mentioned before stated. In the frame of reference (chapter 3) it is stated that cost saving can be achieved by different ways or objectives.

An objective identified by Min and Galle (1999) is the reduction of the order processing which at the same time leads to shorter order cycle. According to BM, the organization wanted to have less time employed on processing an order. The order processing time has been reduced to less than a day after implementing the extranet. Anandarajan (1998) says that improving the delivery time is also an objective for organizations when implementing the extranet. MSM agrees with this and according to BM, the suppliers

have been able to remarkably improve their delivery time after the extranet. Angeles (2006) says that the reduction of cost for generating a purchase order is another objective; again this objective is on MSM's mind since utilizing less time on generating a purchase order means that it will cost less. MSM does not know yet how much less money is spent on generating an order since as it has been said, this extranet just started in June 2007.

According to BM, MSM sees that improving accuracy of the orders is an objective. The latter goes in accordance to what Angeles (2006) says. MSM has improved the accuracy of its orders by sending the information directly from their Material Requirement Planning (MRP) system to the extranet. In that way mistakes are avoided and the suppliers can get accurately the ordered product's information. Another important aspect that it is linked to this objective but not directly stated in theory is the accuracy of the invoices. This was a very important objective for MSM. By letting the extranet checking that not mismatches exist between what it was received at the warehouse and what the supplier writes in the invoice, MSM has notably decreased the invoice rejection from 20% to practically zero.

On the other hand, there are objectives contained in theory that MSM does not identify as theirs and also objectives not found in theory that MSM considered. For the former, MSM does not see the elimination of supplier selection and bidding process as an objective for this extranet. The reason is that this extranet is meant to be used with the suppliers already chosen. Another objective not directly considered by MSM is to reduce paper transactions. However, even though MSM did not consider paper reduction as an objective, they still obtained an outcome on this matter. They have reduced its paper transactions by placing the orders directly on the extranet, no product catalogs or not order confirmation papers. Finally, inventory reduction was not something MSM had in mind when implementing the extranet. Nevertheless, BM states that with the aid of the extranet MSM is able to have the ordered products in their warehouse at the time they are needed.

As with respect to the objectives not found in theory, MSM saw the fact of having a more transparent process as being an objective for implementing the extranet in the supply activities. The purchase department was a part of the company where money was stolen, so with this extranet remarkable progress has been made. Finally, BM complements on the objective of saving time in the supply process. She says that the extranet allows MSM to save costs by giving the buyers more time that can be used for negotiating better and cheaper contracts.

- Enhance partnership with suppliers

MSM sees that enhancing partnership with suppliers is a goal for them. According to BM, the communication between MSM and its suppliers has been greater with the extranet and the partnership has as well been strengthened. All of the objectives linked to this goal in theory were also considered by MSM.

The establishment of a web B2B communication network is certainly an objective that MSM agrees on. They wanted to have all of the parties involved in the supply activities

interconnected with each other. In addition, BM says that what Vlosky et. al (2000) states regarding sharing of information is also an objective they had in MSM. For the organization it is very important that everybody utilizes the available information resources and take full advantage of it by constantly communicating through the extranet. Moreover, BM adds that it is hard to give a precise answer on whether the past two objectives have been fully accomplished or not. However, she says that the sharing of information is indeed greater than before as well as the accessibility of the information. Yet people are still getting used to this new tool. On the other hand the web B2B communication network was obviously accomplished from the moment the extranet started, she also says that the communication network works properly, is well supported and it is easy to use.

Overall, the position of MSM on enhancing partnership with suppliers supports theory.

- Enhance corporate image

MSM goes along with what Vlosky et. al (2000) say on this regard. For the organization it is important to show to the public eye that it is a company that is aware of the available technology and that knows how to utilize it. BM adds that in a competitive industry like the steel, it is important to distinguish yourselves from the others, and IT is one of the forms to do so.

6.2.3 External and Internal Factors Influencing the Extranet Implementation

Kallioranta and Vlosky (2004) identify some internal and external factors that are influential when implementing the extranet. Based on the MSM's case, some of these are actually influential and others not.

- Internal factors

Corporate culture implies the willingness to share knowledge both within the organization and with business partners. BM says that in MSM there is not big willingness to share knowledge. However, with the extranet this attitude changed towards the business partners and the people in MSM is willing to share more and more knowledge. Within the organization, though, the attitude remained more or less the same. So, contrary to theory, it is not completely true that corporate culture is a factor that influences the successful implementation of the extranet.

The corporate structure, on the other hand is a factor that in the case of MSM was found to be influential. The commitment of the senior management and staff towards IT –more specifically to the extranet, is big. The technical resources are also an influential factor. BM perceives that having the right technical skills, equipment and IT management performance is directly connected to a successful implementation of the extranet. Last but not least, corporate strategy was found to be an influential factor. The strategy of MSM is that of being a leader within the steel industry. According to BM, this strategy implies being a global company that produces a lot and thus consumes a lot of resources. For this

reason having a tool like the extranet –which handles the supply activities effectively, is necessary. The strategy of MSM implies, at the same time, a global company that knows how to fully employ IT in its business practices.

One influential factor that is not included in theory but MSM considers being very important when implementing the extranet is training. BM says that a combined and organized training where the personnel involved in the use of the extranet –from both buyer and suppliers, participate is indispensable.

- External factors

Kallioranta and Vlosky states that the implementation of the extranet should not be only done because competitors are doing it neither ignored if competitors use the extranet. Although the implementation of the extranet in MSM was at none extent solely driven by competition, the organization has looked around it and realized that the use of the extranet can also bring a competitive advantage over the others. The competitors are then a factor that influences the successful implementation of the extranet.

Moreover, MSM found that some elements of the environment have an influence on the implementation of the extranet. BM adds that it is important that the technological developments are out there and are available for the companies. If it is way too expensive or does not have the performance it should, to implement an extranet would be practically impossible. Finally, the factor regarding exchange partners is also an influential factor. MSM perceives that critical and strategic partners are better to connect with an extranet. The small suppliers, on the other hand, are usually less willing to accept the extranet –maybe because they do not see the benefits or simply do not have the resources that such tool requires.

