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Trust, dependence and interorganizational systems

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Trust, Dependence and Interorganizational Systems

PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de Universiteit van Tilburg,
op gezag van de rector magnificus, prof. dr. F.A. van der Duyn Schouten,
in het openbaar te verdedigen ten overstaan van een door het college voor promoties
aangewezen commissie in de aula van de Universiteit

op woensdag 20 december 2006, om 16.15 uur door

Mohamad Khalil Mohamad Ibrahim,

geboren op 22 januari 1978 te Bagdad, Irak

Promotor: Prof. Dr. P.M.A. Ribbers

Copromotor: Dr. Ir. B.W.M. Bettonvil

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Table of contents

Chapter 1	Introduction	1
1.1	Introduction	1
1.2	Interorganizational relationships and interorganizational systems	3
1.3	Problem statement.....	6
1.4	Research objective and research questions	6
1.5	Research approach	7
1.5.1	Stage 1 – Literature review	7
1.5.2	Stage 2 – Development of a conceptual model.....	8
1.5.3	Stage 3 – Development of research design.....	8
1.5.4	Stage 4 – Analysis of empirical data	8
1.5.5	Stage 5 – Conclusions.....	9
1.6	Chapter summary	9
Chapter 2	Literature review	11
2.1	Introduction	11
2.2	Resource-based view	11
2.2.1	Resources and capabilities	12
2.1.1	IT resources and capabilities.....	12
2.2.2	Competitive advantage.....	13
2.3	Interorganizational relationships	14
2.3.1	Interorganizational systems.....	14
2.3.2	Transaction-cost economics	15
2.3.3	Resource dependence theory	16
2.3.4	Interorganizational Trust.....	17
2.4	Chapter summary	18

Chapter 3	Conceptual model	21
3.1	Introduction	21
3.2	The role of the conceptual model	21
3.3	The conceptual model	22
3.4	The influences of interorganizational trust and dependence.....	24
3.4.1	Interorganizational trust	24
3.4.2	Interorganizational dependence.....	24
3.4.3	Relationship specificity of IOS-related resources	25
3.4.4	IOS capabilities	25
3.4.5	Strategic benefits	25
3.5	Propositions and hypotheses	27
3.5.1	Proposition 1.....	27
3.5.2	Proposition 2.....	30
3.5.3	Proposition 3.....	31
3.5.4	Proposition 4.....	32
3.6	Chapter summary	33
Chapter 4	Research approach	35
4.1	Introduction	35
4.2	Research methods in IS.....	35
4.2.1	Quantitative and qualitative research	36
4.3	Unit of analysis	38
4.4	Case study research design.....	39
4.4.1	Data collection.....	41
4.4.2	The measurement instrument	41
4.5	Field study research design	43
4.5.1	Data collection.....	44
4.5.2	The measurement instrument	45
4.6	Chapter Summary	45

Chapter 5	Conceptual model assessment	47
5.1	Introduction	47
5.2	Conceptual model and Structural Equations Modeling (SEM)	47
5.3	Data and method	49
5.4	Results	51
5.5	Discussion	53
5.6	Chapter summary	54
Chapter 6	Trust and IOS-related resources.....	55
6.1	Introduction	55
6.2	Theoretical background and hypotheses	55
6.3	Data and Results	61
6.4	Caring-based Trust.....	74
6.5	Discussion	77
6.6	Chapter summary	78
Chapter 7	Dependence and IOS-related resources	81
7.1	Introduction	81
7.2	Theoretical background and hypotheses	81
7.3	Data and results.....	85
7.3.1	Case studies	85
7.3.2	Field study	91
7.4	Discussion	94
7.5	Chapter summary	95
Chapter 8	IOS-related resources and IOS capabilities.....	97
8.1	Introduction	97
8.2	Theoretical background and hypotheses	97
8.3	Data and results.....	101
8.3.1	Case studies	101
8.3.2	Field study	111
8.4	Discussion	114
8.5	Chapter summary	115

Chapter 9	IOS capabilities and strategic benefits.....	117
9.1	Introduction	117
9.2	Theoretical background and hypotheses.....	117
9.2.1	Operational benefits.....	117
9.2.2	Strategic benefits	118
9.2.3	Data and results	120
9.2.4	Case studies	120
9.2.5	Field study	128
9.3	Discussion	130
9.4	Chapter Summary	131
Chapter 10	Summary and discussion	133
10.1	Introduction	133
10.2	Background of the research.....	133
10.3	Summary of key findings.....	134
10.3.1	Research question 1	135
10.3.2	Research question 2	138
10.4	Research contributions.....	141
10.4.1	Contributions to theory	141
10.4.2	Contributions to practice.....	143
10.5	Limitations and future research.....	145
10.6	Conclusions	147
Appendix A	Measuring The Constructs	149
Appendix B	Case Study Questionnaire.....	185
Appendix C	Survey Questionnaire.....	197
Appendix D	IOS Capabilities and Operational Benefits.....	209
Dutch summary	211
References.....		215
Index		234

Chapter 1 Introduction

1.1 Introduction

Classical Greek philosophy focuses on the roles of virtue, reason and inquiry. Socrates, Plato and Aristotle argue that virtues are central in a well-lived life. They perceive ethical virtues, such as justice and temperance, as complex rational, emotional and social abilities. Aristotle (384 – 322 BC) argues that an author can persuade his audience by providing good reasons, appealing to their emotions and increase their trust by showing good character (Aristotle, 1975). According to Aristotle, the trust of the author concerns the ethical appeal in the rhetorical context, and can be established by demonstrating three factors: intelligence, virtue and goodwill. The first factor, the intelligence of the author, is indicated by the amount of knowledge of the subject. The author can show his knowledge by discussing and considering the various viewpoints of the issue. The second factor, virtue, increases the credibility of the author as it indicates that the beliefs, values and priorities of the author and the audience coincide. The third factor, goodwill, is formed by the attitude of the author towards the audience. The author needs to show that he has the best interest of the audience in mind.

Within contemporary society, trust still occupies a central position (Burt, 1997). Trust is a valued dimension of relationships and can have broader consequences for well-being and the quality of life. People favor relationships based on trust rather than suspicion and opportunism. Individuals with many similarities tend to have fewer disagreements and higher levels of trust. These pleasurable relationships also improve an individual's self-respect, which is founded on internalized norms and is improved by adherence to these norms. Good social relationships also increase the social recognition by showing and demonstrating obedience to established norms within society.

The development of information technology (IT) has had a major impact on enabling modern forms of communication. Computerized information systems enable people to convey substantial amounts of information in different forms of text, images, audio and video. The Internet is no longer a mysterious tool utilized by scientists, but is part of the everyday activities of many ordinary

people. It offers people continuous access to information and unprecedented opportunities. Digital rapid communications enable connectivity with distant places, rendering geographic distances almost negligible. People are thus confronted with internationalization and globalization forces that offer opportunities and threats of varying magnitudes.

IT is opening new opportunities for business organizations as well. Organizations use IT to conduct internal and external electronic communications, to share business information and to conduct business transactions. The use of information systems in a successful manner enables organizations to streamline activities and boost productivity -- creating new value and enhancing competitiveness. Accordingly, using and utilizing IT is imperative. Managers perceive information as an important means of supporting business improvement and innovation. The Internet is an additional channel of communication that enables organizations to achieve increased accessibility, to enhance communications with suppliers and customers, and to collaborate with allied businesses. Table 1.1 presents a number of potential benefits that can be attained by organizations through the use of IT (Laudon & Laudon, 2005; Papazoglou & Ribbers, 2006).

