The influences of Inter-Organizational Information Systems on the effectiveness of buyer-supplier relationships

by

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An exploratory research study at Rabobank Netherlands

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Abstract

This report describes an exploratory study of the role of inter-organizational information system use within the discipline of purchasing and supply management. As main topic of interest, the research study focuses on the impact of inter-organizational information systems (IOSs) on the effectiveness of the buyer-supplier relationship analyzed from the perspective of a buying organization. A qualitative case study was performed to identify how and to what extent the business relationship is affected by the use of information technology. Research study outcomes revealed that the overall effectiveness of relationships is increased by higher levels of relationship strength, interaction and operational performance. Relationship effectiveness was found to be decreased by higher levels of interdependence between the parties as the presence of switching costs inhibits the buying company to switch to alternative suppliers. Organizations should take these implications into account when aligning suppliers to their e-procurement system in order to maximize value that can be obtained from electronic information exchange.
Preface

This report is the final product of my graduation project for my Master in Innovation Management at the Technical University of Eindhoven (TU/e). The Master Thesis project has been carried out at the procurement department of Rabobank Netherlands, being Rabobank Concern Inkoop (RCI).

The Master Thesis describes an exploratory study to the role of inter-organizational information system use on the nature of buyer-supplier relationships. This endeavour has been a very interesting and inspiring one for me. Not only did it provide me the unique opportunity to design and execute a theoretical-based research study within the field of purchasing and supply managing by myself, I also learned a lot by experiencing procurement practices outside the theoretical doctrine of an academic environment. The whole experience increased my interest in purchasing and supply management activities.

My sincere gratitude goes out to Rabobank Netherlands, for providing me the opportunity of performing my graduation project within their organization. The great support and interest in my project that I received from my colleagues gave me the overall feeling that my research study really provided added value for RCI. At the same time, colleagues where always there to provide me with new insights, which resulted into more profound research study outcomes. From all my colleagues from RCI and the Sirius project, I would like to especially thank Jan-Pieter van der Linden for providing me the opportunity to conduct my own research study within RCI, and for his professional guidance and support during the project. Also, I would like to thank Joost Paalvast and Maarten Bosch for involving me within the business change part of the Sirius project. The participation gave me valuable insights into the challenges and barriers that have to be overcome in aligning suppliers to the Raboshop® e-procurement system.

From all persons involved in my graduation project at Eindhoven University, I would like to especially thank my supervisors, Dr. Ir. Wendy van der Valk and Dr. Ir. Samuil Angelov. Their advice and steering during the project navigated me when I seemed to lose my way. Furthermore, the critical suggestions that I received from all members of ‘Afstudeerkring Purchasing and Supply Management 2008-2009’ during this project were very beneficial for me in reaching the objectives of my research study.

Finally, I would like to thank everybody who contributed to this research study or supported the process. Especially, I would like to thank my family for their confidence in my capabilities and the support and motivation they gave me during the Master Thesis project.

Ralf van Beek
June, 2009
Management Summary

What does this study explore?

An increasing number of organizations today recognize the potential value that interfirm information technology in the form of supply chain management systems can bring to their operational activities. Thereby, the alignment of organizational activities is likely to change the way how firms operate and interact with their exchange partners. Taking into account the general shift from arm’s length- to cooperative relationship modes in buyer-supplier dyads, these technologies are fundamentally altering the way in which contact takes place, which is likely to influence the nature of the relationship. While early investments in technology were limited to the use e-mail and fax, recent advancements in information technology have led to an increase in the number of applications for coordinating interfirm processes. Buying organizations can now use information technology to gain access to a wider range of goods and services, place orders and exchange transaction information with suppliers via electronic linkages via the internet and track shipments in real time through the use of supply chain management systems. As a result, inter-organizational information technology now plays a dominant role in many interactions between firms.

It can be questioned how the transition from ‘traditional’ purchasing to electronic purchasing affects the overall perceived success of the buyer-supplier relationship. In which way does electronic procurement contribute to the overall objectives of the purchasing strategy being implemented, or how could it frustrate a desired purchasing strategy to be executed? This question seems to get more and more relevant, as organizations nowadays are increasingly focusing on exploiting their core competencies, which means that a diverse amount of goods and services have to be procured. As these supplies differ based on the perceived strategic value that they have for the buying organization, tailored purchasing strategies are being implemented for maximizing value that can be obtained from the service being offered. Thereby, relationships with suppliers are increasingly being managed with an emphasize on added value in terms of performance, satisfaction and productivity gains. Therefore, the main research question of this exploratory study is: how and to what extent do inter-organizational information systems influence buyer-supplier relationship effectiveness?

The research question can be translated into the following conceptual model:
Main findings of the study

The research study is conducted in a business-to-business environment, in which Rabobank Netherlands acted as main participant for analyzing the main unit of analysis: the relationship between Rabobank and its suppliers aligned to the e-procurement system Raboshop®. As the research study had the aim to generate new insights into the way electronic information exchange impacts upon the relationship between buyer and supplier, a case study design was found to generate the richest results. Thereby, the study was based on ‘triangulation’, which means that different sources of information were used to increase the reliability and validity of the research outcomes. More specifically, three main sources of information were used for answering the main research question:

A literature study resulted in the identification of different dimensions of the buyer-supplier relationship which were found to be indicators of relationship effectiveness. These dimensions included the social behavioural aspects within a relationship, mutual dependency aspects, information sharing processes, and operational performance measures. These dimensions were used as input for the formulation of a number of propositions. These propositions were tested by the interpretation of the outcomes of an interview round in combination with a supporting questionnaire. Furthermore, the literature study had the aim to identify differentiated purchasing strategies that are commonly used in practice. A purchasing portfolio approach was found to explain differentiated purchasing strategies based on the characteristics of the products and/or goods to be sourced. In addition, the scarce literature regarding the impact of inter-organizational information system use on business relationships was assessed. The degree to which specialized investments being made within the relationship for securing the performance of the information system was found to be one of the main causes affecting the relationship.

An interview round had the objective to identify how the effectiveness of the relationship between Rabobank and its suppliers was influenced by the use of Raboshop®. Rabobank employees with different backgrounds in the field of purchasing and supply management were involved within these interviews. Outcomes showed that three main IOS drivers could be indicated, that were likely to affect the relationship in different ways. The transparency of information transfer between the parties has led to more openness within the relationship between Rabobank and its suppliers. The increasing visibility into the performance of the supplier due to the availability of spend-related information shifted the relationship clearly from operational- to tactical level. This contributed to the overall desire to have a qualitative relationship focused on bringing the service being provided by the supplier to a higher level. Next, formalization of business processes between the IOS participating parties was found to increase the overall quality of information exchange. Fewer errors within the operational purchasing process were found due to the use of one standard protocol for exchanging information. However, the formalized purchasing process inhibited the fast treatment of conflicts related to price information, order statuses and payments. Formal dispute procedures had to be put in place for indicating the root cause of the conflict, which were sometimes perceived as being inefficient. Thirdly, the presence of specific investments being made with respect to the successful operation of the IOS initiated a cooperative atmosphere between the parties. In most cases, these relationship specific investments were perceived to contribute to the long-term orientation of the relationship, as both Rabobank and its suppliers had to commit asset specific resources. For example, human resources had to be allocated for training purposes related to the operation of the Raboshop® by both parties. Physical investments in terms of the initiation of the exchange infrastructure and the servicing and
updating of the information system asked for a higher degree of commitment between the parties. In most cases, these cooperative activities were also found to be present within the relationship.

An additional questionnaire was used to support the outcomes of the interview round in a quantitative way. The interview round indicated that the degree to which the relationship is affected by IOS use depends on the level of specific assets being deployed between both parties. In the case of Rabobank, the degree of IOS asset specificity was found to differ between the three connection types being used for exchanging information with the supplier. The questionnaire was designed in such a way that it captured the differences between these three IOS configurations. Based on a sample size of 20, descriptive statistics showed that the ‘Tight’ connection being used obtained significantly higher scores on items that represented the overall strength of the relationship, confirming the suggestion that high levels of IOS asset specificity increased the overall closeness of the relationship. In addition, the ‘Tight’ connection showed considerable higher scores on measures related to the interdependency between the parties. Higher levels of switching costs were found which decreased the level of flexibility to switch to another supplier in case of poor performance levels.

Conclusions and implications

The results of this exploratory study imply that the use of an inter-organizational information system increases the effectiveness of the buyer-supplier relationship on three specific relational aspects. First, the possibility to obtain cost reductions and a more ‘lean and mean’ purchasing process generates incentives by both exchange partners to adopt collaborative behaviour by aligning business processes and coordinating activities more clearly. In addition, the formalization and transparency of information being exchanged results in fewer errors within the operational purchasing process and adds a more performance-based character to the relationship, increasing the overall quality of the service being provided by the supplier. Third, the direct effects related to the benefits of e-procurement use related to cost savings and process efficiencies were perceived to increase the overall continuity and stability of the relationship. Relationship effectiveness was found to be decreased by higher levels of switching costs and the possibility to get ‘locked’ within the relationship. This was especially found to have negative influences in purchase situations were products and/or services are standardized and multiple sources of supply are available to choose from. Situations could occur that Rabobank is less likely to switch to another supplier that may offer a lower priced or higher quality-based product/service due to the IOS investments being made within that relationship.

While e-procurement should be seen as a supportive tool within the whole process of acquiring goods and services, this research study has showed that the automation of operational (and to some extent tactical) purchasing processes considerably influences the nature of the relationship between buyer and supplier. Managers should therefore take into account the indicated effects when they want to maximize the value that can be obtained from relationships with suppliers that are connected to an IOS. With regard to the connectivity mode being used between buyer and supplier, not only practical issues such as the number of orders being placed and the related costs should be taken into account. Also strategic implication such as the impact that IOS use has on the nature of the relationship should be incorporated. This increases the overall effectiveness of business relationships and contributes to the general shift of the purchasing discipline from operational- to strategic relevance.
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Introduction

Electronic procurement is gradually taking over the ‘traditional’ purchasing-related activities by providing integrated solutions with regard to sourcing, contracting, ordering and payment practices. These technologies are generally perceived to generate additional benefits with respect to an overall decrease in operational- and administrative costs, and the establishment of a ‘lean and mean’ purchasing process. Thereby, the shift from procuring goods and/or services manually to electronically is likely to change the interaction process between participants considerably. Thereby, it can be questioned how this change is perceived to contribute to the overall success of the exchange relationship by the participating parties. Especially within the field of purchasing and supply management, this issue seems to be of high relevance as relationship management practices are increasingly being noticed as a way to secure sustaining competitive advantages.

While the benefits of e-procurement systems have largely been recognized by practitioners and scholars, less is known how these systems impact on characteristics of the business relationship. Especially, a research gap exists on how the effectiveness of buyer-supplier relationships is affected by interfirm information system use. The increasing strategic importance of the purchasing discipline has generated differentiated purchasing strategies for a variety of goods and services to be procured. Assessing the effectiveness of relationships therefore becomes of primary importance for maximizing the benefits that can be reached by applying a particular purchasing strategy.

This study therefore aims to gain qualitative insights into the way e-procurement use influences the effectiveness of buyer-supplier relationships. One particular type of e-procurement system is analyzed within this study, being a proprietary inter-organizational information system (IOS). This system is likely to affect the relationship between buyer and supplier as it asks for specialized investments by both parties for securing the performance of the information system. The main research question to be answered within this research study is: How and to what extent do inter-organizational information systems influence buyer-supplier relationship effectiveness?

The report describes the exploratory study in three phases, being the orientation-, analysis, and conclusion phase. The orientation phase is included in chapter one and elaborates on the context of the research topic. Chapter two introduces the research design and methodology that will be applied. Part two, the analysis phase, forms the core of the report. It starts off with a literature review in Chapter three. This will be followed up by the analysis of the outcomes obtained from an interview round within Chapter four. Chapter five will include the analysis of an additional questionnaire being used. Finally, within chapter six, conclusions with regard to the main findings will be put forward.
1. Context of the study

1.1 Introduction

The motivation for performing this study initiates from the fact that inter-organizational information system (IOS) use is changing the interaction process between business parties significantly. Especially within the purchasing and supply management discipline, managing the relationship between buyer and supplier has received increasing attention by scholars and practitioners. Analyzing the influences of IOS use on supplier relationship management therefore deserves more attention. This chapter elaborates on the research background of the study by describing key developments that are taking place within the domain of purchasing and supply management. It tries to answer the following questions: Why is it important from science and practice to conduct research in this field, and what is the connection between buyer-supplier relationship management and information system use? Answering these questions will give rise to formulation of the objective of this study.

1.2 Research context

1.2.1 Purchasing and Supply Management

The research area of purchasing and supply management can be regarded as one that has gained increasing attention and interest in the last decennia (Carr and Smeltzer, 1999, Cousins, 2002). Increasing globalisation of customer markets as well as fast economical, social, organisational and technological changes increases the pressure on companies to strengthen their competitive position through product and process innovation (Van Weele, 2005).

The presence of these dynamic forces has led many companies to focus on activities belonging to their core capabilities, where supporting processes are preferably outsourced. Therefore, suppliers have become increasingly important as they account for a large part of the value creation related to the end product or service. Thus, managing the firm’s supplier base is becoming an essential strategic purchasing issue (Dubois and Pederson, 2002). Cousins (2002) suggest that if organizations want to stay flexible, adaptable and efficient, they must focus their resources in managing the supply process. Therefore, it is generally agreed on that the strategic process of supply management is replacing the traditional purchasing function.

In line with this finding, the increasing diversity and complexity of the supply chain has forced companies to manage the relationship with their trading partners on a strategic level. The opportunity to integrate supply management as a strategic resource, from which competitive advantages can be gained for both the buyer and supplier introduced a shift too more intense collaboration modes between organizations. Closer buyer-supplier relationships may offer many technical, financial and strategic advantages over spot market transactions and vertical integration, especially when the long-term perspective of the relationship is taken into account (Monczka et al., 1998). In light of this development, firms appear to be moving from a traditionally widespread range of suppliers towards a much smaller amount of “preferred” suppliers. This movement has caused buying organizations to become much more
dependent upon their suppliers and vice versa, which places a premium on high inter-firm coordination and information exchange (Cousins, 2005).

### 1.2.2 Information systems for procurement

Inter-organizational information systems have gained increasing attention by practitioners and scholars as a way to facilitate the coordination of information transfer between business parties. Advancements in information technologies have already created major impact on the competitiveness of consumer and business markets. Especially the rise of internet-based information systems has led to a transformation into a network- and knowledge based economy. Within this transformation, electronic commerce (e-commerce) has taken an increasingly important role in reshaping business relationships, improving core business processes, providing electronic intermediation and reaching new segments and markets (McIvor et al., 2000).

With the increasing popularity of internet applications in the professional area, companies and researchers have evaluated its support for purchasing processes. Because of the fact that the procurement function often involves the largest cost for an enterprise, with many organisations spending 50 to 60 percent of their revenue on goods and services, the potential benefits and new wealth that electronic procurement (e-procurement) may bring to organisations seems substantial (Subramaniam and Shaw, 2002, Amit and Zott, 2001). Due to the added value that electronic information systems can provide for their users, there is rapidly growing interest both on the part of supply- and top managers for integrating these kinds of systems. Electronic procurement (e-procurement) is generally seen as a way to benefit from real-time information sharing and it provides the opportunity to take advantage of total quality management and supply chain management activities (Sriram and Stump, 2004). In addition, the ongoing demand for integration of the purchasing function with other areas in the organization and the considerable importance to connect buyer and supplier, make information systems that support information exchange between all involved parties a prerequisite for achieving long-term competitive advantages. As an example on how an e-procurement system may increase the total efficiency of the operational purchasing process, Figure 1 shows the reduction in order-steps when an e-ordering system is being used compared to the ‘traditional’ ordering process.

![Figure 1. Reduction of steps in the ordering process due to the use of e-ordering systems (adapted from: Van Weele, 2005)]
1.3 Initiative for a study

The initiative of this study is the result of the perceived increase in information technology use between buying and supplying companies. Inter-organizational cooperation by means of information technology is changing the purchasing landscape considerably (Monczka et al., 1998). The relationship between buyer and supplier is therefore likely to be subjected to major changes.

Theory about the influences of information technology use on business relationships can be regarded being relatively scarce up till now. Although a large extent of the purchasing and marketing literature has been devoted recently on business relationship development, only a small number of empirically-based studies have been conducted on the role that IT plays in this process (Carr and Smeltzer, 2002, Boeck and Bendavid, 2006). This can be considered being remarkable, taking into account the major role that information technology plays nowadays in facilitating inter-firm business processes. Moreover, while the productivity and financial benefits of IT investments have been widely studied, there has been relatively little attention paid to other performance outcomes related to the implications on buyer-supplier relationships (Sriram and Stump, 2004). In light of the observed developments in the field of supplier relationship management and interfirm information system use, there is a need for more research concerning the interdependence between the two concepts. More specifically, more insights are needed on how inter-organizational information systems affect the characteristics of the buyer-supplier relationship, and with that the impact that these systems have on the overall effectiveness of business relationships.

As many firms are increasingly outsourcing products and services that are perceived as non-core to their business, the amount and diversity of supply that has to be procured asks for tailored purchasing strategies. Purchasing portfolio models have extensively been applied in practice and theory to differentiate purchasing strategies based on the importance of the products and/or services being sourced (Kraljic, 1983, Bensaou, 1999). As a consequence, a number of recommendations have been proposed on how to manage the relationship with the supplier for obtaining the most favourable position (Caniëls and Gelderman, 2005). Although a number of studies have incorporated the moderating effects that interfirm information systems have on the nature of business relationships (Carr and Smeltzer, 2002), no studies were found that related the actual outcomes to the overall effectiveness of the relationship. It can be questioned in which situation the use of IOSs actually contribute to the objectives of the purchasing strategy, and when does it counteract the execution of a desired relationship mode? The lack of insights regarding this can be perceived as being a shortcoming within the theory of purchasing and supply management, acknowledging the fact that business relationships are increasingly being managed with a focus on added value in terms of performance, satisfaction and productivity gains.

This study aims to fill this research gap by studying the influences of interfirm information system use on the perceived effectiveness of the buyer-supplier relationship. It therefore assesses key aspects of the buyer-supplier relationship that are generally accepted and validated within the literature as measures of relationship effectiveness. The research study will contribute to two ongoing developments within the supply management discipline; the shift from arm’s length relationships to cooperative relationship modes with a preferred number of business partners, and the strategic importance of coordinating supply activities by means of inter-organizational information system use. These two trends indicate that the interaction process between business partners will become critical for securing future
competitive advantages. As information technology is fundamentally changing the way how organisations work together, the impact that these systems have on inter-firm relationships becomes of primary importance.

1.3.1 Concluding: A study on the influences of inter-organizational information systems on buyer-supplier relationships

From literature, it was observed that buying organizations are increasingly engaging into cooperative relationships with their suppliers for obtaining long-term business advantages. One way to reap the benefits of tighter relationship modes includes the initiative of electronic information exchange between business parties. IOSs provide the opportunity to share information for a diverse number of business activities. While it is generally agreed upon that these systems provide added value in terms of cost reductions, efficiency improvements and productivity gains for the participants, less attention has been paid to what extent and how interfirm information technology impacts on the nature of the relationship itself.

This research study has the objective to fill this research gap. By performing a qualitative study in which the role of information system use in relationship management will be assessed, better insights will be obtained regarding the changes within the relationship when interaction takes place electronically. Thereby, this study takes into account the increasing relevance to assess the actual effectiveness of buyer-supplier relationships for maximizing the value that can be obtained from business relationships. A qualitative case study design will be applied, in which the effects of IOS use on the effectiveness of the buyer-supplier relationship will be analyzed from the perspective of a buying organization, being Rabobank Netherlands.

2. Study Design

2.1 Introduction

This chapter concentrates on the structure of the study. It aims to provide direction to the research by emphasizing on the questions what to study (study approach) and how the study will be conducted (methodology). The study approach includes the objective of the research, derived from the exploration provided in chapter 1. This section also addresses the development of the conceptual research model and forthcoming research questions. The second part concerns the methodology to be taken. It includes a description of the applied research design and the field site from which the study is performed. Also, the data collection- and analysis methods used within this study will be discussed.

2.2 Study approach

2.2.1 Research study objective

This study stresses the role that information systems have in supplier relationship management activities. The shift from executing purchasing activities ‘manually’ to ‘electronically’ is hypothesized to influence the interaction process between actors considerably. While the purchasing process may be characterized being more emotionally driven in the past, electronic procurement solutions nowadays asks for a highly structured and
formalized processes, in which both the buyer and supplier should adapt their working practices for reaping the benefits that such solutions can bring. Hence, the overall effectiveness of the exchange relationship between buyer and supplier is likely to be affected by this.