6.3 With-in Case Analysis of Wuyang-Honda

6.3.1 Supply Activities

Following the same procedure we did for the other two cases, Table 6.3 on the following page will present a comparison between what WH does and what theory states. The same criteria regarding the symbology will be applied. The checked boxes (√) indicate that the correspondent activity is done by WH. The check-asterisk (√*) boxes indicate that the correspondent activity is at some extent done by WH. Finally, the asterisk (*) shows that the activity in matter is done by WH and it is applicable throughout all the supply phases.

Table 6.3 The supply activities for Wuyang-Honda

Supply Activities	WH	WH Supply Steps
1. Place order directly to suppliers	√	Order making
2. Schedule deliveries	√	
3. Check the status of orders placed with vendors	√	Purchase
4. Track shipments	√	
5. If applicable, notification of changes in configurations in ordered products	√	
6. Respond to problems that may arise, for example late deliveries, stock-outs, alterations in scheduled shipment dates, late arrivals, and a wide variety of other service issues	√	
7. Receive ordered products	√	Receiving and Inbound logistics
8. Receive, inspect and pay invoices, as well as check debit balances	√	
9. Make post-purchase/performance evaluation	√	
10. Constant supplier-manufacturer communication	*	

On Table 6.3 we can see that the supply activities that WH performs are really close to those stated in theory. Thereby, the case of WH reinforces what authors like Lancioni et. al (2000), Novack and Simco (1991), Robinson et. al (1967) and Chen and Paulraj (2003) state.

It is very interesting to see that all the activities listed in theory are reinforced by the case of WH. According to the purchase manager, the ISP of WH is a kind of comprehensive and extensive application of extranet in supply activities. The biggest feature of ISP is that it links all functions related to purchasing together: production, logistics and accounting. The configuration of orders, for example: the requested products, the desired number, the optimal order release date and planned receiving date come from the MRP system in the production department. Based on the mentioned information from the MRP system, the purchase department can make orders. Once the orders are made, they will be sent to suppliers through the extranet, and delivery will be scheduled at the same time. ISP is also a powerful communication platform which is able to facilitate the communication between WH and its 280 suppliers, permitting then to deal with order-related issues like: order configuration changes, stock-outs, late delivery and late arrivals. Information exchange is fast and convenient. Basically, all the problems can get fast responses from suppliers through the extranet.

More than just providing effective communication functions, ISP connects logistics and accounting operations, which in turn synchronizes the information flow among the different departments and simplifies the whole supply process. Take logistics for example, by having a unique identification code for each kind of spare part or material, the people

in logistics know from the extranet where the received products should be delivered to: the warehouse or a specific production plant. And the people in purchasing know the receiving status of the ordered products without going physically to the warehouses. ISP is connected with the accounting system also, every invoice from the suppliers will be sent to the accounting department. People in accounting inspect and confirm it, then a copy of the approved invoice will be sent back to suppliers through extranet.

6.3.2 Goals, objectives and Outcome of Implementing Extranet in the Supply Activities

- Cost Saving

Retaking the argument of Min and Galle (1999) and Angeles (2001), the major motivator for companies when implementing the extranet is cost saving. Again, in the case of WH, this applies. Purchase manager said that they hoped that the total cost could be driven down mainly by decreasing paper transactions and having much lower inventory level.

For the objective of reducing the number of paper transactions, WH went from using 50 pages per purchase order down to none when using the extranet. In the case of lowering the inventory level, WH ended up with a reduction of 62% when using the extranet.

Another objective mentioned by Min and Galle (1999) is to shorten the order cycle time, WH perceives that this is an objective for them. Purchase manager mentions that now they do not have to wait for the supplier to confirm receiving the order from WH. Before, it could have taken at least one working day and now it can be done in a couple of hours. The latter impacts also the objective of WH of reducing the order processing which is at the same time an objective stated in theory.

According to Anandarajan et al. (1998), improving delivery time is one of the expected benefits of implementing extranet. WH agrees with this since they considered it as one of their objectives, adds purchase manager. She also thinks that improved delivery time obviously leads to a shorter order cycle time. While improved delivery time focus more on the logistics issue during the order delivery procedure. Due to the more transparent information flow, the logistics efficiency improved a lot in WH, by enabling the people working in logistics to know exactly where the product(s) should be delivered to.

Vlosky and Kallioranta's (2004) mention that elimination of supplier selection and bidding process could be an objective for companies when implementing the extranet. However, this is not the case of WH. According to the purchase manager, ISP is only applied to already selected suppliers and can not support the online bidding process.

- Enhance partnership with suppliers

According to purchase manager, WH perceives that enhancing partnership with suppliers is a goal for them. In addition, they believe that this could be accomplished by three ways: the establishment of a web communication network, the sharing of information and an

improved B2B relationship. WH expected that the extranet would be a powerful communication tool and has actually been so. Purchase manager adds that the suppliers have seen the benefits of the extranet and are hence keener on sharing information, being more responsive and cooperative. This has in turn brought a better relationship between the manufacturer and its suppliers.

- Enhance corporate image

Vlosky et. al state that to enhance the corporate image is a goal for the organizations when implementing extranet. Contrary to theory, this was not really seen as a goal for WH. However, it interesting to mention that the fact of not setting enhancing corporate image as a goal does not mean that you can not have an outcome on that regard. According to purchase manager, after implementing the extranet, 93% of the suppliers feel that WH as become a more reliable business partner and there are 18% more suppliers that treat WH as their critical business partner.

6.3.3 External and Internal Factors Influencing the Extranet Implementation

- Internal Factors:

The purchase manager perceives that in WH, the willingness of sharing knowledge is not high. However, the implementation was not affected by this fact, so corporate culture is not a factor that influences the implementation of extranet.