Table 1.1 Potential benefits of information technology for organizations

Short-term benefits	Long-term benefits
<ul style="list-style-type: none">• Efficient data entry and processing• Improvement of payroll processing• Availability of online inventory information• Rapid distribution of brochures and newsletters using website and e-mail.• Availability of detailed ordering and delivery information to customers• Online communications crossing geographical boundaries	<ul style="list-style-type: none">• Improvement of corporate and brand image• Flexibility of business processes• Novel interorganizational network models• Enhancement of return on organizational assets• Improvement of relationship with customers and suppliers• Faster product development lifecycles

This study focuses on the use of interorganizational systems (IOSs) that facilitate interorganizational relationships (IOR). IOSs are information and communication technology-based systems that transcend legal enterprise boundaries (Bakos, 1991; Gregor & Johnston, 2001; Konsynski, 1993). These systems assist organizations in coordinating their activities and cooperating

with other organizations by transferring information and conducting business transactions. The benefits of using IOSs to facilitate relationships include global connectivity, increased accessibility, higher interactivity and enhanced flexibility (Bakos, 1991; Choudhury, 1997; Gosain et al., 2004). It is commonly accepted among researchers and practitioners that information systems are a means of achieving business objectives. Therefore, the IOS is ideally tailored to the characteristics and objectives of the relationship. Two influential factors that affect commerce relationships in general and the development of IOSs in particular are interorganizational trust and dependence (Handfield & Bechtel, 2004; Hart & Saunders, 1997).

The purpose of this study is to investigate the influences how interorganizational trust and dependence influence the use of IOSs and how the IOSs influence the attainment of strategic benefits. The study distinguishes between different types of trust in order to gain additional insights regarding the specific influences of trust in different types of relationships. Additionally, the study distinguishes between various types of IOS-related resources in order to obtain insights regarding the different types of IOSs used and their influences on the attainment of strategic benefits.

This chapter presents a concise introduction to the study. Section 1.2 introduces the main topics of the study. Section 1.3 presents the problem statement steering this research. Section 1.4 presents the research objective and research questions. Section 1.5 outlines the research approach pursued. Section 1.6 provides a brief summary of this chapter.

1.2 Interorganizational relationships and interorganizational systems

Organizations need to cooperate and share resources in order to survive. The performance of any enterprise depends on its role in facilitating the demands and requirements of its environment -- including other organizations with which it deals. Disruptive shifts within the environment increase the need for and value of information. These disruptions are caused by various sources including changing customer preferences, technological progress and increased business dynamics. The scope of the environmental changes determines the reactions required from the organizations. Small changes create the need to modify existing process parameters. Large changes may cause severe discontinuities and may require structural modifications. The changes of

greater magnitude also affect the business partners to a greater extent. To ensure smooth cooperation, the organization can enter into strategic alliances with its key business partners. Effective strategic relationships can provide benefits such as generating growth and profitability. Strategic relationships thus continue to gain popularity, and the formation rate of interorganizational strategic relationships has increased dramatically (Dyer et al., 2001; Gulati & Harbir, 1998). The increased number of alliances has led to competition between sets of allied organizations rather than between individual organizations. Many strategic relationships, however, fail to achieve their objectives (Reuer 1999, Young-Ybarra & Wielsema 1999). This indicates that the presence of potential synergies does not guarantee the attainment of strategic benefits.

The role of IT in enabling effective and rapid responses is recognized as critical (Gosain et al., 2004). The development of information technology and the decline in electronic communication costs has resulted in new opportunities and challenges. Interorganizational systems (IOSs) are used to facilitate human-based and IT-based information exchange. The various types of IOSs (ranging from electronic markets to specialized highly customized systems) amplify the diversity of potential IOS usage and benefits (Choudhury, 1997). Accordingly, the benefits obtained range from reducing operational costs to achieving competitive advantage (Premkumar et al., 1997; Sawy et al., 1999). Within a stable environment, an organization is likely to choose highly specific and efficient processes, and is likely to complement its interorganizational relationships by similarly specific and efficient information exchange. Increased disruptive effects within the dynamic environment intensify the reliance on information. IOSs are used to create stronger relationships between organizations to improve information flows and to gain transactional efficiencies. This can lead to intensive electronic communications (Donk & Vaart, 2005). Earlier studies indicate that when organizations engage in tight relationships and combine resources through governance mechanisms, higher profits can be obtained (Mukhopadhyay & Kekre, 2002; Subramani, 2004). However, the increased reliance on IT introduces complexities related to issues of interorganizational trust and dependence (Hart et al., 1997).

Trust has been argued to be essential in all economic exchanges (Granovetter, 1995), and it is also emphasized as an important factor in the development and success of IOSs (Karahannas & Jones, 1999; Kumar et al., 1998). Previous studies indicate that high levels of trust positively influence the development of

long-term relationships, sharing of information and overall satisfaction (Dyer & Chu, 2003; Gulati, 1995; Sako, 1998). Practitioners often point to the lack of trust as a major factor contributing to the failure of alliances (Parkhe, 1998). A lack of trust coincides with sentiments of suspicion and scepticism regarding the actions and intentions of the business partner. These sentiments are detrimental for the relationship, as they impede information sharing and accommodating behavior. Furthermore, researchers distinguish between diverse conceptualizations of trust. Zaheer et al. (1998) differentiate between interpersonal and interorganizational trust, and argue that both levels can influence each other. Aulakh et al. (1996) focus on international interorganizational relationships, and perceive trust as the degree of confidence the partners have regarding the reliability and integrity of each other. Sako et al. (1998) emphasize the relationship between culture and trust, and argue that Japanese automotive suppliers have a higher level and more complex conceptualization of trust than American automotive suppliers. The different types and conceptualizations result in part from the adoption of different theoretical backgrounds and from disagreement on the scope of trust.

Tight cooperation, integration of activities and blending of internal processes across organization have multiple effects on interorganizational dependence. Practitioners and academics agree on the potential strategic importance of integration (Donk et al., 2005; Stevens, 1989). Organizations are developing tight interorganizational relationships for various reasons. Increased levels of dependence coincide with “lock-in” of interests of the business partners, and thus promote joint actions and continuity (Heide & John, 1990; Williamson, 1985). Tight relationships have more leverage in managing complex production, coordination and consumption activities (Dyer et al., 2001). The collaboration can even include multiple layers of suppliers or customers to ensure the availability of information and compatibility of business processes.

The presence of trust and dependence may therefore strongly influence the success of strategic relationships and the use of IOSs. This study draws on the literature on management strategy, and more specifically the resource-based view (RBV). The RBV can be used to explain the competitive advantage of organizations (Barney, 1991; Wernerfelt, 1984). It argues that organizations are idiosyncratic and have access to bundles of resources. Specific resources enable the organizations to achieve competitive advantage and higher returns. Information systems researchers identify a mixture of IT-related resources that can enable organizations to achieve superior performance. The RBV is applied

within an interorganizational context to assist in conceptualising the various types of IOS-related resources and studying how IOSs support business relationships.

1.3 Problem statement

Organizations can invest in various types of IOS-related resources including tangible resources (Bharadwaj 2000; Williamson 1985) and intangible resources (Dyer et al. 1998; Subramani 2004). As mentioned in the previous section, trust and dependence are argued to influence relationships and the use of IOSs. The extensive literature on trust has also distinguished between various forms of trust (Mishra 1993; Nooteboom 2002; Sako 1998). However, researchers and practitioners know little about how dependence and the various forms of trust impact the individual types of resources.