Researchers who studied interfirm information system use seem to have concentrated mainly on the “hard” motives such as cost reductions, process optimization and transaction efficiencies for implementing them. Fewer studies were found that analyzed information system use by assessing the impact on qualitative characteristics of the buyer-supplier relationship. This lack of interest can be seen as being notable, especially when considering the increasing attention that relationship management activities have received in obtaining long-term competitive advantages. A variety of business relationship dimensions have been widely studied by different researchers within the industrial marketing domain (Morgan and Hunt, 1994, Handfield and Bechtel, 2002). Subsequently, these relational aspects have increasingly been applied to describe and characterize differentiated (portfolio-related) purchasing strategies (Olsen and Ellram, 1997, Bensaou, 1999). For example, supply that is perceived to be of strategic relevance for the organizations’ end business are likely to be best treated by entering close relationship modes, characterized by cooperative behaviour. Within this type of relationship, the objective is to secure and improve the service being provided and to mutually seek for innovative solutions to increase the long-term competitiveness of the organization. Relationships with suppliers that supply goods and services that are acknowledged to be of less strategic importance are most of the times characterized by being more distant, in which the relationship is only based on the terms and conditions with respect to the exchange process.

Within this study, one specific type of information system will be investigated, being an internet-based private network. This information system enables the exchange of procurement-related data between customers and suppliers via ‘secure’ linkages through the internet. This type of information system is generally known to be one of the most extensively used e-procurement tools by organizations at this moment in time (Harink, 2003). By the fact that this system can be characterized as an automated information system shared by more than one organization supporting boundary spanning activities, the term ‘inter-organizational information system’ (IOS) will be applied when referring to this system from now (Saeed et al., 2005). Advancements in the field of information transfer supported by internet technology have led to the development of differentiated solutions regarding the way information is being exchanged between participants. This provides buying organizations the possibilities to connect a diverse number of suppliers in a more strategic way. These different information sharing technologies will be taken into account within this study.

The study will take on an approach for analyzing the topic of interest by combining elements of industrial relationship theory, e-procurement models and purchasing portfolio management. The relevant aspects will come together into one research model that will be used as reference for conducting the research study. This study is therefore a first step for underlying the relevancy of information system use from a relationship management perspective, making it an exploratory research study.
The following research objective of the study can be stated:

**Research objective**

*The aim of the Master Thesis study is to further develop theory about the relation between inter-organizational information system use and relationship management. The focus of the study is on the impact that proprietary inter-organizational information systems have on the perceived effectiveness of buyer-supplier relationships.*

The research objective will be met by performing a qualitative study by the use of a case study design. A precise description of the analysis steps that will be applied can be found in section 2.3.3. It can be noted that the unit of analysis of this research study can be regarded being the buyer-supplier relationship. The observed effects will be studied from the buying organization’s perspective, which is in this case also the initiator of the IOS that is used.

### 2.2.2 Research model

For conceptualizing the concepts and links being proposed within this study, the research model as showed in Figure 2 will be applied. The model suggests that for a specific purchasing strategy being applied (depending on factors describing the purchase situation), a particular type of relationship that fits the purchasing strategy should be initiated for obtaining high effectiveness. The use of an IOS between buyer and supplier is proposed to influence this link, affecting the degree of buyer-supplier relationship effectiveness. The model takes into account the observed developments and shortcomings within the purchasing and supply management literature regarding the use of interfirm information systems. More specifically, it incorporates:

- The presence of differentiated purchasing strategies for managing a variety of supplier relationships
- The possibilities of web-based IOSs to connect buyer and supplier via different electronic linkages in which the linkages differ against each other based on the degree of specific investments being introduced within the relationship
- The increasing need to assess the effectiveness of buyer-supplier relationship for maximizing the value of business relationships

![Figure 2. Research model](image-url)
Within this research model, IOS impact on business relationships is modeled as a fully moderating variable. According to Baron and Kenny (1986), a moderating variable is a quantitative or qualitative variable that affects the direction and/or strength of the relation between dependent and independent variables. The “purchasing strategy” is chosen as main independent variable. It includes the formulation of purchasing-related activities that enables an organization to obtain its short-and long term supply objectives. Recent attention to supply management activities has led to the formulation of differentiated purchasing strategies, depending on the importance of the product/service or commodity to be sourced. It is affected by relevant (internal and external) forces and influences related to the acquisition of the required goods and/or services, which have a potential impact on the way buyer and supplier work together. These forces and influences are captured within this model by the variable “purchase situation”. As the formulation of purchasing strategies directly resides from the present purchase situation, these two variables are modeled as being interconnected with each other.

The formulation and execution of a particular purchasing strategy directly affects the way in which buyer and supplier interact with each other. As an example, the Japanese car manufacturer Toyota applied a cooperative purchasing strategy towards their suppliers that were proposed to contribute significantly to the overall profit of the organization. By letting their suppliers actively participate within their product development processes, Toyota was able to significantly increase their productivity rates and achieved a reduction of their total inventory levels (Dyer and Nobeoka, 2000). Another approach was taken by General Motors, who let their suppliers compete against each other in order to obtain the lowest-priced bid. By holding a more distant approach towards a variety of alternative supplies, and letting them compete on price aspects, General Motors was able to secure short-term cost savings with respect to their supply activities. This example shows that the execution of different purchasing related strategies will lead to different relationship-modes and eventually to different performance outcomes.

To incorporate the notion that the successive execution of a purchasing strategy largely depends on how the relationship between buyer and supplier is being crafted, the variable “buyer-supplier relationship effectiveness” will be used as main dependent variable. Here, relationship effectiveness should be treated as a qualitative measure of the overall success of an exchange relationship. Following Van der Ven (1976), relationship effectiveness captures the degree to which a party in a relationship views the relationship as being worthwhile, productive and satisfying. Within this research study, the degree of relationship effectiveness will be assessed by analyzing to what extent the effects of IOS use contributes to the objectives of the purchase strategy being applied.

### 2.2.3 Research questions

Elaborating on the stated research objective of the study, a main research question can be put forward covering the content of the research topic. The following main research question is provided:

<table>
<thead>
<tr>
<th>Research question</th>
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<tr>
<td><strong>How and to what extent do inter-organizational information systems influence buyer-supplier relationship effectiveness?</strong></td>
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Because of the different concepts being proposed within this research question, answering it at once becomes difficult. To obtain supporting knowledge about the different parts of the main research question, sub-questions will be stated. Based on the notion that the proposed research model is theory driven and exploratory, the concepts being used should be clarified by assessing the theory. Therefore, the first set of sub-questions is related to the explanations of the different concepts used from a theoretical perspective.

At first, insights regarding the motivation and implementation of different purchasing strategies should be obtained. The theory regarding purchasing portfolio models will be assessed for answering research question 1;

1. Which differentiated purchasing strategies are commonly applied?

Focusing on the main dependent variable of the applied research model, knowledge is needed with respect to the different elements that all together determine the characteristics of the business relationship. Thereby, different aspects of the relationship will be assessed from theory to be able to make statements about the overall success of an exchange relationship. Outcomes of the following research question should provide guidance on how the effectiveness of buyer-supplier relationships can be analyzed.

2. How could buyer-supplier relationship effectiveness be defined and measured?

Acknowledging the fact that interfirm information systems are affecting the way in which activities take place between business parties, knowledge is needed in which way IOS use influences the effectiveness the relationship between buyer and seller.

3. How is buyer-supplier relationship effectiveness influenced by IOS use?

Outcomes of research question three will give rise to the development of an overall research model in which all the relevant forces and influences of IOS use on the buyer-supplier relationship characteristics will be included. This research model will than be tested by analyzing a number of independent relationships between the buyer and different suppliers. Thereby, the different IOS connectivity modes being used to transfer purchasing information between buyer and supplier will be taken into account. Outcomes will provide input for answering the following question;

4. How is buyer-supplier relationship effectiveness influenced by the interplay between the purchase strategy and IOS configuration?

An overview of the different sub-questions mapped onto the research model can be viewed in Figure 3.

Appendix A provides on overview of definitions regarding the core concepts being used within this research study.
2.3 Methodology

This section further describes the applied methodology for this study. First the choice of the research design is explained and clarified. This will be followed up by a description of the data collection- and analysis methods. Those sections will incorporate how the research will be conducted, what data sources will be used and how the data will be analyzed. This will be followed up by a description of the organization that acts as main participant within the research study.

2.3.1 Research design

The thesis will be designed according to the principles of a case study. This section explains why a case study is chosen as research design. Therefore, the problem statement in the form of the main research question will be stated once;

```
How and to what extent do inter-organizational information systems influence buyer-supplier relationship effectiveness?
```

Due to the exploratory nature of the main research question and the relatively small time span in which the research study should be conducted, the case study method is considered being most appropriate for reaching the stated goals. The qualitative character of a case study, where the objective is to obtain in-depth knowledge on the phenomena being studied, should reveal the underlying mechanisms regarding the interrelation of IOS use and relationship management as it is described within this research study.

According to Yin (2003), a case study is the preferred strategy when “how” and “why” questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real life context (Yin, 2006, p. 13).
In addition, Paré (2004) provides four prerequisites when a case study can be regarded as being useful. Each of the mentioned reasons will be applied to this specific research study, clarifying the appropriateness of the research design that is chosen:

- **a broad and difficult phenomena is studied**: two phenomena are studied that cover two fields of research, relationship management and information system technology. These phenomena have gained increasing attention within the purchasing and supply management theory.

- **causal questions cannot be formulated because the existent body of knowledge is insufficient**: the existing academic studies failed to relate relationship management activities with information system use. Especially, a research gap exists regarding the way in which IOS characteristics impacts upon the effectiveness of buyer-supplier relationships.

- **a thorough research is required for understanding the topic of interest**: both phenomena are closely related to overall organizational performance. The interdependencies between the concepts ask for an in-depth investigation.

- **the phenomenon can only be studied in the environment it arises**: the study covers two phenomena and in order to be able to connect them they have to arise at the same moment in the same environment. Therefore, the research study should be conducted within a real business setting.

### 2.3.2 Data collection methods

To increase the construct validity of the research study, the strategy of ‘data triangulation’ as suggested by Yin (2003) will be applied. Data will be gathered via four main collection methods to obtain well founded answers to the research questions. These collection methods will be differentiated based on their degree of contribution to the analysis of the outcomes. Two methods will be labeled as ‘purposeful’ and two will be named ‘non-purposeful’. The purposeful data collection method includes the execution of a multiple participant interview round and the fulfillment of a mail questionnaire. These sources were supported by two non-purposeful data collection methods, incorporating an analysis of documentation and archival records and the execution of direct- and participant observation. The analysis of scientific articles has led to the establishment of a literature review regarding the topic of interest. The following sections will elaborate in more detail on the data collection methods being applied.

**Interviews**

As a purposeful data collection method, semi-structured interviews were performed with a number of people with various backgrounds. Taking into account the exploratory nature of the research study, the inclusion of a number of interviews was expected to obtain the richest insights regarding the interrelation between the two concepts. The interview round had the main objective to identify in which way the use of an IOS impacted upon the relationship between Rabobank and its suppliers, and therefore covers the “*how*” part of the main research question.

According to Yin (2003), interviews may take several forms. The most commonly applied procedure for case study research is to conduct interviews of an open ended nature, in which a researcher can ask key participants about facts of a matter as well as for the respondents’ opinions about facts. Another approach is to use a focused (semi-structured) interview type, in
which the interview has a shorter duration (approximately one hour). These interviews may still include open-ended questions, but with the difference that the interviewer is trying to follow a pre-established set of questions derived from the case study protocol (Yin, 2003).

The semi-structured interview approach was selected to be used for this research study as primary data collection method. This method was chosen because of the fact that the stated research questions provided direction to the establishment of a number of interview questions. The set of questions being used reflected a number of independent themes that each covered an aspect of the research topic. The questions had an open ended format, which forced the respondents to come up with their own thoughts and ideas regarding the topic of interest. In some cases, additional questions were asked to obtain more detailed insights concerning a specific topic that was mentioned by the respondent.

Although the interview method is generally known to be a valuable procedure in case study designs that have an exploratory character, some drawbacks are mentioned by several authors. Remenyi et al. (1998) for example states that interviews are subjected to response bias. This issue has largely been solved by interviewing multiple employees with different backgrounds and by checking the provided answers with additional documentation where possible. In addition, it is suggested that bad articulation and poor listening can lead to false inputs. This has been dealt with by recording the interviews, making transcripts and letting the participants read and comment on the transcripts. Another issue that has been taken into account is the possible presence of reflexivity within interviews (Paré, 2004). This refers to the situation in which the interviewee says what the interviewer wants to hear. It was tried to counteract this issue by not informing the participant completely about the background of the research study. Only a general introduction was provided about the topic of interest. With regard to the possible bias of poorly constructed interview questions (Paré, 2004), the designed set of questions was checked by both the supervisor from university and the supervisor from Rabobank.

**Questionnaire**

The interview round was followed up by an additional questionnaire, which is used to support the outcomes of the interview round in a quantitative way. The construction of the questionnaire was based on the outcomes of the interview round. Also, the questionnaire has been used to identify outcome differences between the three different connectivity modes being incorporated within the study. Therefore, the use of a questionnaire contributed to the research study by gaining insights in a more quantitative way, covering the ‘to what extent’ part of the main research question. The analysis of the questionnaire outcomes in combination with the results of the interview round provided input for testing the propositions that were stated in chapter three.

**Documentation and archival records**

At the start of the Master Thesis project, several internal documents were addressed regarding purchasing-related activities within Rabobank Netherlands. These documents included ‘Yearplan RCI 2008’, ‘Business Plan RCI 2006-2008’, ‘Profile Rabobank Group 2008’ and ‘Purchasing Policy RCI’. The documents provided a general overview of the position of RCI within Rabobank Netherlands and the way in which the purchasing function is being organized and executed. In addition, specific documents were analyzed regarding the establishment and implementation of supplier relationship management activities, including
the documents ‘Strategic Supplier Management Programme 2008’ and ‘Supplier Categorization Method 2006’.

Next to the information that addressed the purchasing function of Rabobank in general, additional documents were analyzed that elaborated on the e-procurement activities within the organization. Especially, those documents were assessed that focused on the different connection modes that are available between Rabobank and their suppliers for sharing purchasing related information electronically. Thereby, characteristics of the different technologies being used were analyzed and documented.

All documents that were suggested by internal members were first read globally. If the content contributed to the research topic, the document was analyzed in a more detailed way and the specific parts were marked for later use. In addition, a list of references to the specific documents was made available. The most important documents are also included in the reference list of this Master Thesis document. The same procedure was carried out for the theoretical articles that were used for conducting the literature study. For each theoretical article that has been read, a short summary of the content and main findings was written down in a separate document.

**Participant observation**

Due to that fact that the Master Thesis project has been conducted (full-time) at the research side itself, direct- and participant observation was applied as a secondary source of data collection. Especially, the involvement within the Sirius project generated rich insights into the adoption processes of the new Raboshop® between Rabobank and its suppliers. A meeting with one of the largest suppliers was attended in which issues regarding the use of the new Raboshop® were discussed. This provided additional knowledge with respect to the (sometimes conflicting) interests of the different stakeholders.

In addition, weekly project meetings were attended, in which the progress of the project was discussed from the Rabobank side. Also, several workshops initiated by RCI and the Sirius project have been visited. All together, these insights provided added value with regard to the overall understanding of the research topic and have contributed to the interpretation of the results of the primary data collection methods.

**2.3.3 Research validity and reliability**

Many academics have criticized the case study research design, especially concerning the prevention of bias or the threat of using incomplete evidence. In addition, opponents of the case study research design argue that the method lacks quantification, objectivity and rigor (Yin, 2003). Because of these critics, it is of importance to pay attention to measures that can be taken to ensure and improve the quality of the study.

Yin (2003) mentions four specific aspects that are of relevance in assessing the degree of quality of a research design. The next section clarifies how this research study will incorporate and increase each of the four quality aspects.

- **Construct validity**: refers to the degree to which correct operational measures for the concepts being studied are established. To meet the test of construct validity, Yin (2003) proposes three tactics. The first one refers to the use of multiple sources of evidence, also
known as ‘triangulation’. Various sources of evidence will be incorporated within this study, including observation, semi-structured interviews, a supporting questionnaire and a review of organizational documents. The second tactic is to have the draft case study report reviewed by key informants. This has been achieved by letting participants within the organization comment onto the draft version of the Master Thesis document.

The third tactic mentioned is to establish a chain of evidence by establishing explicit links between the questions asked, the data collected, and the conclusions drawn. This issue will be covered by the execution of a number of successive steps with the aim to fulfill the stated research objective.

1. A review of the current literature on buyer-supplier relationship management and interfirm information system use will function as the basis for conducting the research study. Outcomes of the literature study will provide direction for the development of a set of propositions to provide direction in answering the research question. In addition, the literature study will give input for the design of a number of interview questions that will be used during the semi-structured interview round.

2. The interview round has the aim to indicate field site-specific factors that are likely to impact upon buyer-supplier relationship effectiveness when information is electronically being exchanged between parties. The factors obtained from the field research will be verified with those that were indicated from literature. Outcomes of the semi-structured interviews give rise to the development of an overall model including all the relevant forces and influences regarding the impact of IOS use on business relationships.

3. The second phase of the study incorporates the validation of the designed research model. This will be accomplished by conducting a supportive questionnaire. Outcomes of the questionnaire round should provide insights to what extent relationship effectiveness is affected by the use of an IOS. The successive steps of the research study can be viewed in Figure 4.

*Figure 4: Structure of the research study*

- *Internal validity*: refers to the extent to which event x actually leads to event y. This test has been given the greatest attention in causal and/or explanatory studies, where the aim is to
make causal statements about events. Although assessing the internal validity in case studies is more difficult than for experimental studies, Yin (2003) proposes to increase the degree of internal validity in case study designs by analyzing the obtained data by the use of the ‘pattern matching’ method. This method will be applied within this research study and is further explained in section 4.3.1.

- **External validity:** this test deals with the problem of knowing whether a study’s outcomes are generalizable beyond the case study itself. While this research study is conducted within one specific organization, the results will only be valid within this specific case. However, because of the fact that this research study has a theory building objective, the degree of external validity will be of less relevance.

- **Reliability:** refers to the reduction of errors and biases in the research study (Paré, 2004). This can be achieved by carefully describing the research steps in such a way that the procedures are repeatable by other investigators and that it enables them to draw the same conclusions. Remenyi et al. (1998) suggests that the degree of reliability can be improved by the use of a case study protocol. This protocol includes the overview of the case study project and case study objectives, a description of the field procedures to be performed, an outline of the case study questions and a guide for the case study report. These elements will also be described within this research study. The research model, -objectives and questions are covered in section 2.2. Guidelines of the case study report are captured within the introduction. The field procedures being applied will be incorporated in section 4.2.

### 2.3.4 Field site

**Rabobank Group**

The research study will be performed within Rabobank Netherlands. Rabobank can be described as an international financial service organization, executing “all finance services” in the Netherlands. Internationally, activities are employed on retail- and wholesale banking and food and agriculture. More than 60,000 people are employed over 43 countries. The Rabobank Group consists of independent, local banks and a central organization, being Rabobank Nederland, and affiliates. In The Netherlands, Rabobank serves over 9 million customers. These customers are mainly served through 161 local banks, making it the densest network of banks in the Netherlands. Rabobank is a cooperative bank that was formed by the Coöperatieve Centrale Raiffeisen Bank and the Coöperatieve Centrale Boerenleenbank and has members instead of shareholders. The local banks ‘own’ the company and Rabobank Nederland can be seen as their ‘daughter’ company, performing a supportive and advisory role. Also, Rabobank Netherlands has the role to monitor the overall business activities and results which are reported to ‘De Nederlandse Bank (DNB)’. Although the local banks have much authority, one of the exceptions is the fact that Rabobank Nederland has to look upon the financial health and expertise of the local banks; this is required by the ‘Credit System Supervision Act’ (Profiel Rabobank Groep, 2008)

**Rabobank Concern Inkoop**

The Master Thesis study will be performed within the purchasing department of Rabobank Nederland, called Rabobank Corporate Purchasing (=Rabobank Concern Inkoop, RCI).
Every year, Rabobank Nederland purchases goods and services at an amount of over one billion euros. With that, the purchasing function can be considered having a significant impact on the risk-profile and financial results of the Rabobank Group (Business Plan RCI, 2006-2008). Purchasing is a shared responsibility of Rabobank Concern Inkoop (RCI), Control Rabobank Group (CRG) and the budget holders within the departments of Rabobank Nederland. RCI has the responsibility to organise and implement the purchasing function of Rabobank and has the objective to maximize purchasing savings and take control over risks by mastering the total purchasing volume. By the fact that Rabobank act as a financial service provider, the supply to be procured can be characterised as being Non-Production Related (NPR).