The commitment of both senior managers and staffs is something that was specially stressed by purchase manager. She believes that the commitment from those two parties could be seen as the most important factor for the implementation process. The managers in different levels paid attention and gave priority to the implementation project. When problems or difficulties occurred, support from managers was always provided. The purchase manager also says that it was very good to see that most staff in the operation level had a positive attitude towards the implementation of the extranet, which made the process smoother.

Technical resources is another factor that influences WH's extranet implementation process. Purchase manager perceives that the IT infrastructure and the computer skills of employees are excellent. WH has implemented many IT applications before, so they have accumulated many experiences on IT implementation. And employees know how to change their working methods and how to get used to this new technology quickly. These technical and skill resources gave a big advantage when WH implemented the extranet in 2006.

In February 2006, WH established a new plant in Zeng Cheng, Guangzhou in order to reach the annual production volume of one million units. The expansion decision was made due to their development strategy: to be the No.1 motorcycle manufacturer in China. At the same time, the adoption of the extranet was seen as the best way to support this

expansion decision. So the decision of implementing an extranet was derived from and integrated into the existing strategy: to be the biggest motorcycle producer in China. This discussion confirms then what Kallioranta and Vlosky (2004) state in their theory: corporate strategy is an influencing factor for extranet implementation.

Just as with the other two cases –GITI Tire and MSM, training is a factor mentioned by purchase manager, she even perceives that the employees of WH have excellent computer skills. The objective of training is not only to teach employees on how to use the extranet, but also to try to clarify the right intentions or purposes of the application of the extranet: the adoption of the extranet is not a threat to their current positions, but a tool to help them reduce their work-load.

- External Factors:

Kallioranta and Vlosky (2004) mention three external factors in their theory, but there is only one factor that is applied to the case of WH: exchange partners. Classifying 280 suppliers into different groups according to their importance and profitability is actually very helpful when implementing the extranet. WH gave different priorities and executed different methods when deciding on which supplier should be involved and how to integrate them in this extranet. For example, for the critical suppliers, WH sent IT staff to the suppliers' places to help them set up the devices and to train people there. By doing this, WH could make sure that the extranet would work well with its critical suppliers.

Both environment and competitors are not seen as external factors that influence the successful implementation of extranet. The reason for this is that the initiative of adopting extranet was derived from the company's own requirements. So the implementation is not driven by competitors in the first place and is not affected by the competitors during the implementation process.

6.4 Cross Case Analysis

6.4.1 The Supply Activities

Table 6.4 on the following page presents a comparison of the supply activities that the three companies in this study –GITI Tire, MSM and WH, follow. A dot will be used to represent that the companies perform the activity listed under the supply activities column. In addition, a dot followed by an asterisk will be used to represent that the correspondent activity is partially followed or done at some extent.

Table 6.4 Cross case analysis for the supply activities.

Supply activities	GITI Tire	MSM	WH
Place order directly to suppliers	●	●	●
Check the status of orders placed with vendors	●	●	●
Track shipments		●	●
If applicable, notification of changes in configurations in ordered products	●	●*	●
Respond to problems that may arise, for example late deliveries, stock outs, alterations in scheduled shipment dates, late arrivals, and a wide variety of other service issues	●	●	●
Receive, inspect and pay invoices, as well as check debit balances		●*	●
Schedule deliveries	●	●	●
Receive ordered products	●	●	●
Make post-purchase/performance evaluation	●		●
Constant supplier-manufacturer communication	●	●	●

All three companies follow the activity of placing an order directly to suppliers over the extranet. On the other hand, not all three companies are able to track the shipment of the ordered products. GITI says that their extranet is not linked to its logistic functions thus it is not capable of handling such activity. The notification of changes in configurations of the ordered products is fully done by GITI Tire and WH on the extranet. In the case of MSM, the suppliers are able to notify on the extranet about changes in the delivery time but the buyers need to negotiate these changes with them.

From Table 6.4 we can see that all three companies may respond to service issues that could arise during the order cycle, the extranet serves as a mean where buyer and supplier(s) can solve these situations. Regarding the reception, inspection and payment of invoices, the only company that performs this activity with the extranet is WH. With its ISP they are able to do everything from the reception of the invoice until the payment of it. MSM conversely, can do the inspection of the invoices through the extranet but they receive them in paper in the purchase department. It is also possible to see the debit balances but then again, not pay them online. In the case of GITI Tire these activities are not performed on the extranet at all.

Table 6.4 shows that the three companies schedule their deliveries on the extranet; this information is included when they place the order to the supplier. The same situation

happens for the reception of the products. The three companies receive the products at their warehouse and then upload to the extranet all the information on this matter.

GITI Tire and WH are the two companies that make the post-purchase/performance evaluation and then share it with their suppliers over the extranet. MSM on the other hand keeps that information “offline”. Finally, it is shown in Table 6.4 that GITI Tire, WH and MSM perform constant exchange of information throughout the whole supply process with its suppliers over the extranet.

6.4.2 Goals, Objectives and Outcome of Implementing Extranet in the Supply Activities

A comparison on the objectives, goals and outcomes that each of the three studied companies had is presented in Table 6.5. Just like in Table 6.4, the dot expresses that the item to left is identified by that company. Moreover, the dot-bracket (•_[x]) represents that the item to the left is identified and a corresponding note is provided under the table:

Table 6.5 Cross case analysis for goals, objectives and outcomes of implementing the extranet.