This thesis is concerned with gaining a more detailed understanding of the influences of these influential attributes on the use of IOSs. More particularly, this thesis investigates how dependence and various types of trust influence different types of IOS-related resources and how these resources facilitate the attainment of strategic benefits. The insights from this study will improve the theoretical understanding of interorganizational trust. The study scrutinizes the influences of the various types of trust and offers a conceptualization of their distinctive effects. Furthermore, the study aims at determining the importance of different types of IOS-related resources and the influences of these resources in attaining strategic benefits. The study provides practitioners a way to anticipate the influences of relationship-specific assets due to various types of trust and to identify their links to successful IOS usage. The distinction of various types of investments and successful IOS deployment reveals when and what kind of IT matters in achieving strategic objectives.

1.4 Research objective and research questions

The objective of this study is twofold. First, it addresses questions regarding the influences of dependence and various types of trust, and develops a theoretical approach to study such influences on the IOS-related resources. The second objective is to understand how the different types of IOS-related resources facilitate the attainment of strategic benefits. The research objectives can be met by answering the following research questions:

Research question 1: How do dependence and different types of trust influence the different types of IOS-related resources?

Research question 2: How do different types of IOS-related resources influence the attainment of strategic benefits?

1.5 Research approach

To achieve the research objective and to answer the research questions, the study uses the following research process:

- Stage 1: Review of the relevant literature
- Stage 2: Development of a conceptual model
- Stage 3: Development of a rigorous research design
- Stage 4: Collection and analysis of empirical data
- Stage 5: Assessment of conclusions, contributions, and limitations

Each of these stages is briefly described in the following sections.

1.5.1 Stage 1 – Literature review

The literature review is conducted at the beginning of the research to achieve two objectives. The first is to gain in-depth insights concerning the phenomena investigated. These insights enable a more comprehensive understanding of the theoretical constructs, provide guidance in constructing definitions and improve the development of the conceptual model. The second objective is to gain up-to-date insights concerning the research in the domain of interest and related domains. The current study is placed within a historical perspective that prevents it unnecessarily duplicating earlier studies. The historical perspective also relates the current findings to previous knowledge and aids in suggesting further research paths.

To be able to examine how dependence and trust influence IOS-related resources and consequently strategic benefits, the literature review is aimed at finding insights in the following areas:

1. The different types of trust and the influences of interorganizational trust
3. The influences of interorganizational dependence
4. Organizational IT resources and their usage
5. The use of different types of IOSs and their influences on relationships
6. Benefits obtained from interorganizational relationships

1.5.2 Stage 2 – Development of a conceptual model

The conceptual model is based on insights acquired from the literature review. The objective of the model is to distinguish particular theoretical constructs that reflect the phenomena investigated and to determine specific relationships between these constructs. Hence, the conceptual model determines the boundaries of the study by providing definitions of the theoretical constructs and formulating clear and falsifiable propositions and hypotheses.

1.5.3 Stage 3 – Development of research design

The nature of this study is explanatory. It is aimed at finding and validating causal relationships between the phenomena investigated. The two research questions refer to the influences of dependence and trust on IOS-related resources and to the influences of these types of resources on strategic benefits. Yin (2003) argues that case studies and field studies are suitable research designs for explanatory studies. This study combines both designs to achieve a more rigorous research approach. The findings of the in-depth analysis of case studies are combined with the quantifiable analysis of the field study.

1.5.4 Stage 4 – Analysis of empirical data

The empirical data are analyzed in two phases. The entire conceptual model is first assessed. The objective of this phase is to test the reasoning that higher levels of interorganizational trust and dependence lead to the attainment of strategic benefits through the use of specific IOS-related resources. The analysis entails applying structural equations modeling (SEM) to the quantitative data acquired from the field study. SEM permits the simultaneous testing of several relationships among multiple independent and dependent variables. The validity of the entire conceptual model is thus tested in one run.

The second phase consists of examining phenomena at a more detailed level. Different types of interorganizational trust and IOS-related resources are distinguished. The distinctive influences of the different types of trust on the different types of IOS-related resources are analyzed. This analysis can provide interesting theoretical and practical insights. From a theoretical perspective, the study offers a conceptualization that complements existing studies (Dyer et al., 2003; Janowicz, 2004) asserting that higher levels of trust improve relationships. From a practical perspective, managers can utilize the insights to figure out which type of trust is required to achieve certain purposes. Similarly,

the study examines the influences of dependence on the different types of IOS-related resources. This detailed analysis can reveal whether dependent organizations use IOSs in similar ways. This provides interesting insights regarding the influences of dependence within relationships. In this stage, the study also investigates the influences of IOS-related resources on attaining strategic benefits. The aim is to determine how the use of IOS-related resources influences the achievement of certain abilities and competencies within the relationship, and how these specific abilities influence the attainment of strategic benefits. This provides insights for both academics and practitioners regarding the importance of particular types of IOS-related resources and regarding how IOSs can be used to attain competitive advantage within IOR.

1.5.5 Stage 5 – Conclusions

The conclusions of the study are presented and discussed in this stage. The key findings obtained from the empirical testing of the conceptual model are evaluated. This is complemented by identifying the contributions of the research findings to theory and practice. Finally, the limitations of the study are acknowledged and potential paths for future research are suggested.

1.6 Chapter summary

This chapter introduced the study by briefly discussing the key issues. A general background of interorganizational relationships, and more particularly interorganizational systems, is presented. The focus of this research was clarified and the research questions were stated. This chapter also discussed the research approach and described each stage.

Chapter 2 outlines the current literature concerning the investigated phenomena. Chapter 3 develops the conceptual model used in this study. Chapter 4 describes the research methods and the way the data are collected. Chapter 5 provides a general assessment of the conceptual model. Chapters 6 through 9 examine more extensively each of the relationships within the conceptual model. Finally, chapter 10 summarizes the findings and discusses their implications for theory and practice.

Chapter 2 Literature review

2.1 Introduction

Chapter 1 discussed the problem statement and the objective of this study. This chapter reviews and discusses the literature related to organizational resources and, more specifically, IT resources. Subsequently, interorganizational relationships are discussed from various perspectives starting with interorganizational systems focusing on the influences of IT on interorganizational communications. A discussion on transaction cost economics follows, emphasizing the important characteristics of interorganizational transactions and the impacts of IT. After that, the section on resource-dependence theory focuses on the sources and influences of organizational dependence. Interorganizational trust is then briefly discussed by focusing on two of its conceptualizations. The insights found in the literature will lead to the development of the conceptual model in chapter 3.

2.2 Resource-based view

The resource-based view (RBV) is used within the strategic management literature to assist in providing analytical reasoning concerning the use of organizational resources. The RBV perceives each organization as a bundle of resources emphasizing the heterogeneity between organizations originating from different resources and different mechanisms of combining resources (Wernerfelt, 1984). The theory is based on economic theories of monopolistic and imperfect competition (Chamberlin, 1933; Robinson, 1933). Robinson (1933) emphasizes the importance of diversity between organizations and imperfect competition in enabling organizations to obtain above normal returns. Penrose (1959) extends these theories by arguing that the organization “is basically a collection of resources” and the diversity between organizations results from different combinations of various resources. She argues that organizational growth is dependent on the speed of accumulation and assimilation of resources and on avoiding the underutilization of resources. She suggests that the organization benefits from the services provided by resources and not the resources themselves. Various definitions of resources have been presented (Amit & Schoemaker, 1993; Barney, 1991; Wernerfelt, 1984). A common characteristic in most resource definitions is the assumption of

ownership and control. Wernerfelt (1984) defines resources as tangible and intangible assets which are tied semi-permanently to the firm. He argues that resource position barriers (i.e. imitation barriers) can produce above normal returns that influence the strength or weakness of the organization. Later studies focus on various resource characteristics that lead to competitive advantage (Amit et al., 1993; Dovev, 2002; Peteraf, 1993). Barney (1991) presents a concrete theory to identify the needed characteristics of resources to create sustainable competitive advantage. Such resources are argued to be valuable in the sense that they exploit opportunities or neutralize threats in the organization's environment, rare among the organization's current and potential competitors, inimitable, and non-substitutable. Other researchers have adopted and expanded Barney's theory to include other resource characteristics such as resource durability, non-tradability, and idiosyncratic nature of resources (Grant 1991; Collis and Montgomery 1995; Powell and Dent-Micallef 1997; Venkatraman 1997).