**E-procurement and relationship management within Rabobank**

At Rabobank and more specifically RCI, the developments on relationship management and information system use within the purchasing and supply chain discipline can be recognized. Rabobank already acknowledged the benefits that e-procurement can bring in a very early stage, adopting their electronic catalogue system “Raboshop®” twelve years ago. Thereby, Rabobank can be considered as one of the early adopters of electronic purchasing technologies.

After a project duration of two years, a new enterprise system will be implemented late 2008, migrating the “old” legacy systems Raboshop® and Tiffany® (contract system) to one standard system running on SAP SRM architecture.

Three reasons can be given for this initiative (Sirius kick-off presentation, 2007):
- replacement of unstable legacy systems of RCI
- “close the loop” for procurement at Rabobank by establishing the relationship between invoices, contracts and payments
- standardization of applications at Rabobank

As a result, the use of this system should increase the visibility of the total spend volume by reducing so called “maverick buying”. This issue is especially of importance for Rabobank, as local banks are likely to purchase their products and services at their local suppliers.

At the same time, Rabobank RCI places increasing emphasize and importance on managing their portfolio of suppliers. For example, the “Rabobank Purchasing Council” has stated that the “Strategic Supplier Management” program should be up and running in 2008. This program includes the categorization of suppliers based on the drivers that impact Rabobank businesses, being Cost, Value and Risk (CVR). A number of suppliers is qualified as being strategic, as they are selected to contribute to the growth of the Rabobank in the upcoming years.

The developments as they are going on at the moment within Rabobank RCI indicates that the two main concepts being studied in this research study, being relationship management and e-procurement usage, are visible and regarded as important topics within this organization. The developments with regard to the professionalization of the Raboshop® and the supplier relationship management programme can be viewed in Figure 5 and 6 respectively.
Applicability of Raboshop® as inter-organizational information system

When considering the e-procurement activities as they are going on, it can be concluded that Rabobank makes use of a transactional e-procurement system, including an e-ordering system based on an internal electronic catalogue connected to an electronic payment system (Paalvast and Spaan, 1999). After the SAP SRM architecture is operational, contract registration will also be automated, covering also a part of the tactical purchasing process. For testing the propositions that will be stated in Chapter three, the electronic ordering- and payment system Raboshop® will be used as the main inter-organizational information system.

Three different connectivity methods are being used for sharing electronic information between Rabobank and their suppliers. These different connectivity modes differ from each other on a number of aspects. The main differences in functionalities between the connections include the level of automation of the messages being transferred, the integration of the system into supplier’s own information systems, and the investment costs for designing and servicing the connection. The three different connections as being provided to suppliers for connecting to the Raboshop® are called: Full XI Interface, Supplier Assistance Module (SAM) and Supplier Self Service (SUS). The Full XI Interface exchanges information electronically by use of a XML (Extensible Markup Language) protocol, where the Supplier Assistance Module makes use of an FTP (File Transfer Protocol). The Supplier Self Service solution includes the use of a web-based portal in which information is transferred via a secured internet connection. These three connection modes further vary on the different functionalities as follows: a Full XI Interface exhibits a high rate of automation, high degree of integration and relatively high investment costs. On the other end of the continuum, the Supplier Self Service Module provides relatively low automation, low integration and low investments costs. The Supplier Assistance Module is in between these two extremes. A schematic overview of the different connections can be viewed in Figure 7. With regard to the differences in characteristics between the three connection modes being used, the following characterizations will be applied within this research study: the Full XI Interface will be named ‘Tight’, the Supplier Assistance Module as ‘Medium’ and the Supplier Self Service solution as ‘Light’.
This system is being used by a large part of Rabobank’s suppliers having a medium- to long term contract. The group of suppliers that make use of the Raboshop® can be regarded being diverse, representing all of the five main product categories as they are recognized within RCI (Facilities, HRM, Marketing and Communication, ICT and Primary Process). A variety of different products and services are being ordered by the use of Raboshop®, including commodity products as office supplies, computer hardware and magazines up to strategically-oriented products and services such as payments machines, deposit forms and labour contract application.

2.4 Conclusions

The exploratory nature of the research domain asks for an in-depth study in which the topic of interest should be studied within a real business case. Rabobank Netherlands is selected as main participant within the case study design. The purchasing related trends that were observed from literature are also found to be present within this organization. The internal e-procurement system Raboshop® is considered as the IOS to be analyzed. To increase the likelihood of obtaining more valid and reliable results, the strategy of triangulation will be applied. The methodology involves a literature study, a semi-structured interview round and the execution of a supporting questionnaire. The literature study will results in the development of a number of propositions that will be tested by the interview round and questionnaire. Results will provide guidance in answering the main research question.
3. Literature Review

3.1 Introduction

This chapter provides the theoretical foundation of this research study. It includes an analysis on what is written in literature about the three main concepts being used: purchasing strategies, buyer-supplier relationships and interfirm information system use. Section 3.2 will elaborate on the independent variable within the research model, being the identification and characterization of differentiated purchasing strategies. This gives rise to the answering of sub-research question one. Section 3.3 focuses on the dependent variable of the research model by analyzing the characteristics of buyer-supplier relationships and the way in which relationship effectiveness can be assessed. Outcomes will provide input for answering sub-research question two. In addition, section 3.4 will incorporate the moderating IOS variable by assessing the way in which IOS use impacts upon the relationship between buyer and supplier. Together with the outcomes of sub-research question one and two, section 3.4 will lead to the establishment of a number of propositions that will be used to provide direction in answering sub-research question three and four.

3.2 Identifying purchasing strategies with a purchasing portfolio approach

In response to the increasing competitive pressures with regard to market-, economical-, technological- and organizational changes, companies recently draw more attention to exploiting core competencies for holding a competitive market position (Prahalad and Hamel, 1990). A main consequence of this development is that a general shift has taken place from in-house production to outsourcing activities. In this respect, the function of procuring goods and services has changed from administrative necessary to one that holds strategic importance (Gadde and Snehota, 2000). By implementing more outsourcing activities, the call for a sophisticated approach towards supplier management becomes of primary importance. Especially when concerning medium- to large sized organizations, the diversity of goods and services to be sourced asks for differentiated purchasing strategies. By applying tailored purchasing strategies for their supply markets, firms are better able to manage their supply base in a more effective and efficient way (Van Weele, 2005).

Researchers have generally acknowledged this change towards strategic procurement, resulting in the development of several portfolio models in which the purchasing strategies and supporting action plans have been made explicit. These portfolio models are still increasingly being used by many organizations for managing the supplier relationship.

3.2.1 Purchasing portfolio use

Following the definition of Gelderman (2003), a portfolio model is “a tool that combines two or more dimensions into a set of heterogeneous categories for which different (strategic) recommendations are provided” (Gelderman, 2003, p.21). It can be noted that within this definition, three basic elements are to be recognized: (1) dimensions, (2) categories, and (3) strategic recommendations. Thereby, it implies the classification of objects/subjects which are
usually presented in the form of a two-dimensional matrix. The position of the units in the matrix should determine the most appropriate strategy. Gelderman (2003) stresses the importance to differentiate between classification schemes and portfolio models. Classification schemes do not provide guidance for management decisions, only characterizing the unit under study. In purchasing, classification tools as the ABC-analysis and the commodity-analysis are regarded as the predecessors of purchasing portfolio models.

Kraljic (1983) was the first one that introduced a comprehensive purchasing portfolio for the purchasing and supply discipline. It constitutes a classification of products on the basis of two dimensions: profit impact and supply risk. Here, the profit impact of a given supply can be measured against criteria such as the costs of materials, total costs, volume purchased, percentage of total purchase cost, degree of contribution to end product/service or impact on product quality or business growth. Supply risk can be captured by taking into account criteria such as short-term and long-term availability, number of potential suppliers, cost of changing a supplier, competitive structure of the market, make-or-buy decisions and substitution possibilities (Van Weele, 2005). It can be noted that the ‘profit impact’ dimension has an internal business focus, and is determined via a financial approach. The ‘supply risk’ dimension represents the external environment, and emphasizes on the logistical characteristics of the item, the supplier, and the supply market. Kraljic’s model aims at matching external resources provided by suppliers with the internal needs of the buying firm. As each dimension is characterized being ‘low’ or ‘high’, the result is a 2x2 matrix and a classification of four main categories. Figure 8 shows the Kraljic matrix with the representative dimensions, categories and strategic recommendations.

Figure 8. The Kraljic purchasing portfolio with proposed strategies (Kraljic, 1987)

While Kraljic (1987) proposes a multi-phase action plan for implementing supply management activities with the use of the portfolio model, only the ‘strategic’ quadrant is described in more detail by the use of a second portfolio. Within this model, the strategic relationships that can be entered with the supplier are differentiated based on dependency aspects. If the buyer has a power positions against the supplier, the proposed strategy is to
impose the requirements on the supplier (exploit). When buyer and supplier are in a situation in which mutual dependence exists, a ‘partnership’ relationship may develop over time. In case the supplier dominates the buyer, the buyer should defend itself and start looking for material substitutes or new suppliers (diversify).

Because of the fact that Kraljic (1987) elaborates on the strategic category of the portfolio, the descriptions and proposed strategies for the other three categories are kind of underemphasized. Other authors have filled this gap. Table 1 includes an overview of the main characteristics (Van Weele, 2005), proposed strategies (Kraljic, 1987) and relationship goals (Olsen and Ellram, 1997) for each category of the portfolio model. Concluding on the differentiated strategies, Dubois and Pederson (2002) suggests applying ‘supply management’ activities for strategic items, while ‘materials management’ should be incorporated for leverage items. The bottleneck items calls for ‘sourcing management’ activities and the routine items should be treated by applying ‘purchasing management’ related practices.

|----------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Strategic| These are high-tech, low volume products, which are often supplied to customer specification. Only one source of supply is available, which cannot be changed in the short term without incurring considerable costs. It represents a high share in the cost price of the end product. | - Accurate demand forecasting  
- Detailed market research  
- Development of long-term supply relationships  
- Make-or-buy decisions  
- Contract staggering  
- Risk analysis  
- Contingency planning  
- Logistics, inventory and vendor control | “The company should manage these purchases by establishing a close relationship with the supplier, focusing on early supplier involvement and joined development of products and services, keeping a long-term value focus and lowering poor performance costs.” |
| Leverage | These products can be obtained from various suppliers at standard quality grades. They represent a relatively large share of the end product’s cost price. A small change in price has a relatively strong effect on the cost price of the end product. Therefore, the buyer exerts aggressive sourcing and tendering activities. | - Exploitation of full purchasing power  
- Vendor selections  
- Product substitution  
- Targeted pricing strategies / negotiations  
- Contract / spot purchasing mix  
- order volume optimisations | “Leverage volume across product lines and suppliers to lower the material costs. The goal is to create mutual respect in the supplier relationship and communicate requirements further into the future.” |
| Bottleneck | These items represent a relatively limited value in terms of money but they are vulnerable in regard to their supply. They can only be obtained from one supplier. | - Volume insurance (at cost premium if necessary)  
- Control of vendors  
- Security of inventories  
- Backup plans | “The company should try to establish some sort of relationship focusing on concurrent engineering and involving the supplier in value analysis in order to lower the costs of operation” |
| Non-critical | These products produce few technical or commercial problems from a purchasing point of view. They usually have a small value per item and there are many alternative suppliers. | - Product standardisation  
- Order volume monitoring / optimisation  
- Efficient processing  
- Inventory optimisation | “The company should reduce the number of suppliers and the number of duplicate products/services (standardise)” |

Table 1. Characteristics, strategies and relationship goals proposed for each segment of the Kraljic portfolio model
3.2.2 Answering sub-research question 1

Elaborating on research question 1 “Which differentiated purchasing strategies are commonly applied?”, it was found that purchasing portfolio models provide a clear foundation for analyzing and developing differentiated purchasing-related strategies. A combination of internal- and external factors related to the characteristics of the product/service to be sourced provides direction to the establishment of tailored purchasing recommendations. These recommendations have the aim to guide the buying company into the most favorable position with regard to the product/service to be procured.

The internal dimension ‘profit impact’ captures the strategic importance of the transaction, while the external dimension ‘supply risk’ covers the degree of criticality of the product/service to be procured. This leads to a classification of four main strategies. Strategic products ask for supply management activities. This can be achieved by establishing a long-term value focus, trying to lower poor performance costs and initiating co-development of new products/services. Leverage products can be best treated by exploiting buying power over the supplier. The goal is to leverage volume across product lines and suppliers to lower the material costs. Bottleneck items require the insurance of product volume and the security of inventory levels. This can be achieved by tightening the relationship, but at the same time search for alternatives to lower the dependence upon the single supplier. Routine items ask for the establishment of efficient processing procedures, product standardization and order volume optimization. This can be achieved by selecting a number of preferred suppliers by which operational relationships can be established.

An important implication that can be drawn from the purchasing strategy analysis is that for obtaining effective management of the supply chain, a firm needs to choose appropriate relationships with suppliers. Thereby, management initiatives should be structured to fit the nature of the relationship.

3.2.3 Applicability of theoretical concepts to Rabobank

The differentiation of purchasing strategies based on the perceived strategic importance of the product/service being sourced is also found to be present within Rabobank. Because of the fact that a large variety of goods and service have to be procured in different quantities, tailored purchasing approaches are applied for achieving optimal results. Thereby, ‘cost’, ‘value’ and ‘risk’ function as main drivers for making decisions with regard to the purchasing strategy to be applied. As example, Rabobank tries to establish cooperative-working relationships with those suppliers that are perceived to add sustaining benefits to the end business. In addition, supply risk analyses are constantly being performed in order to be able to react pro-actively on changing market-conditions. For leverage- and non-critical items, sourcing- and tendering activities are being conducted with the aim to obtain the best cost-efficient bid. To achieve order-volume optimisations, operational relationships are established with a number of preferred suppliers where the relationship is based on improving the service being provided by the supplier.

3.3 Buyer-supplier relationships in focus

The increasing importance of outsourcing activities generated more attention by organizations regarding the role of the business relationship as such. Numerous authors have emphasized
the value adding role of relationship management activities for obtaining sustainable competitive advantages (Sako, 1992, Cousins, 2002). Ford (1980) suggests that relationships matter when the value of to the parties involved in an exchange stems from interaction in its entirety, rather than simply from the tangible resource transfer between the companies involved.

3.3.1 Business relationship theory

Various theoretical perspectives have been applied by researchers for studying business-to-business relationships. One traditional research stream analyzes the phenomena from a transaction cost perspective (Williamson, 1975), by describing the economic activity between firms in terms of two competing costs: production costs and transaction costs. Proponents of this perspective view competition between firms based on the costs of competing in the marketplace. The theory proposes that a prerequisite for a firm to survive is to produce at lower costs. Therefore, firms are likely to make a cost-based trade-off between in-house production and market acquisition, also referred to as the hierarchical governance structure and market governance structure respectively. Three major dimensions of transaction cost theory can be indicated, being asset specificity (the investment in specific assets required for an exchange), uncertainty embedded in the exchange process and the degree of exchange intensity (Williamson, 1975). It is argued that in the case of a high degree of all these factors, a 'hierarchical mechanism' such as vertical integration, will perform more effectively than market mechanisms.

Because the transaction cost perspective only consider internal cost structures as the main decision variable to choose between two extreme forms of governance structures, researchers have criticized the over simplicity of the theory in explaining business relationships (Barney, 1991). Proponents of the resource dependence theory have challenged these shortcomings by stating that external environments are the source of scarce resources and organizations are dependent on these finite resources for survival (Pfeffer and Salancik, 1978). A lack of control over these resources may create uncertainty for firms operating in that environment. Pfeffer and Salancik (1978) determined three factors that influenced the dependence upon particular external resources. At first, the importance of the resource to the buying firm is regarded as critical in determining the degree of dependence of the firm. Second, the degree of scarcity of the resource is seen as a key factor for determining the overall dependence. Finally, resource dependence is influenced by the degree of competition between organizations for controlling the resources.

For controlling the uncertainty that comes with the acquisition of external resources, organizations increasingly enter cooperative relationships with their business partners. Ring and Van der Ven (1992) argue that by applying a long-term collaborative approach reflecting mutual dependence, the potential for opportunistic behaviour by one of the parties is reduced. Due to the fact that cooperative relationships are strongly driven by reciprocal interdependence, higher incentives are created for both parties to safeguard the relationship. In addition, lasting relationships are generally acknowledged as a way to secure competitive advantages. By forming a barrier against third-party competitors getting into contact, the possibility to ‘break into’ the existing relationship will be more difficult (Van Weele, 2005). Resource dependence theorists argue that this mode of inter-organizational transactions offer more effective coordination than market mechanisms, while it also offers lower risks of investment than vertical integration (Cousins, 2005).
3.3.2 Key components of the buyer-supplier relationship

In line with the increasing attention that has been given to the establishment and execution of collaborative relationship forms, numerous studies have focused on key aspects of the business relationship recently (Ruyter et al., 2002, Handfield and Bechtel, 2002). It is argued that for each relationship form, from adversarial- to partnership types, certain key elements exist to different degrees (Carr and Smeltzer, 2002). The following sections will elaborate on those relationship components that have gained most interest within theory.

Social exchange factors in business relationships

The formation and management of cooperative, partnership-based business relationships is largely described and supported by the use of social exchange theory (Anderson and Narus, 1984). Within this perspective, the nature of business relationships is assessed by the presence of certain behavioural characteristics between the parties. Relationship marketing literature has focused on aspects of commitment, coordination, interdependence and trust as important attributes for creating successful cooperative relationships (Morgan and Hunt, 1994, Handfield and Bechtel, 2002). The existence of these relationship aspects implies that both partners acknowledge their mutual dependence and their willingness to work together in order to reap benefits of the relationship. It is suggested that in the case one party should act opportunistically, the relationship will suffer and both will feel the negative consequences (Mohr and Spekman, 1994).

Addressing the role of trust and commitment within relationships, Morgan and Hunt (1994) conclude that the presence of these factors increases the productivity and effectiveness of relational exchanges. It is suggested that a high degree of trust and commitment will encourage the establishment of cooperative behaviour between exchange partners, and thereby reduces the chance that one party will misuse the intention of the relationship. Another relational aspect that is frequently assessed within the literature refers to the coordination between the exchange partners. Coordination is related to boundary definition and reflects the set of tasks each party expects the other to perform (Mohr and Spekman, 1994). Narus and Anderson (1987) argue that successful working relationships are characterized by coordinated actions directed at mutual objectives that are consistent across organizations.

(Inter)dependence in business relationships

As organizations are by nature dependent on their environment for obtaining their necessary resources, there always exists a certain degree of dependence between the actors (Cox, 2001). Within the purchasing and supply management discipline, the buyer is concerned with resources from suppliers at the input side of the production process or has to secure the non-product related supply. This dependence is not one-sided, as the supplier relies on the buyer’s demand for their products and/or services. In other words, dependence can be considered being mutual, making it an essential element within buyer-supplier relationships. Caniëls and Gelderman (2005) argue that mutual dependence and power are closely related concepts, where the buyer’s dependence on the supplier is a source of power for the supplier and vice versa.

Researchers have come up with various definitions regarding power and (inter)dependence within business relationships. Pfeffer and Salancik (1978) suggest that most of the definitions
of power include an element indicating that power is the capability of one social actor to overcome resistance in achieving a desired objective or result. Stated in a different way, if A depends on B, more than B depends on A, then B has power over A. In asymmetric relationships, the most independent partner dominates the exchange, while balanced relationships are characterised by equal dependence. It is suggested that the presence of asymmetrical interdependence has a negative impact on relationship building as the independent partner experiences high power and will be attempted to exploit it. In addition, Anderson and Weitz (1989, p.312) concludes that “imbalanced channel relationships are characterized by less cooperation and greater conflict”.

Besides the importance of ‘relative power’ within the relationship, also the absolute value of power plays a vital role, referred to as ‘total power’ or ‘total interdependence’. Caniëls and Gelderman (2005) explain total interdependence as the intensity of a relationship. A high level of total interdependence is an indicator for cooperative, long-term relationships; however, mutual trust and commitment should be present for overcoming the chance of opportunism of one of the parties. Another effect of high total interdependence is that both parties are faced with high switching costs, leading to an overall increase of exit barriers within the relationship (Geyskens et al., 1996). From a purchasing and supply management perspective, higher exit barriers reduces the ability of the buying firm to search for alternative sources, which subsequently constrains the degree leverage over the supply market for the buying organization.

Information exchange in business relationships

Communication, the formal and informal sharing of information through frequent two-way interchanges, also plays an important role in realising the benefits from a relationship (De Ruyter et al., 2001). Ellram (1995) conducted research on what both buyers and suppliers considered the most important factor in alliance success. Two-way information sharing was rated as most important factor. In addition, Carter and Narasiham (1996) indicate that the relationship between buyers and suppliers is becoming much more interactive, with a variety of interpersonal linkages on different levels within one relationship.