Goals	Objectives	GI TI	M S M	W H	Outcomes	GI TI	M S M	W H
COST SAVING	Reduced paper transactions	•		•	Reduced paper transactions	• _[1]	•	• _[5]
	Shorter order cycle time	•	•	•	Shorter order cycle time	• _[2]	• _[3]	•
	Inventory reduction	•		•	Inventory reduction	•	•	• _[6]
	Improved delivery time		•	•	Improved delivery time		•	•
	Reduced order processing	•	•	•	Reduced order processing	•	•	•
	Elimination of supplier selection and bidding process				Elimination of supplier selection and bidding process			
	Improving accuracy of orders	•	•	•	Improving accuracy of orders	•	•	• _[7]
	Reduce cost of generating purchase orders	•	•	•	Reduce cost of generating purchase orders	•	•	•
	Improving accuracy of invoices		•		Improving accuracy of invoices		• _[4]	

COST SAVING (continued...)	Improve the transparency of the purchase process		•				•	
ENHANCE PARTNER-SHIP WITH SUPPLIERS	Quality, versatility and accessibility of information (external and internal)		•		Quality, versatility and accessibility of information (external and internal)		•	
	Establishment of web B2B communication network		•	•	Establishment of web B2B communication network	•	•	•
	Sharing of information		•	•	Sharing of information	•	•	•
ENHANCE CORPORATE IMAGE			•				•	• ^[8]

Notes:

- [1]: 17 types of form filling work has been eliminated
- [2]: 30 hours per month of paper processing has been reduced
- [3]: the order issuing time has gone down to less than one day –compared to many days
- [4]: the invoice rejection rate has gone down to zero compared to 20% they had before
- [5]: more than 50 pages of paper files have been eliminated per order
- [6]: the inventory level has been reduced by 62%
- [7]: the order accuracy is as high as 98% currently, which is 20% higher than before
- [8]: 93% suppliers feel that WH becomes a more reliable business partner. And there are 18% more suppliers that treat WH as their critical partner after the adoption of the extranet

● Cost Saving

All three companies perceive cost saving as a major goal for implementing the extranet. In addition, all of them expect that the goal of cost saving can be achieved by fulfilling the following objectives: shorter order cycle time, reduced order processing, improving accuracy of orders and reduced cost of generating purchase orders.

As mentioned before, reduced order processing and shorter order cycle time are treated as objectives by the three studied companies. MSM wanted to have less time employed on order processing which also led to shorten the whole order cycle time. Similar considerations were found in the information collected from GITI Tire and WH. As a result, all three companies experienced the reduction of time and human resources’

spending on order processing. Along with the fast information sharing, the whole order cycle was shortened.

Another similarity among these firms was that they wanted to improve the accuracy of the orders, with the extranet there have been remarkable improvements on this matter since in the three cases the inputs of the orders come directly from the MRP. Table 6.5 also shows that all of the studied companies wanted to reduce the cost of generating purchase orders. In the three cases, positive outcomes have been perceived since using less paper, less time, less people and fewer mistakes when processing the order, means at the end, less money.

On the other hand, there are objectives where GITI Tire, MSM and WH converse on. GITI Tire and WH considered the reduction of paper transaction as a main objective where costs could be saved. However, all three companies have got rid of many paper transactions by using –among others, online orders, notifications and confirmations, instead of paper documents. GITI Tire and WH even claim that there is almost no paper transaction at all after the extranet was used. Another objective that was not the same for the three companies is to improve the delivery time. The latter was just seen as an objective –and achieved as an outcome, for WH and MSM. Although GITI Tire did also want to have a shorter order cycle, an improved delivery time was not directly a way to achieve so.

Inventory reduction is another major objective that GITI Tire and WH set up before they decided to adopt the extranet. WH hoped that the better logistics operations could lead to a lower inventory level. The two firms perceived that they have reduced their inventory after implementing the extranet. WH says that with the extranet the supplier can see exactly when is certain product going to be required thus there are fewer products stored for less time. Purchase manager adds that before the extranet a certain product could have been stored for a week and now it can be just a day, for instance. In the case of MSM, inventory reduction was not directly seen as an objective but BM says that the more effective process that the extranet has enabled, gave as a consequence to have the ordered products in the warehouse at the right time.

MSM wanted to improve the accuracy of the invoices since they had –before the extranet, many invoices rejected due to this inaccuracy, now this rejection has gone practically down to zero. The same company saw also that a more transparent supply process was an objective when implementing the extranet. MSM has now on the extranet all the information that is concerned with every purchase order.

- Enhance partnership with supplier

MSM and WH are the two companies that saw enhancement of the partnership with suppliers as a goal for the implementation of their extranet. For the two companies, establishment of a web B2B communication network and sharing of information were considered as objectives. MSM and WH agree on the fact that the extranet is a powerful communication platform and that the exchange of information with suppliers is greater.

In the case of WH, the purchase manager says that the increase of information sharing is maybe greater from the suppliers' side than from theirs. Finally, just MSM considered that the quality, versatility and accessibility of information was an objective for them.

Even though just MSM and WH considered enhancing of partnership with supplier as a goal, the three companies have experienced results on this regard. GITI Tire says that the communication network and sharing of information with its suppliers have been improved with the extranet. MSM and WH have perceived a better relationship with their suppliers.

- Enhance corporate image

As shown in Table 6.5, MSM was the only company that considered enhancing of the corporate image as a goal. BM says that the implementation of the extranet has reinforced their image of being a company who is up-to-date in technology. On the other hand, although WH did not set the latter as a goal, they have perceived that their corporate image has turned better after implementing the extranet.

In order to elaborate more on the comparison between these three cases, it is important to add that even though companies share common goals –for instance cost saving. There are slight differences among the centers of attention for reaching a goal. MSM had as a main goal, just like the other two companies, to save cost. The focus of MSM was however on saving time. On the other hand, WH focused more on inventory reduction for achieving this goal. Finally, GITI Tire was really keen on reducing the use of paper at the maximum. At the end these different perspectives converged in the final outcome of saving money.

6.4.3 External and Internal Factors Influencing the Extranet Implementation

In Table 6.6 on the following page, a contrast between the different factors that influence the implementation of the extranet is shown. A dot represents the factors that correspond to each company.

Table 6.6 Cross case analysis for factors influencing the implementation of the extranet.