2.2.1 Resources and capabilities

After choosing a strategy, managers need to focus on acquiring or controlling resources that support the strategy and have the potential to produce sustainable competitive advantage (Morgan, 2000). Path dependence is a key issue as the organization's previous investments constrain its future behavior, and its opportunities for learning will be 'closed in' to previous activities and therefore will be transaction- and production-specific. Following the acquisition, organizations need to assemble their resources into desirable capabilities (Grant, 1991). Two distinct advantages can be distinguished from combining resources. First, the proper combination of resources should lead to superior value than would be the case if each resource were isolated. Second, combinations of resources are much more complex, and therefore are more difficult for competitors to replicate, than single resources (Morgan, 2000).

1.1.1 IT resources and capabilities

Within the information systems field and related literature, the resource-based perspective is utilized to distinguish between different types of IT resources and capabilities (Bharadwaj, 2000; Powell & Dent-Micallef, 1997). Resources are perceived as inputs into the production process; capabilities are organization-specific, information-based processes that are developed through interactions among the organization's resources. Mata et al. (1995) and Powell

et al. (1997) argue that top management commitment and the organization of IT are valuable organization-specific resources. These resources can produce a competitive advantage for the organization when they are complemented with suitable human resources such as IT skills and an organizational culture encouraging change and experimentation. Bharadwaj (2000) presents a classification scheme that distinguishes three types of IT-based resources. The first type comprises tangible resources including the physical IT infrastructure. The second type comprises the human IT resources including technical and managerial IT skills. The third type comprises intangible IT-enabled resources including knowledge assets and synergies enabled by IT. He demonstrated that organizations with high IT capabilities are likely to outperform on a variety of profit- and cost-based performance measures. Teece et al. (1997) present a framework relying on dynamic capabilities illustrating how organization-specific assets and their evolution path can form distinctive organizational processes that produce a competitive advantage. They argue that competitive advantage is influenced by the distinctive processes of coordinating and combining resources -- including difficult-to-trade knowledge assets and complementary resources.

2.2.2 Competitive advantage

The resource-based view provides an approach for IS researchers to evaluate how information systems effect the strategy and performance of organizations. An important question is whether IT fulfills the criteria of providing a competitive advantage. The technology alone is hardly rare and inimitable, as the progress of IT, price decline, standardization and the availability of open systems have made IT accessible to most organizations (Carr, 2003). Organizations that gain a competitive advantage through only IT can rapidly lose the advantage, as competitors are able to duplicate IT functionalities in various ways. Hence, IT resources such as hardware, software and applications don't fulfill the criteria to provide a competitive advantage. Mata et al. (1995) argue that top-management commitment and the organization of IT constitute valuable organization-specific resources. These resources can produce a competitive advantage for the organization when they are complemented with suitable human resources such as IT skills and an organizational culture encouraging change and experimentation. Their assertion coincides with the dominant view within the information systems field, which argues that IT resources can produce value and lead to a sustainable competitive advantage

when they are combined with other resources (Powell et al., 1997; Teece et al., 1997; Wade & Hulland, 2004).

2.3 Interorganizational relationships

The formation rate of interorganizational relationships (IORs) during the past few decades has been unprecedented (Gulati et al., 1998). Since organizations have different objectives when they participate in IORs, they consequently create different types of IORs (Barringer & Harrison, 2000; Bensaou & Venkatraman, 1995; Grandori, 1997). The advantages of the different types of IORs have been described in the academic and practitioner literature (Doz & Hamel, 1998). However, the number of IORs that fail to meet their founders' expectations are impressive. Porter (1987) estimates the failure rate to be 50 percent, and Park et al. (1997) give the same ratio for joint ventures. In spite of these high failure rates, organizations continue to form IORs; failures of IORs are thus expected to increase (Miles & Snow, 1992).

Several disciplines contribute to the substantial literature on IORs and discuss different aspects of relationships (Cox et al., 2002; Gurbaxani & Whang, 1991; Maskin & Tirole, 1999; Morgan, 2000). This corresponds with the versatile nature of IORs. The following sections focus on different aspects of IORs: interorganizational systems, transaction cost economics, resource-dependence theory and interorganizational trust. These sections briefly discuss streams of literature relevant for this study and for the development of the conceptual model.

2.3.1 Interorganizational systems

For a system to qualify as an interorganizational system, it is necessary and sufficient that it be used by two or more organizations (Cash & Konsynski, 1985). Diverse types of IOSs have been distinguished including electronic data interchanges, extranets, shared databases and electronic-support supply-chain management systems (Chaffey, 2004). It is emphasized that the use of IOSs can yield significant transactional advantages such as communication efficiency, enhanced storage and processing capabilities (Bakos & Treacy, 1986; Clemons et al., 1993; Malone et al., 1987). Within the IS field, researchers draw from various theories to examine the relationship between ownership and investment (Bakos & Nault, 1997; Clemons & Kleindorfer, 1992). Transaction-cost economics has been widely used to explain the role of IOSs in reducing

transaction costs (Clemons & Row, 1991; Gurbaxani et al., 1991; Weill & Vitale, 2001). Recently, greater emphasis has been placed on the benefits of knowledge resources and on partner-enabled knowledge creation for long-term advantage (Malhorta et al., 2005; O'Callaghan & Andreu, 2006; Subramani & Venkatraman, 2003). Knowledge-intensive cooperative social contexts among employees, business units and business partners are distinguished (Chen & Edgington, 2005). These contexts are favorable to the creation, coordination, transfer and integration of knowledge to achieve continual value innovation (Goshal & Moran, 1996). For example, Malhotra et al. (2005) distinguish various supply-chain partnership configurations based on interlinked processes and information-system infrastructures that facilitate partner-enabled market-knowledge creation.

2.3.2 Transaction-cost economics

Transaction-cost economics (TCE) focuses on the governance structures organizations adopt to conduct transactions. TCE provides arguments concerning how organizations should organize their boundary-spanning activities. Williamson (1975) contends that transactions are performed more efficiently within organizations when they have highly uncertain outcomes, when they occur infrequently and when they necessitate asset-specific investments. Furthermore, TCE argues that actors can exhibit opportunistic behavior, which is a self-interested or deceptive behavior that drives transaction costs higher. Initially, Williamson (1975, 1985) distinguished only between markets and hierarchies. Later, he and other scholars (Heide, 1994; Williamson, 1995) perceived cooperative interorganizational relationships as reflecting a shift away from market-based exchanges toward closer, collaborative non-market relationships identifying interorganizational forms.

IS literature applying TCE has tried to analyze the impacts of IOSs on the transaction structure. Malone (1987) argues in the 'electronic markets hypothesis' that IT will decrease the coordination costs of information favoring electronic markets above electronic hierarchies in the long run. Gurbaxani and Whang (1991) differentiate between three types of costs: external and internal coordination costs and operating costs. They argue that IT can decrease external and internal coordination costs and enhance operational efficiency. Furthermore, they predict that the use of both electronic markets and electronic hierarchies would increase. Clemons et al. (1993) agreed that IT has the potential to lower coordination costs but they added that the governance

structure of IORs will be affected by factors such as the transaction economies of scale and learning-curve effects leading to an increase in the level of explicit coordination and reducing transaction risks. According to Clemons et al. this will eventually imply increased reliance on fewer, long-term cooperative relationships, branding the theory as a ‘move to the middle’ hypothesis. Subramani and Venkatraman (2003) emphasize that intangible relationship-specific investments enable enhanced value creation between suppliers and their customers. They argue that within IORs quasi integration and joint decision-making are important. Quasi integration comprises the degree of linkage between two organizations. Joint decision-making entails the organizations jointly making decisions about key issues affecting their relation.