Three specific components of information exchange are largely supported within literature, being the quality of the exchanged information, the degree of information sharing, and the degree of participation within the relationship (Mohr and Spekman, 1994). Here, communication quality can be regarded as a key aspect of information transmission. It includes such aspects as the accuracy, timeliness, adequacy, and credibility of information being exchanged. Information sharing (quantitative and qualitative) refers to the extent to which critical and proprietary information is communicated to one’s supply chain partner. The establishment of closer ties results in more frequent and more relevant information exchanges between high performing partners (Huber and Daft, 1987). In addition, it is suggested that by sharing information and by being knowledgeable about each other’s business, partners are able to act independently in maintaining the relationship over time (Mohr and Spekman, 1994). The third aspect concerns the participation of parties within the relationship. It refers to the extent to which partners engage jointly in planning and goal setting. Dwyer and Oh (1988) state that input decisions and goal formulation are important aspects of participation that help cooperative relationships succeed.
3.3.3 Assessing the effectiveness of buyer-supplier relationships

While literature generally admits that the execution of relationship management activities are becoming of key importance, a prerequisite should be that the initiation of the relationship should lead to a desired result. In accordance to this, Cousins (2002) argue that ‘a relationship’ should not be seen as an entity, but as a process. Like any process it needs to be focused on a definable outcome. As organizational performance is largely discussed within theory by assessing objective measures as profitability, cost structures and productivity rates, the performance measurement of interfirm relationships is often excluded (Toole and Donaldson, 2002). Especially, there seems to be lack of studies that incorporate qualitative measures for determining the overall effectiveness of relationships.

Relationship effectiveness is addressed within the literature as a qualitative measure of the overall success of an exchange relationship. It covers the degree to which a party in a relationship views the relationship as being worthwhile, productive, and satisfying (Van de Ven, 1976). It is suggested that if benefits are not gained in a relationship, an exchange partner may not perceive the relationship as being effective. This condition may result in a poor match between the buyer and supplier, indicating a potential lack of trust and/or commitment. A buyer who perceives a relationship as effective will likely become committed to maintaining the relationship (Moore, 1998).

Several factors appear to affect the overall perception of relationship effectiveness. Moore (1998) identified conflict, trust and risk of opportunism as significant indicators. Van der Ven (1976) includes interdependence, commitment and information flows as measures of relationship effectiveness. These indicators largely cover the key relationship components that were addressed in section 3.3.2.

3.3.4 Answering sub-research question 2

The theoretical review of section 3.3 provides input for answering sub-research question 2: “How could buyer-supplier relationship effectiveness be defined and measured?”. It was shown that the business relationship itself constitutes of different elements that all together determine the nature of the relationship. The presence of social exchange factors as trust, commitment and coordination, in combination with a high degree of mutual dependence and information sharing capabilities can be regarded as strong predictors of cooperative relationships. However, when power imbalances exist between the parties, relationship-building practices are likely to be frustrated in case one party is misusing their power position within the relationship.

These qualitative factors were included in a number of studies for determining the effectiveness of buyer-supplier relationships. Here, buyer-supplier effectiveness can be described as a qualitative measure of the overall success of an exchange relationship. Within this study, the overall success of the relationship will be analyzed by incorporating measures of relational (social) behaviour, interdependence, information exchange and operational performance.

3.3.5 Applicability of theoretical concepts to Rabobank

Rabobank is increasingly emphasizing on downsizing their supply base and entering collaborative relationships with a number of preferred- and strategic suppliers. The ‘Supplier
relationship management programme’ is introduced to further focus on increasing the effectiveness of the working relationships with these types of suppliers. Performance management is applied by the use of Key Performance Indicators (KPIs), while value-added initiatives are being initiated with suppliers that are perceived to be strategic. By implementing these initiatives, the objective is to achieve higher levels of cooperation and commitment within the relationship which is likely to lead to sustaining benefits for both parties. In addition, the selection of preferred- and strategic suppliers introduces a higher degree of interdependence within the relationship. Relationship management practices are focused on controlling this dependence and assuring that Rabobank holds their power position against the supplier. Overall, these activities have the aim to obtain highly effective business relationships that contribute to the ‘cost, value, risk’ approach applied by Rabobank RCI.

The upcoming section addresses the role that interfirrm information system use has within the buyer-supplier relationship. It tries to reveal the underlying mechanisms of IOSs that have an impact upon characteristics of business relationships. Based on these outcomes and the answers on sub-research question one and two, propositions will be stated that will be used to provide direction in answering sub-research question thee and four.

### 3.4 Using Information Systems for Procurement

A key development that has recently taken place is the increasing use of electronic information systems in a business-to-business context. The exponential growth of electronic commerce applications is leading organizations to plan high investments in innovative technologies, for maintaining competitive benefits in an increasingly dynamic market. The intensive adoption of information technology to support industrial processes dates back to the 1960s with the first applications of EDI (electronic data interchange) protocols. These electronic communication links between firms allowed participants to obtain substantial reductions on transaction costs along the supply chain. However, high implementation costs and complexity of the infrastructure has led EDI adoption only to be feasible for large enterprises (McIvor et al., 2003).

The rise of the internet created increasing attention of the role of web-based technologies to support interfirrm operations. The openness and transparency of information transfer and the relatively low investment costs of these technologies diminished most of the original shortcomings. As a consequence, more firms increasingly recognize the capabilities of these systems for creating effective supply chain networks. Advancements in the field of internet-driven business-to-business technologies have led to the introduction of information systems that support a variety of purchasing-related activities (e-procurement tools) (Harink, 2003). As each of these systems provides value in different ways, the choice of implementing a tool within a specific business context becomes of strategic importance (Wagner and Essig, 2006).

#### 3.4.1 E-Procurement tools and added value

The adoption of internet technologies for purchasing and supply management activities has led to a shift in how organisations operate and communicate with their stakeholders. The impact that this development has on organizational processes has widely been acknowledged by practitioners and academics. Scientific articles have been published, in which the topic of interest has been studied from different points of view. De Boer et al. (2002) for example focus on the reduction of different organizational cost structures by executing e-procurement
activities. The study concluded that successful e-procurement implementation reduces total purchasing costs. As a result of automated and digitalized order systems and catalogues, different cost structures will be lowered such as transaction- communication- and administrative costs. Next to the cost-related effects, efficiency gains that can be obtained by using inter-firm information systems for purchasing activities are widely recognized. Van Weele (2005) explains that the use of standardized protocols gives rise to faster sourcing and transaction processes which will suffer from fewer problems. Subramanian and Shaw (2002) concluded that the improvement in process quality in turn improves the level of output, leading to higher productivity and improved quality. In addition, Presutti (2003) suggests that the standardization of information systems along different sub-units will lead to better visibility in the spending corporate wide in various purchased product area’s.

The possibility to use information technology for purchasing related activities has led to the introduction of a variety of e-procurement tools that each fulfils a certain function within the purchasing process. Harink (2003) provides a complete classification of e-procurement tools that are most well known and described in literature. Figure 9 includes an overview of these e-procurement tools.

![Figure 9. Positioning of e-procurement tools within the purchasing process model (Harink, 2003)](image)

Table 2 provides an overview of the main characteristics and functionalities for each of the indicated e-procurement form.

The internet technology that is needed in these processes can be offered to the employees via electronic (public) marketplaces, electronic catalogues or private networks (intranets and extranets) (Wagner and Essig, 2006). Here, electronic marketplaces are specific websites on the internet (aimed at, for example, an industry or a commodity) that aim to bring buyers and sellers together in order to facilitate the application of various e-procurement forms. Electronic catalogues provide access over the internet to information about products and services which can then be purchased online or via conventional channels. The catalogue contains descriptions of products or services, provide price information and support transactions to a certain degree. Considering private networks, these are ‘secure’ linkages between customer and suppliers in which data are exchanged via private ‘tunnels’ through the internet. Private networks are also referred to as extranets, Web-EDI or internet-EDI applications. These communication channels are only accessible for a number of pre-selected participants, and have the goal to improve transparency, speed up processing and reduce costs in supplier networks (Wagner and Essig, 2006).
Table 2. Description of characteristics and functionalities for different e-procurement tools (De Boer et al., 2002)

<table>
<thead>
<tr>
<th>E-procurement form</th>
<th>Description (De Boer et al., 2002)</th>
</tr>
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<tbody>
<tr>
<td>E-ordering</td>
<td>The process of creating and approving purchasing requisitions, placing purchase orders and receiving goods and services by using a software system based on internet technology. The goods and services ordered are MRO or NPR. The software systems contains of an ordering catalogue system preferably used by all employees of an organization.</td>
</tr>
<tr>
<td>Web-based ERP</td>
<td>The same process as in the case of e-MRO, but with web-based ERP, the goods and services ordered are product related.</td>
</tr>
<tr>
<td>E-sourcing</td>
<td>Includes the process of identifying new suppliers for a specific category of purchasing requirements using internet technology. It can lead to identification of new suppliers, which can lead to increased competitiveness in the tendering process. It is also a way of decreasing the supply risk associated with a purchasing category.</td>
</tr>
<tr>
<td>E-tendering</td>
<td>The process of sending requests for information and prices to suppliers and receiving the responses of participants using internet technology. It sometimes also concerns the analysis and comparison of responses, but excludes the process of closing the deal.</td>
</tr>
<tr>
<td>E-reverse auctioning</td>
<td>An auction enables a supplier to sell goods and services to a number of known and unknown buying organizations. Within a relatively short time frame, the buying organization involved submits bids for the goods and services that are auctioned. A reverse auction is the opposite and enables one purchaser to buy goods or services from a number of known or unknown suppliers.</td>
</tr>
<tr>
<td>E-contracting</td>
<td>The use of a contract management system linked to an automated ordering and /or payment system.</td>
</tr>
<tr>
<td>Purchasing Intelligence</td>
<td>Concerns the process of uploading purchasing data and the analysis of this data into valuable purchasing information.</td>
</tr>
</tbody>
</table>

3.4.2 Interorganisational Information Systems and the change in governance structure

While the productivity and financial benefits of information technology for purchasing purposes have been widely recognised and accepted, no consensus has been achieved regarding the effects on the structure and configuration of supply chains (Croom, 2007, Wagner and Essig, 2006). Early literature that emphasized on the change in governance structure that information systems may bring posits two opposing views on the subject. Malone et al. (1987) proposes two main effects that occur when information technology between organizations is being used. On the one hand, information technology improves the coordination between the participating firms which will lead to an overall reduction in search costs, called the ‘electronic brokerage effect’. On the other side, it has been proposed that the nature of some inter-organizational information systems serve to tie in customers and suppliers into virtual hierarchies, referred to as the ‘electronic integration effect’. By applying a Transaction Cost perceptive, Malone et al. (1987) concludes that the decrease in costs of search, monitoring and evaluation of suppliers by means of information technology favoured a shift from hierarchical to market relationships by approaching the economic model of perfect competition.

In reaction to the ‘move to the market’ hypothesis put forward by Malone et al. (1987), several researchers have criticized and challenged the underlying assumptions made by the authors. Pointing to the fact that inter-firm transactions do not depend only on the cost of searching and evaluating suppliers, several researchers have argued that the use of the Transaction Cost perspective only for analyzing IT impact seems to be incomplete and
outdated. Realising the increasing dynamics of supply markets in recent years, firms have entered more collaborative relationships for securing their competitive position in the market. In line with this, Bakos and Brynjolfsson (1993) argue that companies implementing information system technologies would benefit from reduced costs of information exchange and processing. When relationship investments are indispensable or specific assets are procured, firms will create networks in which suppliers and buyers form close business relationships facilitated by information technology. This shift to cooperative relationships by the use of interfirm information systems is generally known as the “move to the middle” hypothesis, as this form combines elements of both markets and hierarchies (Clemons et al. 1993). It supports the generally recognized trend that organizations are moving towards a reduced set of business partners in which tight relationships are established for achieving better coordination of inter-firm activities. The notion of interfirm information systems that facilitate network-like organization structures has been supported by the results of empirical studies. Holland and Lockett (1997) found that the process of supply chain integration is followed by a reduction in the number of suppliers. Dai et al. (2000) concluded that firms indeed benefit from reduced coordination and search costs, but in case the transaction asks for relationship specific investments, buyers still maintain close relationships with selected suppliers and will use information technology to reap the benefits of cooperative relationships.

3.4.3 Impact of proprietary IOSs on buyer-supplier relationship characteristics

Information system researchers have described a variety of IOSs that are commonly used for the transfer of purchasing-related information. As it was explained in section 3.4.1, these systems range from proprietary networks to open (internet-based) marketplaces. Proprietary IOSs can be recognized by having pre-established standards for messaging, communication and procedures, and are only assessable by pre-selected participants. These systems are commonly initiated by one of the parties within the exchange relationship. This type of IOS has gained increasing interest within theory and practice as their ability to form close ties with business parties contribute to the general development of forming cooperative relationships with a number of preferred business parties (Nidumola, 1995). One of the main aspects of closed IOSs which is considered to significantly affect the characteristics of the relationship is related to the specialized investments that have to be made for obtaining long-term system-benefits. These investments in a specific IOS between buyer and supplier cannot be redeployed towards another relationship, and can therefore be seen as ‘relationship specific’ (Williamson, 1975). Relationship specific investments are related to the degree of ‘asset specificity’, which refers to the extent to which a party is ‘tied in’ in a two-way business relationship. Cousins (2005) suggest that the degree of specialized investments being made for entering and participating within an IOS is closely related to the level of switching costs within a relationship. While the introduction of switching costs may act as a strategic resource for obtaining bargaining power over the exchange partner, it is generally acknowledged that asymmetrical relationships as such have a negative effect on relationship building practices (Caniëls and Gelderman, 2005). Wilson and Vlosky (1998) predict an overall reduction in relationship satisfaction when one-sided technological investments will lead to disruptions and exercise of power within the relationship. By the fact that the use of an IOS introduces changes with respect to the degree of dependency between the actors, it is likely to impact upon social aspects of the relationship as well (Wilson and Vlosky, 1998). Anderson and Weitz (1992) discuss the difficulty or inability to redeploy ‘non contractible’ investments to other channel relationships. Thereby, it is generally acknowledged that IOS specific
investments enhances both parties’ incentives to maintain the relationship and are therefore willing to put considerable cooperative efforts into the relationship.

Next to the notion that specific investments triggers exchange partners to adopt collaborative working relationships for reaping the benefits of the IOS being used, a number of studies suggest that the characteristics of the IOS itself directly impacts upon the nature of the relationship. In an empirical study conducted by Carr and Smeltzer (2002), it was concluded that interaction between buyer and supplier is becoming more frequent and clearer with the use of interfirm information technology. However, no indications were found that the use of IOSs increases levels of trust and depth within the relationship. It was even indicated in some cases that levels of trust decreased as the use of information technology removed the human element in buyer-supplier interaction. White and Daniel (2004) conclude from their case study about the use of a private e-marketplace within the healthcare sector that an overall reduction of errors increased the quality of the information being shared which gave rise to the establishment of better working relationships. In addition, IOS use introduced multiple-level and multiple function linkages between the parties and increased face-to-face interaction on a tactical level. The formation of a variety of contacts at different organizational levels is generally accepted as an important factor in developing enduring relationships.

3.4.4 Applicability of theoretical concepts to Rabobank

Applying the e-procurement system overview of Harink (2003) (see Figure 9), it can be concluded that Raboshop® can be characterised as an e-ordering system which is connected to an e-contract management system. It should be noted that within the new Raboshop®, these two systems are integrated into one enterprise system, establishing the link between contract, order and payment. Suppliers are connected to the Raboshop® via an internet-based proprietary network, and offer their supply by means of an internal catalogue system. Three specific connection modes are being used between Rabobank and suppliers for exchanging purchasing-related information. These three connection modes differ against each other based on the degree of automation of the exchange- and handling of order- and payment processes. Second, differences exist with regard to the degree of system integration with the back-end systems of the supplier. These system characteristics are related to the degree of asset specificity that comes with a specific connection mode. The fully automated connection being used asks for a higher degree of (relationship specific) investments for securing the automated process. The degree of investments being made within the relationship with suppliers that make use of the Supplier Self Service portal is perceived to be significantly lower, as the exchange process is not fully automated and the connection is not integrated with the supplier’s internal order handling- and administration systems.

3.5 Discussion

The literature study showed that the use of information systems for executing purchasing-related activities between buying and supplying organizations affects the nature of the relationship in different ways. First of all, the ability to automate and coordinate operational procurement processes increases the degree of interaction and information sharing between business parties. In general, higher levels of information accuracy, quality and frequency can be obtained, leading to the establishment of qualitative better relationships. In addition, the introduction of relationship specific investments to secure the performance of the system
increases the willingness to apply collaborative activities, including the establishment of higher levels of coordination and commitment between the parties.

Third, the implementation- and operation costs that comes with the adoption of proprietary IOSs affects levels of interdependence and power balance. It is generally acknowledged that proprietary IOS use initiated by one of the exchange parties increases the degree of mutual dependence. This increase in interdependence might be regarded as positive or negative, depending on the overall importance of the exchange relationship perceived and the position of the parties against each other. In general, suppliers are willing to sell their products and/or services as much as possible, in which they might perceive the adoption of an IOS as a way to get ‘locked’ within the relationship. Considering the perspective of the buyer, the general aim is to reduce dependence upon suppliers as much as possible. By decreasing the dependence upon one supplier, buying firms exhibit better sourcing leverage capabilities and could switch to other suppliers when targets are not being met. Even in situations where collaborative relationship modes are perceived to yield the greatest benefits, from the buying perspective it is always desired to obtain a better power position over the supplying organization. This is in line with resource dependence theory which proposes that actors in relationships are always willing to obtain the most favourable position for securing their competitive position in the market.

3.5.1 Development of propositions

The findings of the literature study and the subsequent discussion give rise to the establishment of a number of propositions that will provide further direction in answering the main research question. It was indicated that different components of the buyer-supplier relationship are affected by the use of an IOS, and that the extent to which the suggested effects occur is influenced by the degree of asset specificity (and thus relationship specific investments) that comes with a specific IOS configuration.

For conducting the case study, especially relationships with suppliers that are perceived to be situated within the ‘non-critical’ quadrant of the Kraljic matrix are analyzed. Although the products and services being purchased from these suppliers can be perceived having a low profit impact and supply risk, the increasing use of single-source suppliers for achieving a higher degree of process efficiency, standardization and volume optimization asks for more collaborative oriented working relationships.

Based on the outcomes of the literature study, it is suggested that proprietary IOSs that exhibit high levels of asset specificity provide incentives for both parties to engage in closer relationships characterized by higher levels of trust, cooperation, commitment and coordination. These social aspects of the relationship are captured by the dimension ‘relationship strength’ within this study. Overall, the success of the relationship is perceived to be increased by the establishment of cooperative behaviour. Therefore, the following proposition can be stated:

1. The relationship with non-critical suppliers is getting more effective as relationship strength is increased by the presence of high levels of IOS asset specificity.

Theory revealed that proprietary IOSs that are characterised having a high degree of asset specificity increase the overall interdependence between the parties. This could result in a ‘locked-in’ relationship, in which the buyer is restricted in their capabilities to leverage the
supply base. This is perceived to negatively influence the power position of the buyer against the supplier which is likely to lower the effectiveness of the relationship. Therefore, the following proposition can be stated:

2. The relationship with non-critical suppliers is getting less effective as relationship dependence is increased by the presence of high levels of IOS asset specificity.

It was also indicated that the ability to automate and coordinate operational procurement processes increases the degree of interaction and information sharing between business parties. This is likely to lead to higher levels of information accuracy, -quality and – frequency, leading to the establishment of qualitative better relationships. The dimension ‘relationship interaction’ is used within this study to capture the information exchange component within business relationships. Based on these observations, the following proposition can be stated:

3. The relationship with non-critical suppliers is getting more effective as relationship interaction is increased by the presence of high levels of IOS asset specificity.

The successful use of an IOS characterized by high asset specificity is likely to increase the transparency and openness of processes between the buyer and supplier. The possibility to assess the quality of the relationship by objective measures is likely to introduce a more performance-based orientation to the relationship. This is supposed to enhance the overall effectiveness of the relationship. Therefore, the following proposition is stated:

4. The relationship with non-critical suppliers is getting more effective as operational performance is increased by the presence of high levels of IOS asset specificity.