	Factors	GITI Tire	MSM	WH
Internal Factors	Corporate Culture			
	Corporate Structure	•	•	•
	Technical Resources	•	•	•
	Corporate Strategy		•	•
	<i>Training</i>	•	•	•
External Factors	Environment	•	•	
	Competitors	•	•	
	Exchange Partners	•	•	•

From Table 6.6 we can see that in none of the three companies considered for this study, was corporate culture seen as an influential factor. On the other hand, without exceptions, the three companies possess a hierarchical corporate structure and they believe that the commitment from senior manager as well as staff is critical to the success of extranet implementation. As the case of WH shows, the attention given by senior managers always made sure that the implementation project had the best resources in the company, and the emerging problems could have an immediate attention and then a suitable solution. Thus corporate structure is an influential factor.

Technical resources are also seen as an influential internal factor. The three companies think their good IT infrastructure and the computer skills of employees contributed a lot to the success of extranet implementation.

Both MSM and WH perceive that the implementation of extranet was affected by their corporate strategy. The strategy of MSM is to be a leader within the steel industry. This kind of strategy implies that to take the good advantages of information technologies such as the extranet, to handle the complex supply process, was necessary. The situation of WH is quite similar to MSM. In order to be the biggest motorcycle producer in China, a large production volume is desired. Extranet was seen as a powerful tool to support the bigger production capacity. In the case of these two companies, corporate strategy is an influential factor.

Training is not a factor identified by Kallioranta. and Vlosky (2004), however, it was stressed by three interviewees. In their opinions, training was the key element which could coordinate the planned business flow and employees' practices.

GITI Tire and MSM have experienced the benefits that brought the fast developing information technologies. They both think that the increasing availability of technologies

and the decreasing prices were an advantage for them when implementing the extranets. On the other hand, WH did not stress this factor since they think their successful implementation of extranet relied more on the careful design of the implementation plan rather than on external factors like technological and social factors.

Competition is identified as a factor that influences the implementation of the extranet by the cases of GITI Tire and MSM. They felt that even though the initiative of implementing extranet was not wholly driven by whether competitors were doing so or not, they still looked around them. MSM found itself in a position where not so many were implementing this kind of project and thus gave them an extra motivation. GITI Tire realized that many around them were doing it and did not ignore it. Again, WH did not think competitors affected directly their implementation. The purchase manager says that the decision was made due to WH's own requirements, therefore, no matter if the competitor was using the extranet or not, WH still would commit to this project.

The three companies: GITI, MSM and WH felt that the exchange partners factor had an influence on their extranets' implementation. The three organizations made a classification of its suppliers and found out who to partner with. The slight difference here was that in the cases of MSM and WH they intended to integrate most of their suppliers based on a strategic perspective. For GITI Tire, they were more constrained on its decision of who to partner with by the technical limitations of its suppliers.

7. Findings and Conclusions

This last chapter intends to present the findings and conclusions derived from the study. In order to do so, findings will be presented following the same order of the research questions presented in chapter 1.

7.1 How can the supply activities taking place in the manufacturer-supplier interface be characterized?

Regarding the first research question of this study, the collected data has shown that the described supply activities of GITI Tire, MSM, and WH follow the large majority of the proposed 10 activities in the conceptual framework (Table 3.1). However, some differences were found. In the case of GITI Tire, the activities which required the extranet connected to the logistics and financial functions –track shipments and invoice-related activities, were not identified. The reason of why GITI Tire does not follow the mentioned activities on the extranet is that linking the logistics and financial systems to the extranet demands a considerable investment. Maybe GITI Tire does not consider the benefit-cost ratio as attractive enough. The main motivator for GITI Tire was to save cost through reduction of paper transactions which may be aided by having invoices online. However it may be that due to audit purposes GITI Tire must have the invoices in paper form anyway.

MSM do not make the performance evaluation online they just do it and keep it for them in the offline world. This may be attributed to the bargain power of MSM, they are a big group that negotiates contracts at a global level so the interest of sharing with their suppliers that kind of information over the extranet is not so big. This research also suggests that it is not entirely truth that the configuration of the ordered products can be notified online. Perhaps the contracts are so strictly negotiated in some companies that the extranet is not yet a mean where these issues can be worked out.

Overall, the general similarity of the three companies to the theoretical framework may be attributed to the fact that three companies have a MRP system that functions as the input trigger for the supply activities taken online. The latter means that much of the data that the supply activities require is already available in the studied companies' internal systems.

7.2 How can the goals and objectives for implementing extranet in the supply activities taking place in the manufacturer-supplier interface be characterized?

The research indicates that theory is strongly supported when it comes to the main goals that companies have when implementing the extranet. Saving costs was found to be the main motivator for the three studied companies. This is understandable since the purpose

of using IT resources is to obtain benefits which are usually translated into terms of money. Our findings also show that there are differences among the objectives that companies consider that will lead to saving costs. This difference may be attributed to the subjectivity of what does save cost mean. In example, MSM felt that the time spent on the supply activities was costing them a lot, thus to reduce that time became their main objective. From this same argument other new objectives for MSM –not listed in theory, were derived and these are: to improve the accuracy of invoices and to have more transparency in the supply process. This does not mean that the other objectives listed on theory were not considered at all but the priorities are indeed different. Overall, the objectives where all three companies agree on are:

- Shorter order cycle time
- Reduced order processing
- Improving accuracy of orders
- Reduce cost of generating purchase orders

The objective of "elimination of the supplier base and bidding process" is not included in any of the companies because the type of extranet that this study is looking at is that of a connection with the already existing supplier. The nature of this extranet leaves that objective out since the suppliers have already been selected.

Two of the studied companies perceived that enhancing of corporate image was not a goal for them. This can be explained by the fact that using the extranet on the supply activities would not really be seen or given the enough importance by their clients or competitors. They can also have other means that are considered to be more effective when it comes to enhancing the image of the company.

Our study also suggests that enhancing partnership with suppliers can be achieved through an extranet. However, one of the studied companies did not feel that was the case. It may be attributed to the fact of what does enhancing partnership with suppliers really deals with? For GITI Tire, it meant to have longer payment periods and lower prices for goods. For the others it meant to have a richer and better interaction with your suppliers that ultimately leads to a win-win situation for both parties.