The various theories show an apparent disagreement regarding the impacts of IOSs on IORs. In practice, some IOSs supporting electronic markets and electronic hierarchies have proven to be successful and others have failed. Although some of these practices can be analyzed using the existing theories based on TCE, there are other cases where the concepts offered by TCE are insufficient for providing an adequate analysis of why these systems have succeeded or failed. This study supplements TCE with other theories to provide a more comprehensive analysis.

2.3.3 Resource dependence theory

The interorganizational dependence literature is rooted in the seminal work of Emerson (1962). He argues that social dependence is influenced by the degree to which another party is needed to realize specific goals and by the availability of alternative goals outside the relationship with that party (Emerson, 1962). Thompson (1967) moves the focus to organizations as a unit of analysis and notes that organizational dependence is determined by the organization’s need for resources and the availability of other resource providers. Pfeffer and Salancik (1978) focus on interorganizational dependence, and argue that it is influenced by (1) the importance of a resource, (2) the extent to which the organization has discretion over the resource allocation and use and (3) the extent of concentration of resource control. Cox (1997) views dependence within a supply-chain context and argues that some of the resources that are used to deliver an end product or service are highly valued in utility terms by buyers and suppliers. These resources can be scarce or unique in ownership, as they are difficult or even impossible to copy. A common finding of these studies (Cox, 1997; Emerson, 1962; Pfeffer et al., 1978; Thompson, 1967) is

that dependence is effected by the importance of a resource and its substitutability.

As for the influences of dependence and the resulting power composition, Williamson (1979) posits from the transaction-cost perspective that dependence leads to market advantages, which lead to opportunistic behavior. Under conditions of uncertainty and bounded rationality, organizations are argued to exploit power asymmetries. Organizations that are dependent on their partners would be forced to participate in electronic partnerships, even when these affiliations increase their vulnerability (Evans & Wurster, 2000). Ratnasingham (2000) argues that dependent organizations are impelled into situations of uncertainty and conflict when their powerful business partners use their power coercively. However, other studies have asserted that dependence and power can exist without opportunism. Hart et al. (1997) argues that power can be seen as an opportunity to build and reinforce interorganizational trust and to nurture the relationship.

2.3.4 Interorganizational Trust

Interorganizational trust has been emphasized as important to the success of IOR performance and to conflict reduction (Zaheer et al., 1998), competitive advantage (Barney & Hansen, 1994) and other positive outcomes (Dyer et al., 2003; Gulati, 1995; Kumar, 1996; Sako, 1998). Morgan et al. (1994) and Pavlou et al. (2003) assume that the presence of interorganizational trust is a *key mediating variable* in relationship development and success.

Conceptualizing and empirically examining interorganizational trust is not easy. The conceptualizations and definitions adopted reflect the authors' preferences and their adherence to certain assumptions. Organizations that maintain strategic intentions for collaborating can be distinguished from those organizations that in reality act upon these intentions. Although this issue is rarely reflected in the literature (Janowics, 2004; Salk & Simonin, 2003), the literature does contain various definitions of interorganizational trust. Trust can be conceptualized, for example as an attitude: an expectation held by an agent that its trading partner will behave in a mutually acceptable manner (Sako, 1998). Trust can also be conceptualized by emphasizing the behavioral aspect: the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party

(Mayer et al., 1995). The behavioral aspect is reflected in the decision to rely on the other party (Currall & Inkpen, 2002). A trusting behavior from a partner doesn't imply the existence of attitudinal trust, as the observed behavior may be driven by other factors such as dependence on the partner (Nooteboom et al., 1997). Behavioral trust is thus broader and more comprehensive than attitudinal trust. Attitudinal trust, however is more difficult to examine at the organizational level (Dyer & Chu, 2000) because the individual human being is considered to be the origin and object of trust as opposed to the organization (Zaheer et al., 1998). This study adopts the attitudinal view of trust in order to aid in elucidating the behavioral influences of trust and dependence. Interorganizational trust is therefore defined as the organization's willingness to believe that a partner is competent, open, caring and reliable (Mishra, 1996).

Competence is assessed based on the skills and abilities of the other organization within a specific domain. Organizations that can demonstrate skills in producing high quality goods or services, such as timely delivery of accurate information, achieve high levels of competence trust. The issue of competence has been addressed by various scholars (Butler, 1991; Goshal & Bartlett, 1995). Openness is based on the perceptions of honesty of communications and completeness of conveyed information. The honesty of the partner organization influences the motivation to share knowledge. The formation of collaborative arrangements within an IOR enable distinctive interactions and facilitate sharing knowledge (Inkpen & Dinur, 1988; Kale et al., 2000). Caring is based on the belief that the other party will refrain from taking unfair advantage when the opportunity arises. This belief can be stimulated when the other organization makes an open-ended commitment to take initiatives for mutual benefit. This dimension is related to research on benevolence (Mayer et al., 1995) and goodwill (Sako, 1998). Reliability refers to the consistency of expected behavior based on accumulation of interactions, specific incidents, problems and events. Repeated interactions lead to levels of confidence and predictability regarding future actions. Each of these four dimensions of trust emphasizes expectations regarding a partner's behavior and performance.

2.4 Chapter summary

This chapter briefly discussed the literature on the resource-based perspective and IORs. The literature on the influences of resources in forming organizational strategy was briefly reviewed. The linkage between resources

and capabilities was highlighted, as were the advantages of obtaining value from IT-related resources and capabilities. Subsequently, theories regarding interorganizational systems, transaction-cost economics, resource dependence and interorganizational trust were analyzed to provide economic, organizational and socio-political viewpoints of IORs. Building upon the insights of the theories discussed in this chapter, chapter 3 will present the development of the conceptual model.

Chapter 3 Conceptual model

3.1 Introduction

Chapter 1 described the focus of this study and chapter 2 discussed the related literature. The findings of the previous chapter provide a foundation for developing the conceptual model in this chapter. The conceptual model enables the empirical investigation of the influences of trust and dependence on interorganizational systems. The chapter is organized as follows. The following section will briefly present the conceptual model. Subsequent sections will discuss the theories that contribute to the constructs and provide construct definitions. The research propositions will be presented and justified, followed then by a summary of the chapter.

3.2 The role of the conceptual model

This chapter presents a theoretical conceptualization of the phenomena under investigation. Hall and Lindzey (1957) argue that the function of theory is to prevent the observer from being overwhelmed by the complexity of the investigated events. Consequently, theoretical statements should be parsimonious in their organization and clear in their communication. According to Bacharach (1989), theory can be viewed as a system of constructs and variables. Constructs are by their very nature abstract and unobservable. The variables are observable units and are operationalized empirically through measurement. He asserts that constructs should be related to each other through propositions, and variables should be related to each other through hypotheses. In this study, the variables are perceived as observable and measurable entities related to the abstract constructs. The theoretical statements can take the form of propositions, which are more abstract and all encompassing, or hypotheses, which are more concrete and operational statements. Figure 3.1 illustrates the relationships between two constructs, each related to two variables.