It should be noted that the stated propositions are based on an IOS that exhibits a high degree of asset specificity, which asks for the establishment of high levels of relationship specific investments. In the case of Rabobank, this IOS configuration corresponds with the fully automated XI interface. Two other connectivity modes are applied that differ with respect to a lower degree of asset specificity. More precisely, the Supplier Self Service (SUS) portal is perceived to exhibit a low degree of asset specificity, while the Supplier Assistance Module (SAM) is regarded to have medium levels of asset specificity. Within this research study, it is proposed that the level of IOS impact on relationship effectiveness is moderated by the degree of asset specificity of the IOS configuration. As proposition one till four are specifically aimed at an IOS configuration exhibiting a high degree of asset specificity, additional propositions for the other two connectivity modes can be stated. The full set of propositions can be seen in Table 3. It is proposed that a low level of IOS asset specificity will have no significant effect on the strength of the relationship, while the lower levels of dependence upon the supplier is suggested to increase the effectiveness of the relationship. The customized connection type ‘Medium’ (SAM) is proposed to further increase the cooperative behaviour between Rabobank and the participating supplier and therefore increases the ‘relationship strength’ component, enhancing the effectiveness of the relationship. The ‘relationship interaction’ and ‘operational performance’ dimensions are proposed to affect relationship effectiveness positively to the same extent by the three different connectivity modes.
Table 3. Proposed effects of IOS use on each relationship dimension and on relationship effectiveness

<table>
<thead>
<tr>
<th>IOS configuration</th>
<th>Effect on relationship dimension</th>
<th>Effect on relationship effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Relationship strength</td>
<td>Relationship</td>
</tr>
<tr>
<td></td>
<td></td>
<td>effectiveness</td>
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<tr>
<td>Tight (XI)</td>
<td>+</td>
<td>↑</td>
</tr>
<tr>
<td>a.s. = high</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light (SUS)</td>
<td>n.e</td>
<td>n.a</td>
</tr>
<tr>
<td>a.s. = low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium (SAM)</td>
<td>+</td>
<td>↑</td>
</tr>
<tr>
<td>a.s. = medium</td>
<td></td>
<td></td>
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</tbody>
</table>

+ relationship dimension increase
↑ positive effect on relationship effectiveness
↓ negative effect on relationship effectiveness
n.e no effect
a.s. asset specificity
4. Interview research results

4.1 Introduction

This chapter will elaborate on the execution and analysis of the interviews that were performed. First, the objective of the interview round and a justification of the selection of people for participating in the interviews will be given. Subsequently, a description of the applied interview procedure is provided. In accordance, the respective data analysis method that has been used will be discussed in more detail. This gives rise to the interpretation of the obtained outcomes, which will be used to build an integrative model including all the relevant influences of IOS use on buyer-supplier relationships.

4.2 Interview preparation and procedures

The interview round was used as the first primary data collection method. The aim of performing a number of interviews with internal members was to gain better insights into the way the transfer of electronic information between Rabobank and its suppliers affected the relationship between them. The literature study revealed some preliminary indications concerning the interrelation between the two concepts. However, the interviews were used to indicate those aspects that were supposed to be present within this specific business case. As an overall objective, the interviews were supposed to provide input for the development of a model regarding the influences of the use of Raboshop® on the overall effectiveness of relationships with Rabobank’s suppliers.

4.2.1 Persons interviewed at Rabobank

A total of nine interviews were conducted with internal employees of Rabobank Netherlands. The participants were selected based on their specific knowledge concerning the Raboshop® system. Three groups of participants were chosen, in which the groups differed relative to each other with regard to their backgrounds. This was done with the aim to obtain insights into the research topic from different points of view, enhancing the probability that all the relevant aspects would be covered. The respondents provided a general understanding of the topic and contributed to the identification of the factors that were considered being of key importance within the business context.

The following groups of people were interviewed:

- Three senior purchasers from RCI who were experienced with the use of Raboshop® or obtained knowledge on e-procurement impact in previous positions. These participants especially provided insights on how Raboshop® influenced the relationship between the parties on a tactical and strategic level.
- Three key RCI employees were selected that exhibited knowledge in the field of purchasing intelligence- and service management activities related to the Raboshop®. These respondents were likely to give more information regarding the performance benefits/drawbacks that Raboshop® provides to their stakeholders.
- Three business consultants were approached who held positions in the field of ERP system implementation, business development and business change management. These
people gave additional insights into the way the different connectivity modes between Rabobank and its suppliers affected the relationship between both parties.

4.2.2 Interview procedure

All the employees that were selected for the interview round were asked for their contribution face-to-face or by e-mail. This approach was chosen to introduce the research topic and to explain why these people were selected as participants. After a positive reply a meeting of approximately one hour was planned. A summary of the topic and background were send to the participants to give them a better overview beforehand. Also, two days before the meeting, the list with interview questions was already mailed along.

All the interviews were taped by the use of a voice recorder. The use of a voice recorder for analyzing case study interviews has been discussed by various authors in the field of business research. Proponents of the method argue that a more accurate analysis is possible of what is said by the interviewee. On the negative side, Voss et al. (2002) argues that transcribing tapes is time consuming, it often takes place some time after the interview, can be seen as a substitute for listening and may inhibit interviewees to speak freely. Within this research study, this last issue seemed to be less present, because of the fact that the participants were all internal employees that were willing to contribute to the research study. The interviewee was asked beforehand for his permission to tape the conversation.

Every interview started with providing a short introduction of the research topic and the expectations of the interview were communicated. A standard set of questions were used that covered the different aspects of the research questions. The list of questions was slightly adapted to the different groups of people being interviewed. For example, for the senior purchasers, the questions were more aimed at the impact of Raboshop® on relationship management activities, while the group of questions for the purchasing intelligence specialists and IT consultants were more focused on providing insights about the characteristics of the information system being used and how these characteristics affected the overall business relationship.

The standard question list covered a number of themes that each reflected a part of the research model being used. Each theme consisted of a number of interview questions that were likely to cover the specific issue. The following themes were included:

1. Identification of purchasing related trends and developments related to the concepts and relationships being proposed
2. Relevance of supplier relationship management
3. IOS use and the impact on the structure of the supply chain
4. Impact of IOS use on buyer-supplier relationship effectiveness

Figure 10 shows the different themes being discussed mapped onto the research model. The ellipse form around the model represents the external developments and forces that ‘initiates’ the effect being proposed within the model.
Figure 10. Interview themes mapped onto the research model

After the interviews were performed, a transcript was being made covering the content of the interview literally. The transcript was then send back to the participant with the request to give additional feedback on the content. Also, permission was requested to share the transcript with both the supervisor from Rabobank and University. When quotes of the interview were considered as being relevant enough for inclusion within the Master Thesis document, the participant was asked for his permission to do this.

4.3 Data structuring

For building the case, the information from the transcripts had to be organized in a structured way. This was done by following the recommendations being stated by Hussey and Hussey (1997):
- Reduce the obtained data: this has been covered by assessing the relevance of the interview content. Parts of the interviews that were perceived to contribute significantly to the case were marked and incorporated into a separate document.
- Structure the obtained data: within this new document, the data was arranged according to the four different themes being applied.
- Detextualise the obtained data: the qualitative statements were converted into figures and tables that will be shown in the results- and conclusions sections.

Yin (2003) argues that the analysis of case study evidence is one of the least developed and most difficult aspects of doing business. He therefore proposes to use an analytic strategy to secure the quality of the evidence to be analyzed. Two general strategies are suggested by Yin (2003). The first strategy relates to the reliance on theoretical propositions. Within this strategy, the initial propositions that leads to the development of the research objective, research questions and research model provides direction to the data collection plan. The second strategy includes the development of a descriptive case description. This approach is usually applied when the original purpose of the case study may have been a descriptive one.
For this research study, the first analytical strategy has been applied. This research study is based on a conceptual model with theoretical propositions and has the aim to find new insights with respect to these theoretical propositions.

### 4.3.1 Data mapping

For performing the actual case study analysis, one of the most desirable strategies is the use of a pattern-matching logic (Yin, 2003). Such logic is supposed to compare an empirically based pattern with a predicted one. If the patterns coincide, the results can help a case study to strengthen its internal validity. By applying the pattern matching method as dominant mode of analysis, the analytic strategy of relying on theoretical propositions will be supported.

Within this study, the dependent variable ‘buyer-supplier relationship effectiveness’ is analyzed by assessing different dimensions of the buyer-supplier relationship. As the use of IOSs may affect these dimensions in different ways, a variety of outcomes are possible. Therefore, the so called ‘non-equivalent dependent variable pattern’ method is applied. Yin (2003) proposes that if for each outcome the initially predicted values have been found, and at the same time no alternative patterns of predicted values have been found, strong causal inferences can be made.

It was stated earlier on that this research study has a theory-building character, by assessing how and to what extent IOS use influences the effectiveness of buyer-supplier relationships. The literature study revealed that the effectiveness of business relationships can be captured by assessing a number of relational dimensions, which were indicated and described. To provide overall direction to the analysis of the dependent variable, the outcomes of the interviews were interpreted with regard to those specific relationship dimensions. In this respect, the relational dimensions indicated from literature and the forthcoming propositions being stated acted as the proposed patterns. The patterns of the interview outcomes were than compared to the proposed patterns.

### 4.4 Interview outcomes

In the following sections, the results of the interview round are discussed. The analysis of the outcomes will be done along the four main themes being used to structure the interviews. Section 4.4.1 addresses the purchasing and supply-related developments that were pointed out to significantly contribute to the overall presence of the concepts and its proposed effect. In addition, section 4.4.2 will elaborate on relationship management activities as they are going on within Rabobank. This will be followed up with an analysis of theme three, the influences of IOS use on the structure of the supply chain. At last, the changes that were indicated concerning the effects of IOS use on the buyer-supplier relationship effectiveness will be discussed extensively.

#### 4.4.1 Theme 1: Purchasing related trends and developments

The interview outcomes revealed three main developments within the field of purchasing and supply management that were found to be interconnected with the use of IOSs for conducting purchasing related activities. These developments can be regarded as the ‘drivers’ of the applied research model of this study.
**Purchasing professionalization**

It was indicated that within the last couple of years, the purchasing function within Rabobank has gained increasing strategic importance for the organizations’ end business. Due to the growing cost awareness by many internal stakeholders, there is an increasing demand for a supportive role of RCI for conducting purchasing and supply related activities. This development is fully in line with the approach initiated by RCI to emphasize on three main drivers, being Cost, Value and Risk (CVR). Hereby, purchasing activities should always be related to these three drivers for creating added value for the business.

The increasing importance of RCI’s role to facilitate the purchasing function within the Rabobank Group was indicated by interviewees by mentioning a number of initiatives being implemented recently. For example, the ‘strategic supplier management programme’ was seen as a development that was likely to enlarge the overall performance of Rabobank’s most important suppliers. The introduction of Key Performance Indicators (KPI’s) provided Rabobank the opportunity to monitor and steer the performance of their suppliers in a more objective way. In addition, a focus on Return on Investment (ROI) was mentioned as a way to further improve the value to the customer by linking different activities on a higher level. The initiation of supplier relationship management activities with those suppliers that were perceived to have strategic value was seen as a way to anticipate on future needs together with the supplier.

Another development that was mentioned repeatedly was the implementation of the new Raboshop®. The Sirius programme was considered as a strategic project that was likely to contribute to significant purchasing related cost savings. By migrating the old (stand-alone) legacy systems to one enterprise system based on SAP SRM, the whole process from contract registration up till the payment process becomes interconnected and visible. This development was promised by many participants to increase the overall level of contract compliance and a decrease of the number of orders being placed outside the Raboshop® (maverick buying). A further sophistication of the purchasing intelligence activities were seen as a next step in the professionalization of Rabobank’s purchasing activities.

**Shift towards collaborative relationships with a reduced set of suppliers**

A number of respondents indicated the general objective of Rabobank to reduce the total number of suppliers significantly. Especially, it was desired to scale down those suppliers that only cover a small part of the total amount of purchasing related costs being made, and are considered having no real strategic value to Rabobank. These suppliers can be characterised having no- or short-term contracts, in which the relationship is mostly based on spot purchasing transactions only. It was mentioned that the reduction of the supply base was especially seen as a challenge within Rabobank. Due to the cooperative business model of the organization, no restrictions can be imposed upon the way in which products and services have to be procured. As local banks have the opportunity to choose their own purchasing channels, there is an increasing chance that transactions are being made with suppliers that do not exhibit a systems contract with Rabobank at all. In this way, administration costs are likely to rise and there is less visibility in the total amount of corporate spends being made.

For obtaining the desired supply base reduction, participants indicated that Rabobank recently implemented a more collaborative approach towards a pre-defined group of suppliers. For many product groups, Rabobank has reduced the amount of suppliers in most cases to one
preferred supplier. By doing this, ordering routines can be put in place which has the advantage that internal users can order directly from the supplier without intervention of RCI. In addition, it was noted that the use of preferred suppliers for a specific product group provided the opportunity to better negotiate prices of products and/or service by means of volume bundling.

**Standardization of purchasing related processes**

It was generally acknowledged that most of Rabobank’s purchasing related activities were increasingly being standardized. For example, some participants argued that negotiations being done with suppliers in the past were more emotionally driven, while nowadays, this has been arranged in a more systematic way. The Rabobank Sourcing Method (RSM) being applied by RCI in which the total process from project initiation to follow-up and evaluation is being structured was considered as a good example of the increasing standardization of processes. However, not all respondents reacted positively to this standardization. Purchasing consultants sometimes experienced a field of tension between the way in which they would prefer to work and the way in which the processes were restricted.

The increasing use of purchasing-related tools and systems was also perceived as a form of standardization. Interviewees argued that the increasing need to connect different types of information systems asked for a further standardization of the systems being used. The new Raboshop® was mentioned several times as an example of standardization of the operational purchasing process being executed. Not only were the internal purchasing activities related to this process, also the integration of suppliers to Raboshop® was considered as a further need to streamline the different processes between the parties.

Even though most of the participants experienced the standardization of purchasing processes as positive, comments were put forward related to the impact sensitivity when errors showed up. Several interviewees argued that the presence of an error within the standardized process affected the whole chain. Formal dispute procedures had to be put in place to solve those issues. These procedures were sometimes perceived as being time consuming and labour intensive, influencing the degree of efficiency in a negative way.

An analysis of Theme one revealed three main developments that were perceived to significantly contribute to the presence and relevance of the proposed elements of the research model. The professionalization of the purchasing discipline can be regarded as a development that has increased the strategic importance of the purchasing function within organizations. It was indicated that initiatives such as supplier relationship management and the standardization of purchasing processes by means of standardized procedures and information technology use affects the way in which interaction and communication takes place between Rabobank and its suppliers.

**4.4.2 Theme 2: Relevance of supplier relationship management**

Respondents generally admitted the increasing importance of the role of supplier management activities within RCI. Especially the relationship management component was suggested to support the ‘Value’ dimension of the Cost, Value and Risk approach implemented by RCI. The ‘Supplier Relationship Programme’ has been initiated to structure the different contacts between buyer and supplier. It was indicated that before the introduction of this programme, less visibility existed with regard to the communication lines, -frequency and –intensity
between Rabobank and its suppliers. One senior purchaser expressed the added value of supplier (relationship) management as follows:

“Facilitating the relationship management component is typically an activity that can be seen as a core competence of RCI. You can use this as a strong component to steer the relationship with your suppliers, but also to structure the information being gathered. This information can than be linked to Key Performance Indicators (KPI’s), which works perfectly. Each quarter term, you have your management reports available which provides a clear basis for monitoring the performance of the dyadic activities taking place”.

Further reflecting on the relationship activities being performed for different types of suppliers, the “Grip-and Growth” philosophy implemented contributed to the differentiation of preferred suppliers and strategic suppliers. For preferred suppliers, it was generally desired to establish a qualitative relationship in which the performance should be measured in an objective way. This has been facilitated by the ‘Grip’ component of the programme, supported by supplier performance management activities including the use of KPI’s. For suppliers that were perceived to have strategic value for Rabobank’s core business, there was a general tendency to focus on the ‘Growth’ component within the relationship. For this type of suppliers, mutual initiatives were set up to improve the product or service being sourced to further increase the overall value to Rabobank. Together with the supplier, market conditions were carefully monitored to be able to respond quickly to new developments that could be of strategic importance for Rabobank’s business activities. Thereby, the relationship was focused on achieving long-term benefits for both parties, which was also translated into the long-term contract duration between the two parties.

Raboshop® was generally perceived to contribute especially to the ‘Grip’ component of the Supplier Relationship Programme by the possibility to facilitate overviews of spend-related data. Subsequently, this information could be used to assess the performance of the supplier on a more objective way. Purchasing intelligence was commonly seen as a valuable source of information to monitor and steer the success of the relationship.

4.4.3 Theme 3: IOS use and the impact on the structure of the supply chain

Two key elements were observed that were related to the change of the structure of the supply chain when interfirm information systems are being used for performing purchasing activities. These elements can be considered as the main initiators for the observed changes within the buyer-supplier relationship which will be discussed in section 4.4.4.

Higher degree of transparency

The electronic transfer of purchasing related information between parties was perceived to increase the transparency of processes significantly. Due to the possibility to retrieve valuable data from purchasing intelligence systems, a higher visibility of the supplier’s performance was achieved. One respondent expressed this aspect as followed:

“The operational purchaser who is responsible for the execution of the contract monitors the activities of the supplier. When performance is below the agreed standard, he or she will contact the supplier. In the past, this process was less pro-active. Now, there is much more visibility in the performance of the supplier. We now even have the opportunity to react on
problems beforehand, as the possibilities are there to look at the forecast of the supplier. The discussion with the supplier can now be held in a much more objective way”.

Although the increasing availability of purchasing data was generally perceived to be strategically beneficial for Rabobank, this effect was considered being two-sided, having a significant impact on the role of collaboration within the relationship:

“The more open the supply chain becomes, the more transparent the dyadic activities will be. You cannot only ask the supplier to publish his facts and figures, it should be initiated from both sides. The degree of cooperation will hereby be raised significantly”.

A number of respondents especially referred to Raboshop’s new ‘contract-to-pay’ process as a way to increase the internal visibility of purchasing-related processes. The opportunity to automatically link an incoming invoice to the relevant contract and subsequently put in place the payment process was considered to increase the visibility of the purchasing process considerably.

**Formalization of transactions**

The successful use of Raboshop® asked for highly structured procedures for managing the total flow of information between Rabobank and the supplier. Process descriptions related to for example the handling of orders and the execution of payments were put in place between the two parties. Especially the introduction of the self-billing process introduced a further formalization of the payment procedure. Guidelines had to be implemented regarding the ERS procedure and formal dispute processes were developed to handle possible errors within the automated process. The terms and conditions of the use of Raboshop® were further formalized by the use of a specific Raboshop® contract between Rabobank and the supplier.

**Introduction of relationship specific investments**

The decision to set up an electronic connection introduced investments in technology, human resources and redesign of business processes from both the Rabobank- and supplier’s side. As these investments were specifically aimed to reap the benefits from electronic information transfer within the relationship, in most cases both parties showed incentives to put in considerable efforts for achieving the desired benefits. Especially with respect to the fully automated XI connection being used by some of the suppliers, the relatively high investment costs related to the alignment of internal information systems initiated an overall willingness by both parties to make the electronic integration a success. One interviewee described the effects of resource investments on the nature of the relationship as follows:

“Because of the fact that both parties have to put in considerable investments when they want to share information electronically with each other, they automatically become more interdependent. A prerequisite should be that both parties should invest within the relationship to secure the quality of the system’s processes. Within Rabobank, most of the time this also is the case”.

Concluding on the way in which the structure of the supply chain and with that the position of the business parties against each other is affected by IOS use, three main factors were indicated. At first, transparency of dyadic business processes gives rise to the initiation of a more performance based relationship. In addition, for securing the performance of the IOS, a
higher degree of formalization of procedures is asked for. Thirdly, specific investments being made by both parties are likely to initiate cooperative behaviour from both sides for implementing and operating the system successfully. These three factors are considered to initiate the change within the nature of the relationship when an IOS is being used for exchanging purchasing-related information.

4.4.4 Theme 4: Impact of IOS use on buyer-supplier relationship effectiveness

The effects of IOS use on the effectiveness of the relationship were being assessed by covering four relationship dimensions that were identified from theory. Additional effects that were observed by the interviews but were not identified within the literature review will also be discussed.

**Relationship strength**

The higher degree of transparency that was indicated between the business parties impacted upon the trustworthiness of the relationship. Several respondents argued that the openness of information being shared asked for a tighter relationship in order to overcome possible opportunistic behaviour by one of the parties. However, no strong indications were found that the use of IOSs actually increased the overall degree of trust within the relationship. Only in the case the relationship was considered to be strong beforehand, the implementation of the Raboshop® could further strengthen the relationship. So, mutual trust was in most cases considered as a prerequisite for using the Raboshop® successfully.

Some negative responses were also indicated, especially concerning the degree of personal trust between the parties. The automation of the operational purchasing process reduces for a large extent the necessary to have personal contact with each other. Personal trustworthiness within the operational purchasing process was therefore perceived to be lowered in some cases. The issue regarding mutual trust when using an interfirrm information system was described by one interviewee as follows:

“In the past, we have had suppliers who actively offered products that were not included within the pre-agreed assortment. An electronic connection might reduce this issue. However, the possibility that the other party misuses the situation is always there. I do think that the disappearance of the human aspect has led to a situation of more misunderstanding between individuals. But I doubt if that really has negative consequences in a society that is driven by information technology”.