Finally, this research also shows that sometimes what moves companies to implement an extranet for their supply activities is more a matter of being the best solution overall. The reason for that could be that the size, characteristics and requirements that the supply activities encompass may have no other way to be handled properly but on an extranet.

7.3 How can the perceived impact of extranet in the supply activities taking place in manufacturer-supplier interface be characterized?

With respect to the third research question, our findings generally support what the theories say. The research indicates that the goals of cost saving, enhance partnership

with suppliers and enhance corporate image were achieved through the accomplishment of several objectives, although these objectives can be vary from case to case.

It is interesting to notice that the three companies have fully achieved the goals and objectives they set before implementing the extranet, and some of them even have gained a few extra outcomes. There are several reasons about why these results turned out the way they did. For example, GITI Tire applied the extranet with a few suppliers who were actually owned by GITI Tire. In this case, the suppliers and buyer shared the same benefits, so it was much easier for them to work as one organization and made good efforts to achieve the same goals. By sharing common goals, the involved parties were more willing to commit.

MSM, as a unit of an international group, was not the first one within the group to use the extranet. There were many other units who had already adopted extranets before the studied unit of MSM. The experience that the other units had on the planning and implementation of the extranet was perhaps helpful to this particular studied unit of MSM. Another reason for MSM's successful achievement of goals and objectives is that their supply activities were not suddenly transformed from an offline operation to an online operation, because they had a portal where the orders could be made to suppliers before the extranet. Basically, their adoption of extranet was completed phase by phase, thus some good practices could be learned and mistakes could be avoided.

When it comes to the last studied case –WH, the critical success factor for them was that they made a careful design about extranet application according to their capabilities and disadvantages. So, they did not expected more than what they could do and employees from all levels were committed to this project at an early stage.

From this study, we can say that the way the extranet impacts the supply activities is by the achievement of the goals and objectives previously set. Nonetheless, the latter is not always totally true; the obtained outcomes differ sometimes from what was originally planned. GITI did not set as part of their objectives to establish a web B2B communication network neither sharing of information and MSM did not expect that the inventory could be reduced. However, these three were obtained in form of an outcome after implementing the extranet.

7.4 How can the internal and external factors that influence the implementation of extranet in the supply activities can be characterized?

- Internal Factors:

Our findings show that all of the studied companies agree on the fact that the following are factors that influence the implementation of the extranet: corporate structure, technical resources and training.

The commitment from employees, their IT skills and the IT infrastructure of the company are the most relevant and critical input of the extranet implementation project. A good extranet project should possess the right people who understand it and support it. At the same time, it is also necessary for the success of the project to have a good infrastructure to work with and that the people involved have the essential IT skills.

The most difficult aspect for an extranet implementation project is handling people. The hardware or software can be obtained by spending money, but the good knowledge about the usage of extranet and even the appropriate attitudes towards extranet can not be purchased, those ones lie inside of people. That is why the three studied companies believe that proper training is a quite necessary tool to change people's minds and habits.

On the other hand, we did not find corporate culture as an influential factor. None of the studied company perceives that they have a high willingness to share knowledge, but it seems that the low willingness to share knowledge did not hinder the implementation of extranet. In reality, the problem of resistance for sharing knowledge can be reduced by the commitment from senior managers and proper education. On one side, the commitment from senior managers can be seen as good example to the lower levels of staff. On the other side, senior managers' commitment to extranet implementation project puts pressure on the former, so at the end they actively participate on the project since they may fear penalties.

Corporate strategy has some impacts on the implementation of extranet, although not all of the three studied companies agree on it. Both, MSM and WH committed to extranet's application due to their requirements of having a big production volume and the complexity of materials management. The mentioned requirements are derived from their corporate strategy: to be a leading player in their respective industries. By being treated as a possible way to achieve the corporate strategy, the implementation project could have had a higher priority than other projects, and then gain a better opportunity to receive good resources from the company.

- External Factors

Two of the studied companies perceive that it is worth it to pay attention on the environment and keep eyes on competitors. The context of the industry can influence the decisions that the company makes, including the implementation of extranet. Competitor is then a factor that influences extranet implementation. Sometimes, what the competitors are doing is a kind of motivation or a "pressure" for companies to make decisions. At the same time, companies observe and learn from what the competitors are doing. Nonetheless, in occasions, competition is not that big of a deal. An extranet implementation project can start from the insides of an organization solely, without contemplation of others' actions.

As the theory states, exchange partner is an influential factor. Our findings confirmed this statement. All the studied companies did studies on their suppliers and then put them into

different categories. The classification of suppliers was helpful for them to integrate the most critical, the most beneficial and of course, the IT capable suppliers to the extranet.

7.5 Conclusions

After answering the four research questions above, we now land on our research problem. The objective of this study is trying to get a better understanding of the application of extranet in the supply activities of companies within the manufacturing industry. The research problem of this study has been defined as:

“How can the application of extranet in the supply activities taking place in the manufacturer-supplier interface be characterized?”

A number of conclusions are drawn from this study:

- Extranet can be seen as a useful technology for facilitating the management of complex supply activities. On one side, the extranet is an effective tool to improve the efficiency of supply activities. It is especially good at driving cost down through enhancing the real time information sharing among different functional departments. On the other side, the extranet, as a strong communication platform, can also improve external relationships with suppliers, which further leads to a better corporate image.
- The supply activities proposed in theory can be seen as the optimal situation where extranet can be adopted. But in real life, the application of extranet in supply activities encounters discrepancy. The variations founded in reality lie on aspects like the connection of the extranet to many other functional departments within a company. These functional departments could be logistics, financial and accounting. If the company has very integrated information systems, which means that the information system in the purchase department is connected with the information systems in the other departments. And their daily operations rely on the shared information then the application of the extranet in supply activities could reach its biggest potential in making the information flow smoother, both within the company and with external partners.
- Extranet for acquiring products is used together with MRP systems. The application of MRP systems eliminates the manual input of order quantity, order schedules and other types of data. Resulting then in the reduction of mistakes and the time for making an order.
- Sometimes it is not just a matter of setting goals and objectives when companies decide to implement the extranet for their supply activities. In some cases it was simply the best or perhaps the only way of doing so.