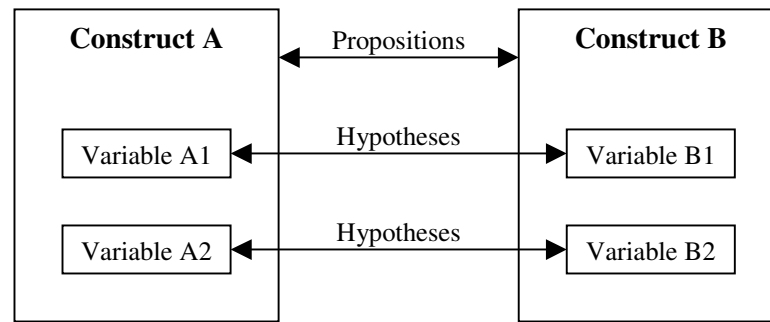


Figure 3.1: Propositions and hypotheses

3.3 The conceptual model

The conceptual model illustrates the influences of trust and dependence on interorganizational systems within dyadic interorganizational relationships. Each organization is perceived as a separate, legally independent organization that is able to take decisions autonomously regarding its relationship with the environment.

In this model, interorganizational trust and dependence are argued to stimulate the use of interorganizational system- (IOS) related resources. The combination of these resources influences the development of distinct IOS capabilities. The IOS capabilities, in turn, influence the attainment of benefits. The conceptual model is portrayed in figure 3.2 and discussed in sections 3.4 and 3.5.

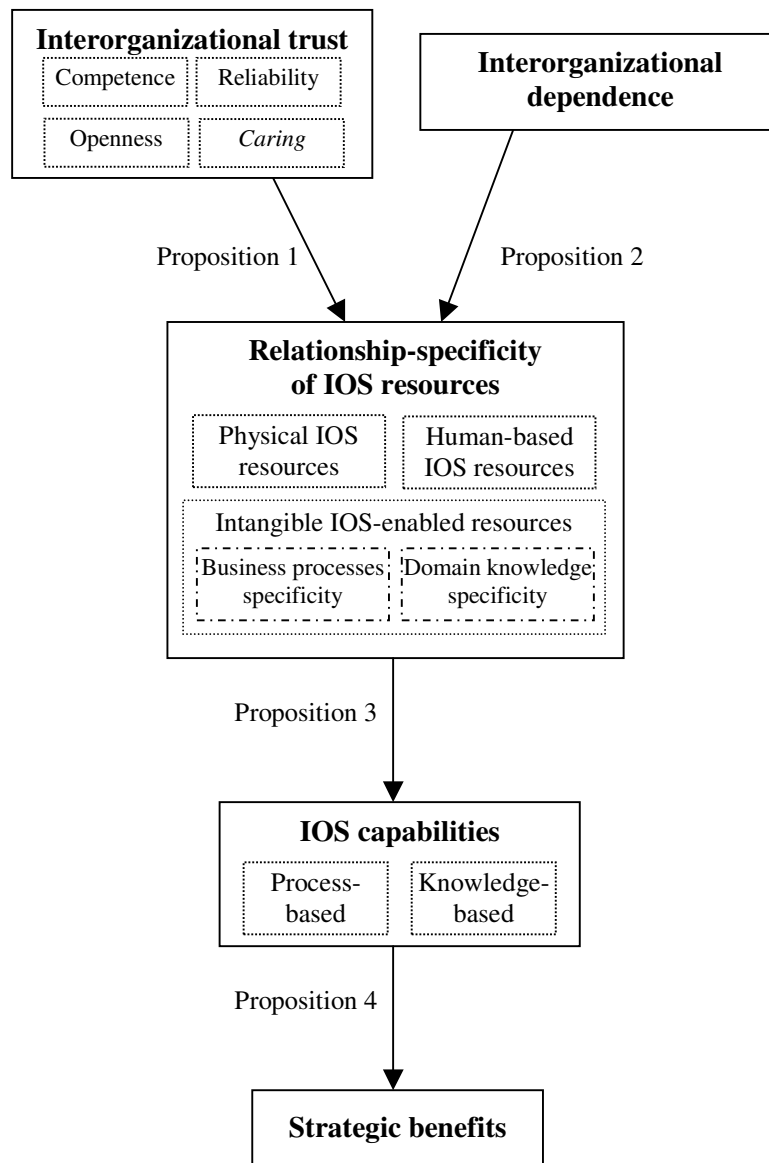


Figure 3.2: Conceptual model

3.4 The influences of interorganizational trust and dependence

This section discusses the theoretical underpinnings of the conceptual model. The model is derived from theories in multiple disciplines including economics, sociology, information systems and management. The literature on resource dependence and the literature on political economics (more specifically on interorganizational trust) are used to understand the influences of dependence and trust on the use of resources within interorganizational relationships and to distinguish between various types of trust. The literature on transaction-cost economics is used to contribute to the conceptualization of the relationship specificity of resources. The literature on the resource-based view is used to assist in the conceptualization of the various types of resources that can be employed within interorganizational relationships and to distinguish IOS capabilities that can aid in attaining benefits. The following sections briefly describe and provide definitions of the constructs.

3.4.1 Interorganizational trust

This study focuses on the influences of interorganizational trust within IORs (Sako, 1998). Following Mishra (1996), interorganizational trust is perceived as an attitude and is defined as an organization's willingness to be vulnerable to another organization based on the belief that the latter organization is competent, reliable, open and caring. Each of these dimensions signifies particular expectations regarding the partner's performances, and may accordingly have distinctive influences. The conceptual model focuses particularly on the influences of competence, reliability and openness.

3.4.2 Interorganizational dependence

This study adopts Emerson's definition of dependence that "dependence of actor A upon actor B is (1) directly proportional to A's motivational investment in goals mediated by B and (2) inversely proportional to the availability of those goals outside of the A-B relationship." The study focuses on the influences of dependence within IORs (Pfeffer et al., 1978). Following Cox et al. (1997; 2002) the dependence of an organization on a partner organization is determined by the importance of the required resource in terms of utility and the substitutability of the other organization in obtaining that resource.

3.4.3 Relationship specificity of IOS-related resources

The IOS-related resources are the IT-related assets that each organization is willing to use within the relationship. A resource is perceived to have a higher degree of relationship specificity if it has lesser value when it is redeployed in alternative relationships (Gosh & John, 1999; Subramani, 2004). Following Bharadwaj (2000), this study distinguishes three main types of IOS-related resources: physical, human-based and intangible IT-enabled resources. Intangible IT-enabled resources are further split into resources related to business processes and to domain knowledge (Subramani, 2004). Physical IOS-related resources are the tangible IT infrastructure components including hardware and software. Human-based IOS-related resources are the skills and efforts of managers and employees of both organizations that are conducted to improve the communications and the IOR. Business-process IOS-related resources are the organizational processes that cross the organizational boundaries and are performed together with the business partner within the interorganizational relationship. Domain-knowledge IOS-related resources include the information and knowledge present within the organization and are related to the business partner and the communications conducted with the business partner.

3.4.4 IOS capabilities

IOS capabilities are the abilities and competencies developed within the relationship through the use of the IOS. IOS capabilities are embedded into the processes and routines within the relationship. A distinction is made between process-based and knowledge-based IOS capabilities. Process-based IOS capabilities encompass the successful interlinkage of business processes across organizational boundaries. Process-based IOS capabilities can support the organizations in coordinating activities and executing daily operations. Knowledge-based IOS capabilities encompass the ability to transfer and share knowledge across organizations. The effective sharing of knowledge can increase the understanding of the environment and leverage the organizational expertise in new business opportunities.