Another aspect that was mentioned referred to the degree of commitment and cooperation between the parties. In most of the cases, both parties acknowledged the mutual benefits that electronic data transfer could bring to them in terms of efficiency and administration costs. Also, the specific investments being made related to technology costs, employment of human resources and the redesign of business processes initiated a more cooperative nature in which both parties were generally committed to secure the performance of the data transfer process. Since most of the suppliers perceived Rabobank as one of their bigger customers, the attractiveness to provide a high quality service was also translated into an overall willingness to manage the electronic transfer process intensively. An example of the overall increase of cooperation was described by one respondent as follows:
“For suppliers that offer personalized products that are of more strategic relevance, we worked together to come up with a solution that was beneficial for both sides. We really collaborated with the mutual aim to share information electronically in a smart way”.

Furthermore, an increase into the degree of coordination (boundary definition) was observed as the formalization of rules and procedures for interactions led to greater clarity of roles and responsibilities for the actors. In the past, coordination of activities was difficult to achieve as the less structured purchasing process inhibited the possibility to formulate clear boundaries of working tasks.

Although indications were found that the degree of cooperation, commitment and coordination were increased by IOS use, the high degree of standardization was likely to bring some drawbacks also. While the highly structured process reduced the total number of errors and mistakes being made, it inhibited a fast identification of the main cause when an error still showed up. It was mentioned that this ambiguity sometimes translated into a tension field within the relationship. The dispute procedures that had to be started up in these cases were sometimes perceived as time consuming and inefficient. As a consequence, the degree of conflict resolution between the parties was affected in a negative way. This issue was expresses in the following way:

“In the past, if our supplier did not deliver for the third time in a row, we just called another one. Now, that’s not possible anymore. If something goes frequently wrong within the chain, this certainly will have some negative implications for the relationship”.

**Relationship dependence**

The use of Raboshop® was indicated by many to have a significant effect upon the interdependency between the two parties. Due to the fact that the implementation of an information system mostly contains relationship specific investments from both sides, the ‘drive’ to switch to another supplier in the near future is less present. This also means that the contract duration for those suppliers is often for a longer period. Especially the purchasing consultants argued that this higher dependency upon the supplier was not desirable from a purchasing management perspective. The chance to get ‘locked in’ within the relationship constrained Rabobank within their freedom to search for alternative suppliers. Higher switching costs were generally seen as the main cause for higher levels of mutual dependence:

“The core of a successful system largely relates to the entry barriers that come with the system. In the most ideal situation, implementation and service costs should be zero. This minimizes the mutual dependency upon each other. However, in practice, investments are always there for ensuring a successful operation of the system”.

A number of respondents suggested that the higher degree of mutual dependence in some cases gave rise to opportunistic behaviour by one of the parties. This opportunism from the supplier’s side was mentioned by one participant as follows:

“Maybe it’s not gently to say, but the supplier might use it with the thoughts that Rabobank will switch less quickly to another supplier. This could affect the overall performance of the relationship in a negative way.”
It was also noticed that interfirm information technology could be used as a power mechanism, especially for the system initiator. In most of the cases, Rabobank was seen as a large and important customer to the supplier. This provided Rabobank a position in which they could impose the Raboshop® upon their business partners:

“If we do not properly arrange it by ourselves, our supplier will take the initiative to use their own systems. Therefore, we ask our suppliers in a friendly way to adopt our information system. Most of the times, they will go along. But if they resist cooperating, the chance is there that alternatives are being looked for”.

Another example that was put forward several times regarding the assertion of power upon the supplier included the implementation of the ERS self-billing process within the new Raboshop®. Instead of letting the supplier send the invoice to Rabobank, this process will be reversed in the near future. By sending the invoice to the supplier, and telling them based on pre-established prices what Rabobank is going to pay, the contract-to-pay process will be fully supported. This approach was sometimes experienced as negative on the suppliers’ side. There was a general feeling that the initiation of Rabobank to use the self-billing process lowered the suppliers’ control over their own prices and sales initiatives. Also, the new situation asked for adjustments within the administration processes of the supplier.

Although the increasing dependence on the supplier was generally perceived as an undesirable effect, in some cases this dependence was seen as less negative. Especially for the non-standardized products, that exhibited a high degree of supply risk, the use of an electronic connection ensured the availability of the product for Rabobank.

**Relationship interaction**

It was generally acknowledged that the information being transferred exhibited a higher degree of quality. The formalized processes that were put in place have led to an overall reduction of the number of errors being made. Human intervention was significantly reduced, leading to a more ‘lean and mean’ process of information transfer.

Not only was the quality of information transfer itself enlarged, also the purchasing intelligence activities being performed were brought up to a higher level. This increase in information richness was expressed by one interviewee as follows:

“We now have the ability to provide total overviews of spend-related information. In the past, this was done in a more passive way by the use of Excel documents, the advancements in information technology now makes it possible to adopt a more pro-active approach. People should have access to the desired information anywhere and anytime”.

The increase in the richness of purchasing-related information introduced a more performance related approach within the relationship. Much better insights could be obtained regarding for example the order behaviour of a specific product and the lead times that are being reached by the suppliers. Proper actions could now be initiated when the actual performance outcomes were below the desired standard. One participant mentioned that a ‘track record’ within the relationship was now possible due to the increase in richness of the obtained information.

Also, higher levels of dyadic information sharing were likely to be achieved with the use of Raboshop®. This development was explained in the following way:
“Due to the fact that the supplier is less dependent on human intervention, he can now predict quite precisely the term of conditions which are likely to be achieved. Together, we make clear specifications regarding issues such as stock numbers, delivery times and service level agreements. This is of great importance because a contract is being signed on the basis of a certain forecast. We now have the possibility to monitor in quite detail if the forecast is in line with reality. Being able to do this, we are really shifting from operational- to tactical level”.

Another aspect that was broad up during the interviews was related to the frequency of personal interaction between the parties. As it was expected, respondents acknowledged that the automated procedures significantly reduced the personal contact between the parties within the operational purchasing process. This development gave rise to shape the relationship on a higher level, by focusing on more tactical and even strategic objectives within the relationship.

The automation of the purchasing process was not always perceived as satisfactory by employees. Especially the operational purchasers showed criticism regarding this issue:

“In the past, you called the supplier once in a while to inform them about the latest developments going on. You really could start a discussion about a certain topic. Now, in principle, you only talk about the exceptions, and even those are centralized at one person”.

**Operational performance**

Changes within in the actual performance of the relationship could be explained by assessing the impact of IOS in a more objective way. The following direct effects were found repeatedly:

A higher degree of process efficiency was generally seen as one of the strongest effects being indicated. Especially the fully automated XI interface used by some of the suppliers led to an overall reduction of human intervention within the operational purchasing process. In addition, the number of errors being made was decreased due to the implementation of standardized processes. Also, delivery times where shortened and better visibility was created within the status of the product being ordered.

From the perspective of Rabobank, the use of Raboshop® led to an overall increase in the user-satisfaction by internal members. The ability to order a diverse assortment of different goods and services at one central place and the user-friendliness of the ordering procedures was perceived as positive by many.

Process costs were also perceived to be affected by the use of Raboshop®. Due to the fact that there is no need anymore to commit considerable human resources, administration costs have been reduced dramatically:

“After we implemented the Raboshop® twelve years ago, we managed to reduce the calculated cost price per invoice line by 50%. Also on the supplier’s side, significant cost reductions have been achieved”.

Next to the direct effects that occurred by the implementation of Raboshop®, purchasing intelligence functionalities provided the opportunity to extract valuable purchase-related information which subsequently could be used to set mutual goals to further enhance the
service being provided by the supplier. Many respondents perceived the new contract-to-pay process as one of the largest benefits of the new Raboshop®. Some even referred to the establishment of a competitive advantage within the new situation.

4.5 Data analysis

The performed interviews had the objective to gain particular insights into the way the IOS Raboshop® affected the overall relationship between Rabobank and their connected suppliers. The analysis of the interview outcomes was done by incorporating four main themes that each handled a specific part of the research topic. The outcomes of Theme four provided input for answering the third sub-research question of this study. The answer on research question three will be put forward within section 4.5.1.

Elaborating on Theme one, three main purchasing-related developments are indicated that were perceived to contribute to the overall presence and relevance of the proposed relationships within the research model. Due to the fact that Rabobank recently emphasized on adopting a cost-awareness approach towards their internal business activities, it was indicated that the purchasing discipline had gained increasing strategic relevance. This was translated into an overall professionalization and standardization of the purchasing function by the introduction of a number of recent initiatives, such as the implementation of the new Raboshop® and the introduction of supplier relationship management initiatives. Related to those two specific initiatives, Rabobank had the general objective to reduce the number of suppliers for each of the different commodities to further decrease administrative- and process related costs and to increase the visibility in the amount of expenditure being made. The alignment of those single-source suppliers onto Raboshop® was seen as a way to achieve these objectives. With a reduced set of suppliers, Rabobank had the intention to tighten the relationship with the aim to obtain more long-term oriented benefits. Theme two indicated that the introduction of supplier relationship management activities for those preferred- and strategic suppliers further introduced a performance-based character of the relationship, leading to an overall increase in the effectiveness of the relationship.

Theme three reflected on the main mechanisms that were likely to influence the relationship when information is exchanged via an IOS. A higher degree of transparency of dyadic business processes was found, which was subsequently proposed to affect the climate of the relationship. In addition, an overall formalization of exchange processes was indicated. This higher degree of formalization was likely to impact upon the interaction mechanisms between the parties. Thirdly, the introduction of specific investments concerning the implementation and operation of the information system was supposed to have an effect in the degree of dependence between the parties.

4.5.1 Answering sub-research question 3

Theme four was specifically targeted on the identification of changes that occur on key aspects of the buyer-supplier relationship. By incorporating value judgements of the respondents about how they perceived the changes in relation to the overall success of the relationship, statements about the impact upon the effectiveness of the relationship could be made. Therefore, the analysis of the results of Theme four provides answer on sub-research question three; how is buyer-supplier relationship effectiveness influenced by IOS use?
The identified effects were arranged along four main dimensions which characterized the nature of the relationship. These dimensions were based on the ones that were formulated within the propositions being stated in chapter 3.

The first dimension ‘Relationship strength’ included the aspects that were related to the social component of the relationship. It is found that a higher degree of openness and visibility of information being transferred initiates a more collaborative atmosphere between the parties. This is likely to be translated into an increasing orientation on the performance component within the relationship. In addition, the introduction of specialized investments (especially regarding the fully automated XI connection) provides incentives by both parties to apply a higher degree of cooperation and commitment for securing the advantages that comes with the use of an IOS. Notably, the degree of trust between buyer and supplier seems not to be increased by the transfer of electronic information. Personal trust between the operational purchasers and sales persons even could be lowered in some cases. This can be clarified by the fact that the formalization and automation of the purchasing process lowers the need of having face-to-face- or telephone contact with each other. While this could have negative effects on the overall effectiveness of relationships, it was indicated that the overall acceptance of transmitting information electronically with the other party did not generated a negative impact on the effectiveness of the relationship. Overall, the results showed that the buyer-supplier relationship is influenced by IOS use due to a higher degree of process transparency, formalization of exchange procedures and the presence of relationship specific investments. Interview outcomes showed that this is likely to be translated into an overall increase of cooperation, commitment and coordination of activities between the parties, resulting in an overall increase of the ‘relationship strength’ dimension. This contributed to the overall objective of having a qualitative working relationship aimed to increase the quality of the service being provided by single-source suppliers. Therefore, it can be concluded that the overall increase in relationship strength was perceived to contribute to the success of the relationship, enhancing the effectiveness of the relationship.

Indications were found that the use of a proprietary IOS increased the overall dependence between the two parties. Relationship specific investments being made seems to play an important role in the decision to pursue or abandon the exchange relationship with a supplier. The switching costs that come with the use of a proprietary IOS generates incentives to the system initiator to switch less quickly to another supplier in case the supplier performs poorly. Furthermore, the feeling of the supplier being ‘locked in’ the relationship could lead to a situation in which the supplier is likely to behave in an opportunistic way. It was indicated that suppliers might cultivate a state of inactivity characterized by less motivation and commitment, as they feel themselves assured of supply to the buying firm. Considered from a buying perspective, the increase of exit barriers was found to inhibit the freedom of searching for other sources of the same type of supply, decreasing the overall leverage capacity. This limitation was especially perceived having negative impact for products and services characterised as being non-critical, as multiple alternative sources of supply are likely to exist for this group of products/services. Therefore, in general, it was found that the increase of dependence generated a negative effect on the overall effectiveness of the relationship.

The influence of the electronic information transfer process itself on the nature of the relationship was captured by the dimension ‘relationship interaction’. Three specific aspects were found to significantly impact upon the effectiveness of the relationship. The automation and formalization of business processes increases the accuracy, adequacy and credibility of the information being exchanged. This is likely to lead to an overall increase of information
quality. In addition, the frequency of interaction was found to be affected. Within the operational purchasing process, an overall reduction of personal contact with regard to the handling and payment of orders was confirmed. As ordering and payment procedures are fully taken over by the IOS, the nature of the contact between the parties is likely to shift from discussing purely on an operational level to tactical- and even strategic level. The case study revealed for example that initiatives were taken to further tailor and improve the service being provided by the supplier to Rabobank’s specific needs. The higher degree of participation contributed to an overall increase of information sharing between buyer and supplier. The transparency of information being exchanged is likely to lead to a higher degree of visibility with regard to spend-related information. It was observed that this higher degree of information richness introduced a performance-based dimension within the relationship. The observed effects give rise to the overall conclusion that the increase of interaction between buyer and supplier contributes to the effectiveness of the exchange relationship.

At last, the direct advantages of electronic information transfer were indicated to directly affect the degree of satisfaction of the relationship in a positive way. The following observed effects were found to contribute to the overall effectiveness of the relationship; an overall decrease of administrative- and process related costs, a higher efficiency of the total operational purchasing process, shorter lead-times and an overall decrease of the number of conflicts. In addition, it was found that the use of an IOS initiates incentives for conducting mutual goal setting practices, and contributes to the overall continuity of the relationship between buyer and supplier.

4.5.2 Research model building

The analysis of the interview outcomes and the forthcoming explanation of sub-research question three provided a general overview of all the influences that were indicated to be of significant relevance within this case study. Considering the conceptual research model that was introduced in section 2.2.2, the indicated effects can be mapped onto the model. Figure 11 includes the relevant influences that were indicated from Theme 1 till Theme 4. The impact of IOS use on buyer-supplier relationship effectiveness is structured along the four main relationship dimensions that were identified.

While the research model of Figure 11 shows which aspects of the relationship are affected by interfirm information system use, no visibility exists on how the four relationship aspects are affected by the three drivers that were identified within Theme three. Figure 12 shows the relationships between the IOS drivers, relationship dimensions and relationship effectiveness. The suggested relationships are based on the outcomes of the interviews and the subsequent answering of sub-research question three. The figure includes the overall observation that the dimensions ‘relationship strength’, ‘relationship interaction’ and ‘operational performance’ are positively influencing the level of relationship effectiveness. While ‘Relationship dependence’ was found to negatively influence the level of relationship effectiveness.

The interview outcomes revealed that the observed effects were moderated by the degree of asset specificity of the connection mode being used between Rabobank and its supplier. For example, it was observed that the use of the fully automated XI connection introduced a higher degree of interdependence in comparison to the supplier self service portal. To gain greater insights into the differences in observed effects for each of the connectivity modes being used, a supporting questionnaire was developed and distributed. Chapter five will
elaborate on the design of the questionnaire, applied procedures and analysis of the questionnaire results.

Figure 11. Research model including relevant influences of IOS use on buyer-supplier relationship effectiveness

Figure 12. Proposed relationships between IOS drivers, relationship dimensions and overall relationship effectiveness
5. Questionnaire research results

5.1 Introduction

The interview round was supported by the execution of an independent questionnaire design. This questionnaire had the objective to further assess the outcomes of the interview results in a more quantitative way, and to provide better insights to what extent the different relationship aspects were affected. In addition, the interview results revealed that the strength of the effects was influenced by the type of IOS configuration being applied. For obtaining greater insights in which way the effects were influenced by the IOS configuration, the design of the questionnaire was tailored to capture these differences. It should be noted that due to the relatively small sample size being used, no inferential statistics can be used for analyzing the results. Descriptive statistics will be provided in the form of standard measures as frequencies and mean values for assessing the outcomes.

Outcomes of the questionnaire in combination with the outcomes of the interview round will give rise to the analyses of the propositions that were stated in Chapter three. With that, research question three will be answered.

5.2 Questionnaire design

By incorporating a questionnaire into the case research design, the degree of data triangulation will further be enlarged. Yin (2003) suggests that a formal survey can be a useful addition to case studies that incorporate the method of interviews. However, the results of the questionnaire should not be interpreted as an independent source of data, but it should be analyzed in relation to other sources of evidence being applied.

Results of the interview round were used as input for the formulation of a number of statements that each reflected a certain construct of the relationship. Due to the fact that no empirical studies were found that analyzed the topic of interest from exactly the same perspective and covered the same aspects as of this study, a complete new questionnaire was designed. Nineteen items were stated, that each reflected a certain relational construct that was identified from the interview round. The validity of the constructs was assured where possible by applying items from literature that were generally known to be empirically verified measures. For developing the items that covered the ‘relationship strength’, ‘relationship dependence’ and ‘relationship interaction’ dimensions, research studies from Handfield and Bechtel (2002), Mohr and Spekman (1994) and Morgan and Hunt (1994) were used. The items that reflected the ‘operational performance’ dimension were based on the work of Toole and Donaldson (2002). Item 1 till 3 represented the ‘relationship strength’ dimension, item 4 till 8 represented the ‘relationship dependence’ dimension, item 9 till 13 represented the ‘relationship interaction’ dimension and item 14 till 19 represented the ‘operational performance’ dimension. A complete overview of the questionnaire being used is included in Appendix C.

All measures were evaluated using a seven-point Likert scale, where the rating ‘1’ was labeled as ‘strongly disagree’, rating four as ‘no meaning’, and rating seven as ‘strongly agree’. For each of the stated items, the respondents were asked to rate the effect for the three different connectivity interfaces being applied within Raboshop®, labeled as ‘Light (SUS)’,
‘Tight (XI)’ and ‘Medium (SAM)’. The seven-point Likert scale was selected in favor of the five-point Likert scale to provide respondents the ability to better indicate the differences between the three connectivity modes.

### 5.3 Questionnaire procedure

After the questionnaire was designed, the content and structure of the questionnaire was tested by letting two participants fill in the questionnaire beforehand. No remarks were placed regarding the content of the questionnaire, only some small changes were suggested with respect to the e-mail invitation letter. All participants were invited by sending them an internal e-mail in which the background of the research study, research relevancy and reason for invitation were described. The questionnaire itself was attached as word-document. As an introduction, a short description of Raboshop® was provided in which the three different connectivity interfaces being used were explained. In addition the procedure for filling in the questionnaire and the way in which the questionnaire should be send back was stated. At the end of the questionnaire, the opportunity was given to the respondents to provide feedback concerning the questionnaire’s content.

Participants were selected based on their experience and background with the Raboshop® system. A number of 38 Rabobank employees were invited, including RCI employees (purchase consultants, purchase intelligence specialists, service managers, product managers), Sirius business consultants, product owners of a number of directorates, and contract managers. These people were likely to exhibit knowledge concerning the topic of interest from different perspectives.