- The implementation of extranet can be simplified when a good IT infrastructure and IT experience are already available. The investment level on IT hardware devices is consequently not so high, and former experiences on implementing IT applications result in a better idea on what should be done and what kind of changes are necessary.
- An extranet implementation project is more than just an IT project; it is instead a way to change a business process. In order to change a business process, some aspects or situations must be adapted. The most important on this regard –and more difficult to adapt too, is people. People are a core factor for implementing the extranet, only when people accept and devote themselves to it, final success can be achieved. Training is then considered as a key tool to enhance people’s positive attitude towards extranet.
- The implementation of the extranet is a complex process where problems and difficulties may arise. Companies usually have pictures or ideas of how things should be like at the end, but as we have stated, the implementation process is dynamic. When problems occur, companies need to make responses to them and make adjustments. As the implementation process goes on, the companies might realize that there are other potential outcomes that can be obtained and they decide to go for them. Therefore variation of outcomes among organizations is expected.

7.6 Limitations

A few limitations for this study are noticed:

- As we mentioned before, we found a great match between the goals, objectives and outcomes: the three studied companies have fully achieved the goals and objectives that set before using the extranet. This result might be biased due to the fact that companies usually do not want that negative information about them is exposed. Thus the interviewees probably did not express entirely the reality of the situation.
- Kallioranta and Vlosky (2004) built a model which shows some internal and external factors that influence the implementation of extranet. However, they did not develop some corresponding measurements for these factors. In this study, we attempted to establish measurements with the purpose of drawing the limits of the factors that Kallioranta and Vlosky (2004) identified. By doing so, it would facilitate the collection and interpretation of data. However, these measurements could be broader or narrower than what we mentioned in Table 3.3
- The studied companies share many common characteristics: they are big size companies and have overseas operations, they were facing some problems when deciding to adopt extranet, and they have MRP system in the production area. The type of selected sample could be a limitation for this study’s results since it does not provide a broad perspective.

7.7 Implication for Theory

This study explored the application of extranet in the supply activities and in fact, it focused on the manufacturing companies. We summarize the supply activities for manufacturing companies, compare the goals, objectives and outcome of this application and finally found out ten factors that may influence the implementation process from the buyer's perspective.

This study has implications for the enhancement of supply activities literature. As stated in the literature review chapter, most previous literature regarding purchasing and industrial buying behavior did not take the influences of information technology into account. So the developed purchase process and industrial buying phases were identified for an offline environment. However, in this study, we discussed the supply activities by using one of the information technologies –extranet, as a constraint. Therefore, the supply activities proposed by this study are more tailored for an online environment. Moreover, the term of “supply activities” was defined and introduced in this study since no previous literature was found on this specific matter.

This study has also implications for the enhancement of the business literature on extranet's application. The reviewed former studies just listed the possible goals, objectives and outcomes of adopting extranet, in an isolated way. They do not however –as it is done in this study, establish a comparison between them.

Also, the model developed by Kallioranta and Vlosky (2004) is based on the supplier's perspective. We tested this model from the buyer's perspective through three case studies. We found that most of the influential factors for suppliers are also applicable to buyers. A contribution to theory was also made by identifying a new influential factor: training.

7.8 Implication for Management

From this study we have found that the extranet indeed, brings positive outcomes to organizations, generally in terms of cost reduction. We have also seen that there are some important external and internal factors that managers should take into account when implementing this type of projects.

- Use extranet when you really need it. The initiative of adopting extranet should be derived from the real needs of the company. Sometimes, the extranet is seen as the best way to satisfy some internal requirements, for instance to manage complex material acquisition, to have a bigger production volume, to have more efficient logistics and many others. But never decide to use extranet just because the competitors are using it. What is more, when the initiative of adopting extranet is derived from the company's real needs, there is usually a higher level of commitment from senior management, which is critical to the extranet implementation project. The commitment from senior management influences people a lot, since it is a kind of pressure that pushes people to take part in the implementation project, at the same time, it is a kind of impetus to encourage people.

- People is the biggest thing. One of the main lessons is that people is a crucial factor for the extranet implementation. Whether it is because it is hard to make them change the way they are accustomed on doing things or because the new way of working goes against the interests of some groups, people will always be an issue. Managers should then beware of this and try to diminish this by including people at the early stages of the project development, by providing sufficient and appropriate training and offering incentives for showing a positive attitude towards the new way of working. From the external perspective, people play again an important role, as it is the case of suppliers' commitment or rejection to the extranet project.
- Do not leave the implementation project only to the IT people. A successful extranet implementation project requires the coordination from different functional areas of the company, and in most of the cases, the application of extranet change the way people conduct the supply activities. Therefore, the implementation process is not a pure technical task, but a business process redesign task. To form a team with members who have diverse backgrounds is important.

7.9 Further Research

This study took a look at the process of implementation of the extranet in supply activities. It did not, however, clearly distinguish between the three different categories of procurement: 1) Procurement of raw material and production goods, 2) Procurement of maintenance, repair, and operating -MRO- supplies and 3) Procurement of capital goods and maverick. There is a gap left here then for future researchers that may want to find out the different impact that the application of the extranet can have to the different categories of procurement.

In addition, this study focused on organizations within the manufacturing industry, it will be also interesting for future researchers to analyze if the impact of the extranet in the supply activities for other types of organizations has the same effect it has for manufacturers.

Finally, this study selected three companies that share many common characteristics. The future studies can choose a different type of sample that includes both big and small size companies in order to see the differences between them.