3.4.5 Strategic benefits

The benefits obtained by an organization within a relationship can be either operational or strategic, or both (Craighead et al., 2006; Subramani, 2004). Operational benefits are obtained from lower transaction costs and production

costs through the use of the IOSs. Strategic benefits are obtained when the organizations position themselves to take advantage of the opportunities occurring within the relationship. The conceptual model focuses on the attainment of strategic benefits by the business partners through the use of the IOS. The strategic benefits are defined as the rewards that are attained due the use of the IOS and that positively affect the competitive position of the organizations.

Strategic benefits are subject to issues of symmetry and degree. The influence of IT on individual organizational performance has received ample attention and debates within the academic community (Bharadwaj, 2000; Mata et al., 1995; Powell et al., 1997; Teece et al., 1997). Recently, there is a transition from a focus on traditional, physically oriented organizations to interconnected organizations that rely on electronic connections for communication, production and distribution (Kuo & Smits, 2003; Straub et al., 2004). The performance and benefits can be examined at multiple levels (Delporte-Vermeiren et al., 2004; Kleijnen & Smits, 2003) including individual employees level (Torkzadeh & Doll, 1999), Group level (Trauth & Jessup, 2000), Organizational performance (Han et al., 2003), dyadic level (Ratnasingam, 2000) and network level (Straub et al., 2004). This study focuses on performance and strategic benefits obtained at the dyadic level.

Table 3.1 presents a definition for each construct and the variables used to assess the construct.

Table 3.1: Construct definitions and variables

Construct	Definition	Variables
Interorganizational trust	A party's willingness to be vulnerable to another party based on the belief that the latter party is competent, reliable, open and caring.	Competence Reliability Openness
Interorganizational dependence	The dependence of actor A upon actor B is (1) directly proportional to A's motivational investment in goals mediated by B and (2) inversely proportional to the availability of those goals outside of the A-B relationship.	Utility Substitutability
Relationship specificity of IOS-related resources	IT assets used by each organization that have lesser value when redeployed in alternative relationships.	Specif. physical IOS resources Specif. human IOS resources Specif. IOS-enabled intangible resources
IOS capabilities	The abilities and competencies developed within the relationship through the use of the IOS.	Process-based IOS capabilities Knowledge-based IOS capabilities
Strategic benefits	The rewards that are attained due to the use of the IOS and that positively affect the competitive position of the organizations.	Quantifiable strategic benefits

3.5 Propositions and hypotheses

This section develops propositions and hypotheses based on the conceptual model (figure 3.2) and the definitions of the constructs.

3.5.1 Proposition 1

Proposition 1: Interorganizational trust positively influences the relationship-specificity of IOS-related resources.

A higher level of interorganizational trust induces positive expectations of the behavior of the other organization and diminishes feelings of skepticism and suspicion (Dyer et al., 2003; Janowicz, 2004; Kumar, 1996; Nooteboom, 2002; Sako, 1992; Sako, 1998). Consequently, trust is expected to increase the relationship specificity of the IT assets that are used. As trust can be built on various bases, it is argued here that each type (i.e. specific positive

expectations) can positively influence the use of particular types of resources. Following Mishra (1996), trust is argued to be based on competence, reliability, openness and caring.

Trust based on competence requires a shared understanding of professional conduct and technical and managerial standards. It is based on the perception that the other organization is knowledgeable in a particular domain and maintains a certain level of competence leading to an elevated level of standards. It is therefore justifiable for the focal organization to rely on the processes performed by the other organization. Moreover, specialization benefits provide various benefits and justify reliance on the processes of a more competent organization by interlinking the processes of the focal organization (Douma & Schreuder, 1998). Hence, a high level of trust based on competence is argued to increase the customization of the processes within the focal organization. Alongside the processes, the focal organization may conduct actions to benefit from the relationship with its competent partner. As the actions are performed by employees to coordinate activities (Zaheer et al., 1998), it is expected that higher competence trust will lead to a higher degree of relationship specificity of human-based resources. Tight communications with a competent partner demand from employees certain adjustments and active pursuits in order to capitalize the potential advantages. These adjustments can vary from informal acquaintances to periodic meetings in order to discuss new opportunities (Lamb, 2003).

Trust based on reliability is related to the extent to which an organization can depend upon and have confidence in the actions of the partner organization (Sako, 1998). A high degree of reliability is argued to motivate the focal organization to depend on the partner to take advantage of possibilities such as just-in-time delivery and agile manufacturing. This can be achieved by interlinking the processes leading to a higher degree of relationship specificity of business-process- and human-based IOS-related resources (Ekerling, 2000).

Openness-based trust has an important role in motivating knowledge sharing (Sharratt & Usoro, 2003). The sharing of information and knowledge involves risk, as it exposes the knowledge of the trusting organization. The existence of openness-based trust provides an encouraging base and therefore suggests the likelihood of a greater willingness to share knowledge. Effective knowledge sharing involves embracing the knowledge of the other organization (Nooteboom, 2002), resulting in domain-knowledge relationship-specific

resources of the focal organization. Moreover, the sharing of knowledge has to be realized by humans. It is expected that openness-based trust will also lead to a higher degree of relationship-specific human-based IOS-related resources.

Hypothesis 1a. *competence-based trust* positively affects the use of *business-process* IOS-related resources with high relationship specificity.

Hypothesis 1b. *competence-based trust* positively affects the use of *human-based* IOS-related resources with high relationship specificity.

Hypothesis 1c. *reliability-based trust* positively affects the use of *business-process* IOS-related resources with high relationship specificity.

Hypothesis 1d. *reliability-based trust* positively affects the use of *human-based* IOS-related resources with high relationship specificity.

Hypothesis 1e. *openness-based trust* positively affects the use of *domain-knowledge* IOS-related resources with high relationship specificity.

Hypothesis 1f. *openness-based trust* positively affects the use of *human-based* IOS-related resources with high relationship specificity.

The influences of caring-based trust are ambiguous and can originate from different sources (Hart et al., 1997; Nooteboom, 2002). The caring and affect is influenced and can influence various factors including the sharing of sensitive information, sensitivity to the partner's needs, type of relationship, culture, social group membership (Bachmann, 2000; Kramer et al., 1996; Lewicki & Bunker, 1996; Sitkin & Roth, 1993). Past research is inconsistent regarding the importance and the influences of caring and affect in business relationships. Gabarro (1990) argues that affect and caring are less important in work relationships while other scholars including McAllister (1995) emphasize the affective qualities of relationships and argue that trust based on care and concern is less superficial, and hence deeper. Williams (2001) claims that affect can have influences in multiple paths such as cognitive, motivational and behavioral. Analyzing the influences of caring involves examining issues outside the focus of this research and therefore no hypotheses are incorporated regarding the impact of caring-based trust.

3.5.2 Proposition 2

Proposition 2: Interorganizational dependence positively influences the relationship specificity of IOS-related resources.

Interorganizational dependence has been argued to influence the investments within a relationship (Casciaro & Piskorski, 2005; Nooteboom et al., 2000; Pfeffer et al., 1978; Ulrich & Barney, 1984). The magnitude of dependence determines the organization's vulnerability and willingness to conform to the constraints set by the other party (Emerson, 1962; Thompson, 1967). Following the rationale of resource dependence and the arguments of Williamson (1985), the constraints set by the dominant organization are expected to increase its control and to intensify the vulnerability of the dependent organization. An effective way of achieving this is by increasing the switching costs (Rumelt, 1987; Williamson, 1979) and consequently increasing the relationship specificity of the utilized resources. A relatively less dependent organization cannot be compelled to use relationship-specific resources because it is not obliged to do business with that specific business partner and can do business with other organizations more easily. Hence, it is argued that a dependent organization will need to employ various types of relationship-specific IOS-related resources (depending on the context of the relationship).