### 5.4 Questionnaire outcomes

A number of 38 questionnaires were send to Rabobank employees. 20 questionnaires were filled in and returned via e-mail. This resulted into a response rate of 53%, which can be perceived as high for a mail questionnaire. The data of the questionnaires were included into an Excel document. For each of the items, values of the overall means were calculated. The overall mean provided a general indication about the absolute value that was scored for each item. In addition, mean values for each of the IOS configuration were calculated for capturing the differences between them. Table 4 shows for each of the items the overall mean value and the mean value for each IOS configuration. This table is supported by the inclusion of a column chart in which the outcomes are presented graphically (see Figure 13).
Table 4. Descriptive statistics

<table>
<thead>
<tr>
<th>Item</th>
<th>Relationship dimension</th>
<th>Overall mean value (SUS)</th>
<th>Light (XI)</th>
<th>Tight (XI)</th>
<th>Medium (SAM)</th>
<th>Construct</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rel. strength</td>
<td>4.9</td>
<td>4.1</td>
<td>5.7</td>
<td>4.8</td>
<td>trust</td>
</tr>
<tr>
<td>2</td>
<td>Rel. strength</td>
<td>4.7</td>
<td>4.2</td>
<td>5.4</td>
<td>4.7</td>
<td>commitment</td>
</tr>
<tr>
<td>3</td>
<td>Rel. strength</td>
<td>5.2</td>
<td>4.6</td>
<td>6.0</td>
<td>5.1</td>
<td>operational coordination</td>
</tr>
<tr>
<td>4</td>
<td>Rel. dependence</td>
<td>4.2</td>
<td>3.2</td>
<td>5.0</td>
<td>4.5</td>
<td>mutual dependence</td>
</tr>
<tr>
<td>5</td>
<td>Rel. dependence</td>
<td>3.2</td>
<td>3.0</td>
<td>3.3</td>
<td>3.3</td>
<td>power over supplier</td>
</tr>
<tr>
<td>6</td>
<td>Rel. dependence</td>
<td>5.0</td>
<td>4.2</td>
<td>5.7</td>
<td>5.2</td>
<td>supplier opportunism</td>
</tr>
<tr>
<td>7</td>
<td>Rel. dependence</td>
<td>2.6</td>
<td>2.4</td>
<td>2.5</td>
<td>2.8</td>
<td>supply risk reduction</td>
</tr>
<tr>
<td>8</td>
<td>Rel. dependence</td>
<td>4.4</td>
<td>2.7</td>
<td>6.0</td>
<td>4.4</td>
<td>switching costs</td>
</tr>
<tr>
<td>9</td>
<td>Rel. interaction</td>
<td>5.3</td>
<td>5.0</td>
<td>5.5</td>
<td>5.4</td>
<td>lower frequency of personal communication</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>higher frequency of communication on tactical and strategic level</td>
</tr>
<tr>
<td>10</td>
<td>Rel. interaction</td>
<td>4.4</td>
<td>4.1</td>
<td>4.4</td>
<td>4.6</td>
<td>information quality (operational)</td>
</tr>
<tr>
<td>11</td>
<td>Rel. interaction</td>
<td>6.2</td>
<td>6.0</td>
<td>6.2</td>
<td>6.4</td>
<td>information richness (tactical/strategic)</td>
</tr>
<tr>
<td>12</td>
<td>Rel. interaction</td>
<td>5.6</td>
<td>5.4</td>
<td>6.0</td>
<td>5.6</td>
<td>mutual information sharing</td>
</tr>
<tr>
<td>13</td>
<td>Rel. interaction</td>
<td>5.4</td>
<td>5.2</td>
<td>5.6</td>
<td>5.4</td>
<td>lower costs operational purchasing process</td>
</tr>
<tr>
<td>14</td>
<td>Op. performance</td>
<td>5.7</td>
<td>5.3</td>
<td>6.0</td>
<td>5.9</td>
<td>higher efficiency operational purchasing process</td>
</tr>
<tr>
<td>15</td>
<td>Op. performance</td>
<td>6.1</td>
<td>5.8</td>
<td>6.4</td>
<td>6.2</td>
<td>mutual goal setting</td>
</tr>
<tr>
<td>16</td>
<td>Op. performance</td>
<td>4.8</td>
<td>4.6</td>
<td>5.1</td>
<td>4.8</td>
<td>shorter lead times</td>
</tr>
<tr>
<td>17</td>
<td>Op. performance</td>
<td>4.3</td>
<td>4.2</td>
<td>4.5</td>
<td>4.4</td>
<td>less conflicts</td>
</tr>
<tr>
<td>18</td>
<td>Op. performance</td>
<td>4.4</td>
<td>4.4</td>
<td>4.4</td>
<td>4.6</td>
<td>continuity, stability</td>
</tr>
<tr>
<td>19</td>
<td>Op. performance</td>
<td>4.9</td>
<td>4.6</td>
<td>5.4</td>
<td>5.1</td>
<td></td>
</tr>
</tbody>
</table>

Figure 13. Column chart including for each item the mean values for each IOS configuration
5.5 Data analysis

Analysis of the questionnaire outcomes was done by assessing the absolute values of the independent items and the groups of items that represented a specific relationship dimension. In addition, differences between the three IOS configurations were analyzed for the different items were analyzed.

5.5.1 General results

Overall, the analysis of the questionnaire outcomes supported the conclusions that were made in section 4.4 based on the analyses of the interview round. Taking into account the absolute levels of the overall mean values, the items that represented the dimensions ‘relationship strength’, ‘relationship interaction’ and ‘operational performance’ all scored in between 4.2 and 6.2. This suggests that a moderate till strong increase of these relationship constructs that represented those relationship dimensions was perceived. Especially the high scores on item 9 till 13 indicated a strong increase of the dimension ‘relationship interaction’, which is in line with the conclusions drawn from the interview data analyses. With regard to the dimension ‘relationship dependency’, surprisingly, the overall mean value of item 4 ‘mutual dependence’ (4.2) revealed that the use of an IOS did not affect the degree of interdependency between the parties. This does not really support the results of the interview round, in which strong evidence was found that the introduction of relationship specific investments introduced a higher degree of interdependence. However, it should be noted the overall mean value was balanced out by the stronger effects that were observed when studying the mean values of the independent IOS configurations. Considering the other items representing the ‘relationship dependence’ dimension, it should be noted that a high score on item 4 ‘mutual dependence’, item 6 ‘supplier opportunism’ and item 8 ‘switching costs’ were perceived to negatively influence the effectiveness of the relationship from the buying perspective. In addition, the low scores of items 5 and 7 (3.2 and 2.6 respectively) showed that participants did not perceive an increase of power over the supplier and a decrease of supply risk by the use of an IOS. These outcomes indeed suggest that with regard to the relationship dependence dimension, the ‘locked-in’ situation generates more benefits for the supplier than for the buyer. Overall, the outcomes of the ‘relationship dependence’ dimension indicate a general decrease of relationship effectiveness perceived from the buyer’s perspective.

With regard to the ‘operational performance’ dimension, the general benefits related to the decrease of cost structures and the increase of process efficiency when using an IOS were confirmed by high scores of 5.7 and 6.1 respectively. The outcomes of items 17 and 18 showed that the degree of conflicts and lead times were not perceived to be influenced greatly. However, mutual goal setting initiatives and the degree of continuity of the relationship were moderately influenced in a positive way.

5.5.2 IOS configuration-specific results

Taking into account the differences scored between the three connectivity modes for each item, the following can be concluded: For most of the items, the ‘Tight’ connection obtained higher scores than the ‘Medium’ connection, while the ‘Medium’ connection scored higher than the ‘Light’ connection for all items. Therefore, largest contrasts were found to be present between the ‘Tight’ and ‘Light’ connection, which conformed the outcomes of the interview results. The biggest outcome differences were present within the items that represented the dimensions ‘relationship strength’ and ‘relationship dependence’. While the ‘Light’
connection showed no strong effects (between 4.1 and 4.6) for the ‘relationship strength’ dimension, the ‘Tight’ connection obtained stronger positive effects with scores between 5.4 and 6. These outcomes suggest that a higher degree of trust, commitment and cooperation are present when the IOS configuration is characterized having a high degree of asset specificity. Considering the ‘relationship dependence’ dimension, the ‘Tight’ connection scored significantly higher than the ‘Light’ connection (with the ‘Medium’ connection in between) on the items representing the degree of mutual dependence (5.0), supplier opportunism (5.7) and the level of switching costs that comes with the configuration (6.0). These differences suggest that especially the use of the ‘Tight’ connection with suppliers will lead to a situation in which both parties are locked within the relationship, where the supplier might use this situation to be secured of supply for a longer period of time.

For the items that characterized the dimensions ‘relationship interaction’ and ‘operational performance’, no strong differences between the ‘Tight’ and ‘Medium’ connection were found. Item 11 representing the quality of information transfer obtained the highest overall score for the ‘Medium’ connection. This may be explained by the fact that the high degree of customization of the information transfer process that comes with this connection mode decreases the overall number of errors within the electronic transfer of purchasing information. Also, in comparison to the outcomes for the ‘relationship strength’ and ‘relationship dependence’ dimensions, differences between the three connections were found to be less strong within the ‘relationship interaction’ and ‘operational performance’ dimensions. This may be explained by the fact that the items of these dimensions are representing the more general benefits of exchanging information electronically, which are not greatly affected by the way in which information is being transferred between the parties.

5.6 Conclusions

The questionnaire round had the objective to support the outcomes of the interview round in a quantitative way, incorporating the effects of the three independent IOS connectivity modes being used between Rabobank and its suppliers. In this way, the questionnaire round had the aim to cover the ‘to what extent’ part of the main research question.

Overall, the questionnaire results confirmed the findings that were obtained from the conducted interviews. Taking into account the overall mean values for each relationship dimension as a general measure for assessing the overall effect of IOS use on relationship effectiveness (see table 5), it can be concluded that two of the four dimensions scored more than one Likert-scale-unit higher than the central score of 4 (‘relationship interaction’ and ‘operational performance’). With a mean score of 4.9, the ‘relationship strength’ dimension almost scored one Likert-scale unit higher. Overall, on a 7-point Likert scale, it can be said that these outcomes increased the levels of relationship strength, interaction and operational performance moderately, each contributing to the overall effectiveness of the relationship. For calculating the mean values for the ‘relationship dependence’ dimension, the scores of items 5 ‘power over supplier’ and item 7 ‘supply risk reduction’ were reversed as these items were perceived to generate positive effects on relationship effectiveness for the buying organization. A high score on this relationship dimension is perceived to negatively influence relationship effectiveness. With an overall mean value of 4.8, the outcomes show that the ‘relationship dependence’ dimension influenced the overall effectiveness of the relationship negatively. For a total overview of the mean values for the different IOS configurations, see Table 5.
When the mean values for the different IOS configurations are compared with each other, it can be concluded that the greatest differences in scores are present within the ‘relationship strength’ and ‘relationship dependence’ dimensions. The ‘Tight’ connection significantly scored higher than the ‘Light’ connection on all constructs representing the ‘relationship strength’ dimension. In addition, the constructs representing supplier opportunism and switching costs within the ‘relationship dependence’ dimension scored considerably higher for the ‘Tight’ connection than for the ‘Light’ connection. These outcomes confirm the conclusions being made with regard to the interview analysis that the higher degree of asset specificity of the ‘Tight’ connection introduces a higher degree of relationship specific investments. This is translated into higher commitment and cooperative behaviour to reap the benefits of the fully automated system, which is likely to increase the overall strength of the relationship. In addition, the outcomes revealed that the ‘Tight’ connection exhibits a significantly higher level of switching costs. These higher switching costs are likely to lower the incentives to search for other suppliers in case of lower (er) performance by the supplier. In addition, a high score on ‘supplier opportunism’ and low scores on ‘power over supplier’ and ‘supply risk reduction’ confirm the suggestions done earlier within the discussion of the interview outcomes that the ‘relationship dependence’ dimension negatively influences the overall effectiveness of the relationship. The differences in mean values for each of the three connection modes for the different relationship dimensions can be viewed in Figure 14.

<table>
<thead>
<tr>
<th>Relationship dimension</th>
<th>Overall mean value</th>
<th>Mean value ‘Light’</th>
<th>Mean value ‘Tight’</th>
<th>Mean value ‘Medium’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship strength</td>
<td>4.9</td>
<td>4.3</td>
<td>5.7</td>
<td>4.8</td>
</tr>
<tr>
<td>Relationship dependence</td>
<td>4.8</td>
<td>4.1</td>
<td>5.4</td>
<td>4.8</td>
</tr>
<tr>
<td>Relationship interaction</td>
<td>5.4</td>
<td>5.1</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Operational performance</td>
<td>5.0</td>
<td>4.8</td>
<td>5.3</td>
<td>5.1</td>
</tr>
</tbody>
</table>

Figure 14. Radar diagram showing the mean values of the three connection modes for each relationship dimension
5.6.1 Testing the propositions

The analysis of the interview round in combination with the outcomes of the questionnaire gives rise to the assessment of the propositions that were stated in section 3.5.1. As a basis, the propositions will be tested by incorporating for each relationship dimension the mean values for each IOS configuration obtained from the questionnaire round. For testing the proposition, the quantitative interpretation of the interview results and the qualitative outcomes of the questionnaire were combined. In case the two information sources revealed contrasting outcomes, the proposition was rejected. It should be noted that proposition one till four are based on a high degree of asset specificity of the IOS configuration. This matches the ‘Tight’ connection being used by Rabobank. Testing the propositions with regard to this connection mode will be described in the upcoming section. The assessment of the propositions for the ‘Light’ and ‘Medium’ connection will be done by the inclusion of table 6.

With respect to proposition 1, the mean average of 5.7 showed a strong increase within the ‘relationship strength’ dimension for the ‘Tight’ connection. Because of the fact that the qualitative analysis confirmed an overall increase of cooperation, commitment and coordination of activities between the parties due to the introduction of relationship specific investments, formalization of exchanges and a higher transparency of interfirm processes, a strong positive effect was found within the interview analysis. This was perceived to enhance the overall success of the relationship. Therefore, proposition one: “the relationship with non-critical suppliers is getting more effective as relationship strength is increased by the presence of high levels of IOS asset specificity” is not rejected.

The mean value of 5.4 revealed a strong negative effect for the ‘relationship dependence’ dimension. The interview outcomes showed that the effects of becoming more dependent upon the supplier have an overall negative effect upon the effectiveness of the relationship as perceived from the buyer’s perspective. Especially the high degree of switching costs increases the likelihood of having a ‘locked in’ relationship, in which the buyer is restricted within his capability to abandon the relationship in case other sources of supply are more beneficial. Therefore, proposition two: “the relationship with non-critical suppliers is getting less effective as relationship dependence is increased by the presence of high levels of IOS asset specificity” is not rejected.

The dimension ‘relationship interaction’ obtained a strong positive score of 5.5. This value is further supported by the conclusions derived from the interview round which showed that a higher degree of information quality and more information sharing activities are initiated by IOS use. These effects were considered to contribute to the overall working relationship between the business parties. In line with these outcomes, proposition three: “the relationship with non-critical suppliers is getting more effective as relationship interaction is increased by the presence of high levels of IOS asset specificity” is not rejected.

The fourth dimension ‘operational performance’ obtained an overall mean value of 5.3. In accordance with the interview analysis that revealed an overall decrease of purchasing-related costs, an increase in process efficiency, and higher incentives of conducting mutual goal setting practices, the outcomes suggest that the performance component of the relationship is positively influenced, enhancing the overall effectiveness of the relationship. Therefore, proposition four: The relationship with non-critical suppliers is getting more effective as operational performance is increased by the presence of high levels of IOS asset specificity” is not rejected.
The additional propositions for the ‘medium’ and ‘low’ degrees of asset specificity were shown in table 3 of section 3.5.1. The questionnaire outcome showed that the IOS configuration ‘Light’, exhibiting a low degree of asset specificity, indeed generates an overall lower value for the ‘relationship strength’ and ‘relationship dependence’ dimensions in comparison to the ‘Tight’ connection (with scores of 4.3 and 4.1 respectively, which are closely situated to the ‘no meaning’ score of 4). The lower score for the ‘relationship dependence’ dimension suggests that the negative influences of getting more dependent upon the supplier are less present in the case of the ‘Light’ connection. This confirmed the overall opinion being made that a low degree of IOS asset specificity does not significantly increase the overall dependence upon the supplier. Since it was generally perceived that a lower degree of dependence upon the supplier increases the overall effectiveness of the relationship, this proposition is confirmed.

While both the ‘Light’ and ‘Medium’ connections generated only positive results regarding the ‘relationship interaction’ and ‘operational performance’ dimension, the score of 4.8 of the ‘Light’ connection for the ‘operational performance’ dimension was perceived being less strong. This was supported by the interview analysis that the ‘Light’ connection asked for human intervention by using the web-portal in which the orders are being handled and processed manually. This could lead to an increase in delivery time and higher administrative costs. In addition, the ‘relationship strength’ dimension for the ‘Medium’ connection did only generate a moderate increase with a score of 4.8. However, the interview analysis showed that this customized configuration for exchanging order-specific information initiated commitment and cooperation by both parties to secure the quality of the dyadic information transfer process. Therefore, relationship effectiveness was found to be increased by the ‘Medium’ connection by an increase of the ‘relationship strength’ component. Also, it was proposed that the ‘Medium’ connection in accordance with the ‘Tight’ connection would obtain a significant increase within the ‘relationship dependence’ dimension. However, the outcomes showed a moderate, no significant increase, rejecting the proposition that relationship dependence negatively influences relationship effectiveness by the use of the ‘Medium’ connection. The total overview with observed effects and confirmations/rejections of the propositions can be seen in Table 6.

Table 6. Rejection/non rejection of the propositions being stated for each IOS configuration

<table>
<thead>
<tr>
<th>IOS configuration</th>
<th>Relationship strength</th>
<th>Relationship dependence</th>
<th>Relationship interaction</th>
<th>Relationship effectiveness</th>
<th>Operational performance</th>
<th>Relationship effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tight (NI)</td>
<td>+</td>
<td>↑</td>
<td>+</td>
<td>↑</td>
<td>+</td>
<td>↑</td>
</tr>
<tr>
<td>a.s. = high</td>
<td>✓</td>
<td>Not rejected</td>
<td>✓</td>
<td>Not rejected</td>
<td>✓</td>
<td>Not rejected</td>
</tr>
<tr>
<td>Light (SUS)</td>
<td>n.e.</td>
<td>n.e.</td>
<td>n.e.</td>
<td>↑</td>
<td>+</td>
<td>↑</td>
</tr>
<tr>
<td>a.s. = low</td>
<td>✓</td>
<td>Not rejected</td>
<td>✓</td>
<td>Not rejected</td>
<td>✓</td>
<td>Not rejected</td>
</tr>
<tr>
<td>Medium (SAM)</td>
<td>+</td>
<td>↑</td>
<td>+</td>
<td>↓</td>
<td>+</td>
<td>↑</td>
</tr>
<tr>
<td>a.s. = medium</td>
<td>✓</td>
<td>Not rejected</td>
<td>X</td>
<td>Rejected</td>
<td>✓</td>
<td>Not rejected</td>
</tr>
</tbody>
</table>

✓ Significant effect  + relationship dimension increase
↑ positive effect on relationship effectiveness  ↘ negative effect on relationship effectiveness
n.e. no effect  a.s. asset specificity
X Non-significant effect

58
5.6.2 Answering sub-research question 4

The analysis of the interview round and questionnaire outcomes provided insights into the way an interfirm information system influences the effectiveness of the overall relationship. This research study particularly focused on the degree of relationship effectiveness with suppliers that supply goods and/or services that are perceived to be situated within the ‘non-critical’ segment of the Kraljic purchasing portfolio model. While the observed effects of the different IOS configurations on the four relationship dimensions holds for all segments of the Kraljic portfolio, the overall degree of relationship effectiveness can be perceived being different for the strategic-, leverage- and routine quadrants. Therefore, sub-research question four was included elaborating on the fit between the purchase strategy being executed and the IOS configuration for obtaining a high degree of relationship effectiveness: how is buyer-supplier relationship effectiveness influenced by the interplay between the purchase strategy and IOS configuration?

The answer on sub-research question one provided insights in the specific purchasing strategies that should be applied for each segment of the purchasing portfolio for obtaining optimal added value. Most of the proposed strategies can be related to the power position that the buyer has against the supplier (Caniëls and Gelderman, 2005). In case the supply to be procured is characterised having a low degree of supply risk, purchasing strategies are generally tailored to prevent dependence upon the supplier as much as possible. In case of a high supply risk of the products and/or services to be procured, and the supply is considered to contribute to the profit impact, the buying organization should emphasize on building a partnership relationship in order to counterbalance this risk. Caniëls and Gelderman (2005) propose that the mutual trust and commitment that comes with the intensified relationship is likely to reduce the supply risk to a minimum. Based on the analysis of the differentiated purchasing portfolio strategies being proposed in theory, relationship effectiveness for each of the Kraljic purchasing portfolio segments was assessed by the use of the four indicated relationship dimensions within this study. Although the study outcomes revealed that the overall relationship effectiveness from the buyer’s perspective is in general increased by a high degree of strength, interaction and performance within the relationship and a low degree of dependence upon the supplier, the importance of these individual relationship aspects to be present within a particular quadrant is likely to differ. To be able to match the obtained IOS configuration-specific outcomes with the differentiated purchasing strategies, weight factors are applied for each quadrant to what extent each relationship dimension is perceived to be of importance to be present within a specific quadrant. The rating is based on the outcomes obtained from sub-research question one. The overall assumption is applied that for supply that exhibits a low degree of supply risk, the most important aspect is to prevent getting dependent upon the supplier. For goods and services that are perceived having a high supply risk and high profit impact, building a lasting relationship is assumed to be of greatest importance. The mapping of the weight factors for each quadrant of the purchasing portfolio model can be viewed in Figure 15. In addition, this figure includes the alignment between the degree of importance of the relationship dimensions for each quadrant and the outcomes of the three IOS configurations being analyzed with respect to the relationship dimensions.