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Appendix

Interview Guide

● Company Profile

Name of the company: _____

Company's antiquity: _____

Name of the respondent: _____

Respondent's position and years in it: _____

Total years in the company: _____

● General Information

1. Could you please tell us about the context that surrounds your company? (your description can follow the PESTEL framework: Political, Economical, Social, Technological, Environmental and Legal).

2. Could you please tell us some information about the main products that you produce?

3. Would you like to tell us some general information about the input goods and services that you purchase? (I.e. type of product: raw material and production goods or MRO supplies, frequency of the purchase, amount of money or percentage of company's expenditure taken on these activities)?

4. Would you like to tell us some information about your main supplier(s)? (i.e. what kind of industries they belong to and which countries are they from)

5. Why did you decide to start using extranet?

6. In which area is the extranet used in your company? In your working area, how is the extranet used?

- **Supply Activities**

7. Could you please describe the supply activities or stages followed by the company when you need to purchase? (Before and after the extranet was adopted respectively)

1) Before the extranet was adopted

2) After the extranet was adopted?

8. Was the extranet implemented with specific purpose of the supply activities?

9. What were your goals and objectives for implementing the extranet in the supply activities?

10. How do you perceive the connection between your corporate strategy and the goals and objectives of implementing extranet?

11. Do you perceive that your goals and objectives may be derived from the overall corporate strategy, as operational outcomes? Why?

12. Do you perceive **cost saving** as being a goal for implementing extranet in the supply activities?

a) In what way?

- Reduced paper transactions?
- Shorter order cycle time?
- Inventory reduction?
- Improved delivery time?
- Reduced order processing?
- Elimination of supplier selection and bidding process?
- Improving accuracy of orders?
- Reduce cost of generating purchase orders?
- Any other (if so, please explain)?

13. Do you perceive **enhance partnership with suppliers** as being a goal for

implementing extranet in the supply activities?

b) In what way?

- Quality, versatility and accessibility of information (external and internal)?
- Establishment of web B2B communication network?
- Sharing of information?
- Improve B2B relationships (i.e. a more responsive supplier)?
- Any other (if so, please explain why)?

14. Do you perceive **enhance corporate image** as being a goal for implementing extranet in the supply activities?

c) In what way?

● **Impact of the implementation of the extranet in the supply activities**

15. Which ones of the goals and objectives identified in the previous section were partially or fully achieved by implementing the extranet?

16. From those goals and objectives where the extranet implementation had an impact on (positive or negative), can you give some evaluation or measurement of it?

● **Internal and external factor influencing the implementation of the extranet in the procurement process**

17. Are you satisfied with the outcome obtained after implementing the extranet? Please explain why.

18. Do you perceive that the corporate strategy could have had an influence on the implementation of the extranet? Why?

19. Could you identify some external and internal factors that you perceive may have influenced the implementation of the extranet?

20. Do you have an organization structure chart? Could you please describe in brief?

- a) Hierarchical-oriented ____
- b) Team-oriented (centralized) ____
- c) Team-oriented (decentralized) ____
- d) Matrix-oriented ____
- e) Another one (please specify)

IN THE FOLLOWING SECTION, A SERIES OF OPTIONS IS PRESENTED FOR EACH QUESTION. FOR EXAMPLE, “VERY HIGH”, “VERY MUCH” AND “VERY GOOD” ARE USED TO DESCRIBE THE DEGREE OF THE CORRESPONDING ITEMS. THE SCALE 1 TO 5 IS USED TO SHOW THE INTERVAL BETWEEN STATEMENTS, WITH 1 BEING THE LOWEST DEGREE AND 5 BEING THE HIGHEST DEGREE.

Please mark a **X** in your position toward the following statements:

21. How do you perceive willingness to share knowledge with your business partners and within the organization? Why?

- a) With the business partners:
 Very High(5)____ High(4)____ Medium(3)____ Low(2)____ Very Low (1)____
- b) Within the organization:
 Very High(5)____ High(4)____ Medium(3)____ Low(2)____ Very Low (1)____
- c) Additional comments:

22. How do you perceive the commitment of senior management and staff to the extranet implementation? Why?

- a) Senior management:
 Very High(5)____ High(4)____ Medium(3)____ Low(2)____ Very Low (1)____
- b) Staff:
 Very High(5)____ High(4)____ Medium(3)____ Low(2)____ Very Low (1)____
- c) Additional comments:

23. How much information about your supplier(s) do you perceive you have?

- Very much(5)____ Plenty(4)____ Enough(3)____ Little(2)____ Very little(1)____
- a) What type of information is it?

b) Do you perceive it can be used to improve the relationship with your supplier(s)?

c) Additional comments:

24. a) How do you perceive the IT infrastructure in your organization? Why?

Very good(5)___ Good(4)___ Normal(3)___ Poor(2)___ Very Poor(1)___

b) How do you perceive the technical skills of procurement staff?

Very good(5)___ Good(4)___ Normal(3)___ Poor(2)___ Very Poor(1)___

C) How do you perceive the technical skills of IT staff?

Very good(5)___ Good(4)___ Normal(3)___ Poor(2)___ Very Poor(1)___

d) How do you perceive the IT management performance in your organization?

Very good(5)___ Good(4)___ Normal(3)___ Poor(2)___ Very Poor(1)___

e) Additional comments: _____

25. How do you perceive the degree of integration of the extranet into your business strategy? Why?

Very high(5)___ High(4)___ Medium(3)___ Low(2)___ Very Low(1)___

Additional comments: _____

26. How do you perceive the environment as to favor your implementation of extranet? Why?

Very favorable (5) ___ Favorable (4) ___ More or less favorable (3)___

Not favorable (2) ___ Not favorable at all (1) ___

Additional comments: _____

27. Do you perceive the implementation was driven by competition? Why?

Yes___ No___

Additional comments: _____

28. Do you identify and classify your potential partners into different groups, such as strategic, major, minor and transaction partners? Why?

Yes___ No___

Additional comments: _____

May we contact you for further questions, if needed?

THANK YOU VERY MUCH FOR YOUR VALUABLE TIME.