It is found that the relatively low levels of relationship dependence of the ‘Light’ IOS configuration fits the ‘leverage’ and ‘non-critical’ quadrants best, followed by the ‘Medium’ and ‘Tight’ connection. The ‘strategic’ quadrant is likely to correspond highly with the ‘Tight’ connection, as high levels of cooperation, commitment and coordination of activities that comes with this IOS configuration enhances the ‘relationship strength’ component the
most. The ‘Medium’ connection was found to align best with the ‘bottleneck’ quadrant. As for these products and/or services, there exists a high necessary to be assured of supply, the quality of the supply process is required to be of a high level. The ‘relationship interaction’ dimension is supposed to capture this requirement the most. In addition, the strategy to search for alternative suppliers within this quadrant suggests that the buyer should try to prevent becoming too dependent upon the supplier. Therefore, the ‘Light’ connection comes in second place.

Figure 15. Mapping of the weight factors and assessment of the fit between purchase portfolio strategies and IOS configuration
6. Conclusions

6.1 Introduction

Within chapter one of this research study, it became clear that the impact of inter-organizational information systems use on the relationship between buyer and supplier deserves more attention. The study aimed at exploring to what extent and how the use of a proprietary IOS affects the effectiveness of buyer-supplier relationships from the perspective of a buying organization. This is achieved by performing a qualitative-based research study in which a case study design was applied for analyzing the topic of interest. The study consisted of:

1. A literature review: within this literature review, theoretical concepts were assessed related to purchasing strategies, business relationships, e-procurement and the effects of IOS use on the nature of business relationships. Outcomes provided input for answering sub-research question one and two, and the establishment of a set of propositions for further providing direction into answering the main research question.

2. An interview round: a number of interviews were conducted to gain insights on how IOS use affected the effectiveness of the relationship between Rabobank and its supplier connected to the e-procurement system Raboshop®. Outcomes gave rise to answering sub-research question three.

3. A questionnaire round: a questionnaire was designed and distributed along Rabobank employees with the aim to obtain information regarding the extent to which the three different connectivity modes being used influenced different components of the relationship between Rabobank and its suppliers. Results of the data analysis generated input for testing the set of propositions and for answering sub-research question four.

Within the upcoming sections, first the main findings of the research study will be summarized. This will be followed up by a description regarding the implications of the research study to practice and theory. Finally, the limitations with respect to the research design will be elaborated on.

6.2 Main findings

The performed research study had the aim to gain insights into the way electronic procurement by means of interfim information system use affects the effectiveness of the relationship between the participating buyer and supplier. With respect to the research study objective, the most remarkable conclusions of the study are:

1. The use of IOSs for pursuing operational purchasing activities increases the overall effectiveness of buyer-supplier relationships on three aspects of the relationship. The study found that an observed increase within the degree of strength, interaction and operational performance is generally perceived to contribute to the overall success of the relationship. IOS use helps to better manage buyer-supplier relationships by
covering the full set of tasks associated with interfirm business processes. In performing these activities, an organization is better able to coordinate the activities with their supply chain partner, leading to optimized communication within all levels of an organization as well as between the buying organization and the supplier.

2. The degree to which the relationship is affected by IOS use depends on three main IOS drivers that are present when purchasing processes are electronically conducted. Two direct effects related to the electronic transfer of purchasing data were observed, being the degree of transparency of purchasing processes and the extent to which business exchanges are formalized. The indirect effect is related to the degree of specialized investments being made within the relationship with regard to the IOS configuration being used. It was found that the general benefits that e-procurement may bring for both parties generates incentives by the participants to adopt collaborative behaviour with the mutual objective to ascertain the quality of the operational purchasing process.

3. The presence of a high degree of asset specificity with regard to the IOS configuration being used increases the dependence upon the supplier. The suggested benefits of high IOS asset specificity related to an overall increase of power over the supplier and a reduction of supply risk were not found to be present within this research study. In contrast, an increase within the costs of switching to another supplier and the suppliers benefits to be locked within the relationship were indicated to be present. Therefore, it is concluded that the increase in interdependency influenced the overall effectiveness of the relationship in a negative way.

4. The presence of a high degree of asset specificity with regard to the IOS configuration being used introduces relationship specific investments which are translated into an increase within the overall strength of the relationship. Non-contractible factors such as the degree of commitment and the overall participation of the parties were affected in a positive way. This was found to positively influence the overall effectiveness of the relationship.

5. Trust between Rabobank and its suppliers was not perceived to be influenced by IOS use. Indications were found that personal trust between operational purchasers and sales representatives could even be lowered as the social aspect of having frequent face-to-face communication is reduced by exchanging information electronically.

6. The communication- and interaction processes within the relationship are found to be influenced most strongly by IOS use. The increase in the quality of the operational purchasing process, a higher degree of information richness which affects the purchasing process on a tactical level, and the initiation of mutual information sharing practices are perceived to increase the effectiveness of the relationship considerably.

7. Indications were found that relationship effectiveness is optimized in case the IOS configuration fits the purchasing strategy that is applied based on the characteristics of the supply being procured. In case of low supply risk, an IOS configuration exhibiting a low degree of asset specificity is likely to maximize relationship effectiveness by preventing a high increase of interdependence. In case of a situation of high supply risk and high profit impact, an IOS configuration having high levels of asset specificity is likely to increase the overall closeness of the relationship.
With respect to the main research question: “how and to what extent do inter-organizational information systems influence buyer-supplier relationship effectiveness”, the following answer can be provided:

Inter-organizational information systems are influencing the effectiveness of buyer-supplier relationships by impacting on four main relationship dimensions, including the social strength of the relationship, the degree of interdependence between the parties, the way in which purchasing-related information is exchanged and the overall level of operational performance being achieved. Overall, higher relationship effectiveness is reached by the introduction of cooperative behaviour, characterised by a higher degree of commitment and coordination of interfirm business processes. These effects were especially found to align strongly with the overall trend applied by organizations to engage in more tightly characterised relationship modes for securing long-term benefits and enhancing the competitive position. In addition, a higher quality of the purchasing process in combination with higher levels of information richness introduces a shift from a clearly operational- to a tactical oriented relationship. This generates performance-based initiatives in which both parties are striving to improve the service being provided, which is likely to lead to an overall increase of user-satisfaction. These effects especially contribute to the overall desire to coordinate supply activities by a number of single-source suppliers to reach economies of scale.

Furthermore, it was indicated that the specific investments being made by both parties for implementing and operating the information system increases the degree of interdependence within the relationship. Especially in supply markets that are characterised having a high number of alternative suppliers to choose from, IOS configurations having high switching costs are likely to undermine the buyer’s power position within that market. This is perceived to negatively affect the overall effectiveness of the relationship from the buyer’s perspective.

### 6.3 Implications for theory

This research study revealed that the shift from conducting purchasing practices manually to electronically introduces a change within the nature of business-to-business relationships. While the literature review revealed that there is still no consensus on how the use of information technology impacts upon the governance structure of organizations, the findings of this research study suggests that the intensity of information exchange between the participating parties generates incentives to tighten the relationship. This conclusion is in contrast with the ‘move to the market’ hypothesis put forward by Malone et al. (1987), who predicts that interfirm information system use leads to more market-based transactions. However, the findings are in line with the ‘move to the middle’ hypothesis suggested by Clemons et al. (1993), who argue that the electronic integration effect that comes with the use of an IOS generates a higher degree of cooperative behaviour between the parties. In this respect, by applying resource dependence theory, IOS use could be regarded as a way to control the scarce resources that organizations are dependent on and reducing the uncertainty that comes with the transaction. In line with this, IOS use can be regarded as a way to contribute to the overall shift from adversarial- to collaborative relationships that has occurred recently.
The findings of this study might provide additional clearance about the reasons why researchers have found divergent outcomes with respect to how IOS use changes the governance structure of organizations. The degree of specialized assets being devoted to the IOS implementation- and operation processes was found to significantly influence the tightness of the relationship. When entry barriers are low for suppliers to engage in electronic information exchange and interfirm business processes are highly standardized, it is likely that the intensity of the relationship may not be affected greatly. The introduction of internet-based information systems has increased the openness of information exchange greatly, which for example has led to an increase of the use of open marketplaces where supply can be purchased on a one-time basis. Although this research study focused on a proprietary-based IOS, indications were found that the type of connectivity mode being used impacts directly on the degree of relationship strength and dependence. Outcomes revealed that the ‘Light’ connection being used by Rabobank, having low entry- and exit barriers for suppliers did not seem to influence the level of cooperative behaviour, trust and commitment greatly between both parties. In addition, the low degree of interdependence that comes with this configuration suggests that the exchange relationship fits a more distant character, exhibiting characteristics of a market-based governance structure.

Furthermore, outcomes of the research study showed that the interaction processes between buyer and supplier are significantly intensified when information is transferred electronically, leading to an overall increase of relationship effectiveness. This logic is also supported by research in the supply chain area, in which researchers have constantly found that extensive sharing of information enhances overall performance. It is generally agreed upon that the increasing intensity of information exchange between buyers and suppliers on multiple levels such as planning, ordering, and inventory management is linked to significant efficiency improvements and a higher degree of process quality. Referring to the theoretical domain of organizational knowledge management, the study results implicate that the use of an IOS might be seen as a knowledge transfer mechanism between aligned parties. Here, the capability of purchasing intelligence systems to act as a knowledge storing and retrieval system and to convert explicit data into strategic information is likely to increase the overall effectiveness of purchasing-related activities and contributes to the professionalization of the purchasing discipline.

### 6.4 Implications for practice

The findings of the research study indicated which aspects of the relationship are affected when an e-procurement system is used for exchanging information electronically. These outcomes could be used by managers for making a strategic decision with regard to the type of IOS configuration to adopt with a particular supplier. In addition, managers should be aware of the proposed relational effects that occur when a supplier is aligned to an IOS, so they can pro-actively take corrective actions for sustaining the effectiveness of the relationship. The interview outcomes indicated that in practice, this decision for adopting a particular IOS configuration was primarily based on the degree of exchange intensity between the parties. When the product to be procured was perceived as being standard, having a high amount of order volume, an integrated IOS configuration was preferred that exchanges purchasing related information fully automatically. Conclusions of this research study suggest that in case the decision for choosing the appropriate IOS configuration is only based on the degree of exchange intensity of a specific product being offered, a misfit might occur with regard to the desired objectives of the purchasing strategy being pursued. Managers need to
carefully consider the underlying objectives they intend to achieve by employing various facets of IOS to support relationships with their suppliers. Therefore, in the case of Rabobank, it is recommended to apply value- and risk analysis activities in case new suppliers are likely to be aligned to the e-procurement system Raboshop®. As the new Raboshop® will cover products and services from more than 200 suppliers, the diversity of supply with respect to aspects as product characteristics, market conditions and the strategic relevance of supply will be enlarged. Thereby, the decision to adopt a certain IOS configuration should not only be based on practical issues but should include strategic considerations with respect to the perceived degree of importance the supply has to Rabobank. Value analysis should indicate to what extent the supplier could contribute to the long-term business objectives of the organization. Risk analysis should capture the degree to which the alignment of a specific supplier to an electronic information system may generate negative implications with regard to the position of Rabobank within a certain supply market. The implementation of these activities will contribute to the general stated objective of RCI to perform their activities in correspondence to three main drivers, being ‘cost’, ‘value’ and ‘risk’.

### 6.5 Study limitations and future research

The case study was designed with the aim to achieve high levels of construct validity. While multiple informants from different hierarchical levels, triangulation using different types of data sources and a systematic data analysis were applied to prevent issues with respect to reliability, caution should be taken by generalization of research results outside this case study. As the functionalities of the Rabobank® are tailored to the specific needs of the users, the outcomes of the research study are likely to be affected by these specific circumstances. Follow-up research should therefore be conducted in another research setting to investigate if the research outcomes correspond with the ones obtained in this research study. This will further enlarge the level of external validity with respect to the obtained results. Furthermore, because of the fact that this study relied on an exploratory research design, causal explanations with regard to the indicated effects can not be made. Although descriptive research has been applied by the use of a questionnaire, the low sample size inhibited the possibility to test the propositions by the use of inferential statistics. Therefore, the study outcomes should be interpreted with care.

Regarding the design of the case study, it was decided to assess the dependent variable ‘buyer-supplier relationship effectiveness’ only from the perspective of Rabobank. On the one side, by concentrating only on the buyer’s perspective, a more profound analysis was possible. On the other side, incorporating the suppliers view regarding the overall success of the relationship might indicate additional or even contrasting insights with regard to the topic of interest. Therefore, additional research might concentrate on relationship effectiveness as perceived from the suppliers’ perspective.

Another limitation with respect to the research design relates to the fact that relationship effectiveness was measured by analyzing relationships with suppliers that are perceived to be situated within the ‘non-critical’ quadrant of the Kraljic purchasing portfolio. The purchasing strategy within this quadrant is to improve the overall efficiency of the purchasing process, optimize/monitor order volume and standardize product ranges. A ‘performance-based’ relationship characterized by mutual commitment to improve the service being provided was indicated as the right relationship mode. Although the observed effects are system-specific and do not differ within different purchasing situations, effectiveness of the indicated effects...
might be perceived to vary across the different quadrants of the Kraljic purchasing portfolio model. Within this research study, the effectiveness of a specific IOS configuration for the three other quadrants was assessed based on a theoretical interpretation regarding the match between the observed relational effects and the perceived importance of the effects to be present within each quadrant. Future research should focus on the impact of IOS on relationship effectiveness for the other quadrants to indicate if the suggested effects provided within this study are valid.
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**Rabobank internal documents**

Business Plan RCI, 2006-2008

Profiel Rabobank Groep, 2008

Purchasing Policy RCI, 2008

Sirius kick-off presentation, 2007

Strategic Supplier Management Programme, 2008

Supplier Categorization Method, 2006

Yearplan RCI. (2008)
Appendix A : Definitions of concepts

**Asset specificity:** the extent to which the investments made to support a particular transaction have a higher value to that transaction than they would have if they were redeployed for any other purpose (Williamson, 1975).

**Buyer-supplier relationship:** a sequence of transactions between one buyer and one supplier which does not happen by change, but is in fact intended to continue for longer time (Walter et al., 2001).

**Inter-organizational information system (IOS):** automated information systems shared by more than one organization supporting boundary spanning activities (Saeed et al., 2005).

**Purchase situation:** all relevant forces and influences related to acquisition of required materials, services and equipment, which have a potential impact on the way buyer and seller work together (Hartmann et al., 2002).

**Purchasing strategy:** the formulation of purchasing-related activities that enables an organization to obtain its short-and long term supply objectives

**Relationship dimensions:** properties of a relationship that all together determine the nature of the relationship.

**Relationship effectiveness:** a qualitative measure of the overall success of an exchange relationship. It captures the degree to which a party in a relationship views the relationship as being worthwhile, productive and satisfying (Van de Ven, 1976).
Appendix B : Interview question list

Part 1. Introduction, identification of relevant developments in the field of purchasing and supply management

1. Which developments/trends are going on in the field of purchasing and supply management?

2. How do these developments influence the purchasing process as they are going on at the moment?

3. How does RCI respond to the developments in the field of purchasing and supply management?

4. What is in your opinion the importance of supply chain management?

Part 2. Relevance of supplier management activities

5. What is in your opinion the added value of performing supplier management activities?

6. On which basis does Rabobank differentiate suppliers concerning their strategic relevance?

7. How do mutual objectives differ between strategic- and non-strategic suppliers?

8. How is this expressed into relationship management practices with the supplier (supplier relationship management)?

Part 3. Impact of IOSs on the nature of the relationship between buyer and supplier.

9. What is in your opinion the added value of e-procurement use for supporting /conducting purchasing-related processes?

10. How do you perceive the link between the use of e-procurement systems and supplier relationship management activities?

11. Which three major differences do you perceive to occur within the relationship between buyer and supplier when purchasing processes are electronically conducted in comparison with the manual purchasing process?


12. How could the use of Raboshop contribute to the development of the relationship between Rabobank and the supplier? How could it prevent the development of the relationship?

13. In which way does the use of Raboshop® contribute to the coordination and integration of activities between Rabobank and the supplier?
14. In which way is the effectiveness of the relationship between Rabobank and its supplier affected by the use of Raboshop®?

15. Which factors play a role in the choice for a specific connectivity mode between Rabobank and the supplier?

16. Could you indicate how the relationship between Rabobank and the supplier will change after the implementation of the new Raboshop®?
Appendix C: Questionnaire design

Questionnaire research study supplier integration Raboshop®

The Raboshop® is an electronic marketplace. A central meeting point for internal customers and suppliers, in which Concern Inkoop acts as main owner. Advantages include a higher ease of ordering, cost reductions, a faster purchasing process and a diverse assortment. Suppliers connect to the Raboshop® to retrieve orders and feed back the actual order status. Hereby, the exchange of information between Rabobank and its supplier can be initiated by the use of three different connectivity modes:

A. “Light” > Supplier Self Service (SUS): The exchange of information takes place via a standard internet connection. The supplier has the possibility to retrieve order information via a web-portal solution, in which the order will be further processed internally by the supplier. The order status will also be communicated back to Rabobank via the web-portal. Rabobank and the supplier will be ‘lightly’ connection with each other by the use of the Self Service interface.

B. “Tight” > Supplier Integration (XI): For high-volume suppliers, an integrated connection can be applied. Herewith, the exchange of information will be fully automated, leading to a fast and efficient process of order placement, handling and payment. The interface is fully integrated with the back-office system of the supplier.

C. “Medium” > Supplier Assistance (SAM): This interface is being used for suppliers who offer personalized products. Hereby, it is of great importance to exchange specific order-related information to the supplier. The transfer of messages between Rabobank and the supplier takes place ‘semi-automated’

Procedure for filling in the questionnaire

This questionnaire contains 19 statements addressing the use of Raboshop® between Rabobank and its supplier. The statements are focused on the possible impact that Raboshop® has upon different aspects of the relationship between Rabobank and the supplier.

I would like to ask you to indicate for each statement to what extent the use of Raboshop® affect the different aspects of the relationship between Rabobank and the supplier. Hereby, it is of key importance that each statement is compared with the situation in which the operational purchasing process is executed without electronic information exchange between Rabobank and the supplier (the ‘manual’ purchasing process). Besides, I would like to ask you to indicate for each statement the perceived difference in effect for the three different connectivity modes which are being used for conducting electronic information exchange.

Results of the questionnaire will be treated as anonymous and will be used exclusively for academic purposes in the form of a Master Thesis document.

For returning the filled in questionnaire, you need to save the word-document and send it back to my Rabobank e-mail address (reply on this e-mail).

Than you in advance for your cooperation,
Questionnaire

Rate on a scale from 1 till 7 to what extent you agree with the following statements. Put an ‘X’ behind the relevant rating.

Example:

<table>
<thead>
<tr>
<th></th>
<th>Totally disagree</th>
<th>No meaning</th>
<th>Totally agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Light (SUS)</td>
<td>1 2 3 4 5 X 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B: Tight (XI)</td>
<td>1 2 3 4 5 6 X 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C: Medium (SAM)</td>
<td>1 2 3 4 X 5 6 7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. The use of connection (A,B,C) between Rabobank and it’s supplier will contribute to a long-term, cooperative relationship based on mutual trust.

2. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to a higher mutual willingness to maintain the relationship.

3. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to a more intensive process of collaboration to guarantee the exchange of information successfully.

4. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to a situation in which both parties will become more dependent upon each other.

5. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to a situation in which Rabobank will be able to obtain a better power position over the supplier.

6. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to a situation in which the supplier will feel itself assured of supply to Rabobank.

7. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to a situation in which Rabobank feel themselves secured of products and/or services that exhibit a high degree of supply risk.

8. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to higher switching costs when Rabobank wants to change supplier.

9. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to less personal communication between the parties within the operational purchasing process.

10. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to more communication between the parties on a tactical and strategic level.

Best regards,

Ralf van Beek
11. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to less errors concerning the exchange of information with the operational purchasing process.

12. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to better insights regarding the performance of the supplier which will provide the ability to better monitor and adjust the content of the contract.

13. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to more transparency and mutual information sharing between both parties.

14. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to an overall reduction of operational purchasing costs.

15. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to an overall increase of the overall efficiency of the operational purchasing process.

16. The use of connection (A,B,C) between Rabobank and it’s supplier will contribute the achievement of mutual goals between both parties.

17. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to an overall reduction of lead times concerning the products/services being offered by the supplier.

18. The use of connection (A,B,C) between Rabobank and it’s supplier will lead to a lower degree of mutual conflicts within the relationship between the two parties.

19. The use of connection (A,B,C) between Rabobank and it’s supplier will contribute to the continuation of the relationship between the two parties.