Hypothesis 2a. High dependence on the other organization positively affects the use *physical* IOS-related resources with high relationship specificity.

Hypothesis 2b. High dependence on the other organization positively affects the use of *human-based* IOS-related resources with high relationship specificity.

Hypothesis 2c. High dependence on the other organization positively affects the use of *business-process* IOS-related resources with high relationship specificity.

Hypothesis 2d. High dependence on the other organization positively affects the use of *domain-knowledge* IOS-related resources with high relationship specificity.

3.5.3 Proposition 3

Proposition 3: The relationship specificity of the IOS-related resources positively influences the existence of IOS capabilities.

Grant (1991) and Bharadwaj (2000) argue that when an organization combines various resources, it can develop capabilities that are specific to the organization and information-based. Prosser et al. (1997) and Subramani (2004) assert that relationship-specific investments can lead to important strategic relationships. By applying the logic of the RBV to interorganizational relationships, one may argue that combining relationship-specific resources will produce IOS capabilities.

The different types of IOS-related resources can have distinctive effects. Relationship-specific human-based resources are argued to increase both process-based and knowledge-based IOS capabilities. IOS-related human resources comprise training, expertise and relationships between employees. These are all factors that support both types of capabilities. IOS-enabled intangible resources are argued to support the development of IOS capabilities as well. More specifically, business processes at each side are more effective when they complement each other (e.g. just-in-time capability can only be achieved when both organizations perform the agreed-upon procedures). Similarly, the sharing of relationship-specific knowledge by both sides would produce knowledge-based IOS capabilities. For example R&D collaborations are more beneficial when the knowledge of organizations within R&D collaborations is complementary (Janowicz, 2004).

Hypothesis 3a. Incorporating *business-process* specific IOS-related resources that have a high degree of relationship-specificity positively affects *process-based* IOS capabilities.

Hypothesis 3b. Incorporating *domain-knowledge* IOS-related resources that have a high degree of relationship-specificity positively affects *knowledge-based* IOS capabilities.

Hypothesis 3c. Incorporating *human-based* IOS related resources that have a high degree of relationship-specificity positively affects *process-based* IOS capabilities.

Hypothesis 3d. Incorporating *human-based* IOS related resources that have a high degree of relationship-specificity positively affects *knowledge-based* IOS capabilities.

3.5.4 Proposition 4

Proposition 4: IOS capabilities positively influence the attainment of strategic benefits.

Within the RBV, certain capabilities are argued to achieve superior performance and produce a sustainable competitive advantage (Bharadwaj, 2000; Teece et al., 1997). Applying the RBV insights to interorganizational relationships, IOS capabilities are expected to allow exploitation of the opportunities presented by the IOR and hence to facilitate the achievement of strategic objectives.

Both types of IOS capabilities are expected to engender enhanced performance and hence to yield strategic benefits. Successful interlinking of processes enables the business partners to react to each other more effectively and efficiently. This can produce a competitive advantage through increasing the flexibility of the business partners and decreasing the reaction time to the environment (Dyer, 1994; Lee et al., 1997; Prosser et al., 1997; Sambamurthy et al., 2003). Recently, increased emphasis has been placed on strategic benefits gained from tight interorganizational collaborations that rely on integration of processes, knowledge building and knowledge communication capabilities (Malhorta et al., 2005). Organizations that utilize the knowledge of their partners have an increased understanding of the environment and subsequently a broader range of opportunities and more effective actions (Nooteboom, 2004). Such benefits may be obtained from the development of new products due to a richer understanding of the partner organization or sharing information regarding market trends that would provide a competitive advantage (Malhotra et al., 2005; Mukhopadhyay & Kekre, 2002). Hence,

Hypothesis 4a. Process-based IOS capabilities positively affect the attainment of strategic benefits.

Hypothesis 4b. Knowledge-based IOS capabilities positively affect the attainment of strategic benefits.

3.6 Chapter summary

This chapter discussed the development of a conceptual model using the various theoretical perspectives. The chapter also defined each of the constructs and justified each of the research propositions derived from the conceptual model. The next chapter will discuss the research approach pursued in this study to test the conceptual model.

Chapter 4 Research approach

4.1 Introduction

The aim of this study is to empirically examine the influences of dependence and the various types of trust on interorganizational systems. Chapter 3 discussed the conceptual model and research propositions for this study. This chapter describes the research methods employed to test the conceptual model. This will be done by first discussing how the methodology adopted in this study is related to the research methods within the IS field. Subsequently, section 3 will discuss the general foundations of the research design. Sections 4 and 5 will discuss the two methods adopted in this study case study and field study methods, respectively. Finally, section 4 provides a conclusion for the chapter.

4.2 Research methods in IS

Various researchers emphasize the importance of identifying the epistemological and philosophical foundation of research. Galliers (1992) distinguishes between research method and research approach. He follows Weick (1984) in defining research methods as “simply ways to systemize observation”, while he defines a research approach as “a way of going about one’s research”. Hence, a research approach may include various research methods. Chua (1986) and Orlikowski and Baroudi (1991) distinguish three categories: positivist, interpretive and critical.

- Positivist research philosophy assumes that reality exists independently of the researcher. A scientific theory is a theory whose predictions can be empirically tested and falsified. Research is classified as positivist IS research if there are formal propositions, quantifiable measures of variables, hypothesis testing and drawing of inferences from a sample of the population.
- Interpretivist research philosophy assumes that reality is a constructed by people, and it is not possible for social phenomena to be examined independently of the individuals contributing to that reality. Therefore, access to reality is only through social constructs such as language, consciousness and shared meaning. The aim of

interpretive studies is to analyze the meanings that humans assign to phenomena. Consequently, interpretive methods in IS are focused at understanding the context of the information system and how the system influences and is influenced by the context (Walsham, 1995). The explanation entails the full complexity of human sense making: hence, there are no predefined dependent and independent variables.

- Critical research involves understanding what motivates people's actions and beliefs. Even though people can consciously act to modify their social and economic environment, critical theory argues that their ability is limited by implicit social, cultural and political controls. It focuses on the oppositions, conflicts and contradictions in contemporary society and aims at eliminating the sources of alienation and domination within the environment.

This study adopts a positivist research philosophy and aims at investigating the 'objective reality' by pursuing the following three principles. First, the world can be described by bare facts, independently of the theory. This implies that there should be a clear distinction between describing and explaining a phenomenon. Second, the data collection should not be influenced by the researcher's theoretical prejudices. The basic factual data concerning a phenomenon should be researcher independent, i.e. it should be the same no matter who collected it. Third, the observed phenomena are reduced into theories that explain these facts. The theories can describe or explain the interrelationships between various observed phenomena or provide predictions of phenomena based on prior observations.

The positivist research philosophy relies on a host of scientific methods producing both numerical and alphanumeric data. The two types are referred to as quantitative and qualitative within social research in general. The next section describes these two approaches.

4.2.1 Quantitative and qualitative research

The quantitative research approach comprises a set of methods and techniques that specializes in quantities in the sense that numerical values signify levels and degrees of theoretical constructs and variables. The interpretation of the numbers is considered as sensible scientific evidence of how a phenomenon in reality is. The core of the quantitative approach is the empirical derivation and

analysis of numbers rather than the sources of data. A researcher can use existing archival data or collect it through experiments. In both cases, the researcher is motivated by the numerical analysis. Statistical tools and packages have an important role in the analysis and in obtaining meaning from the usually vast amount of raw data.

The qualitative research approach is developed in the social sciences to improve the understanding of people and social phenomena within their natural context. The argument is that when data are quantified, a significant portion of the understanding of a phenomenon is lost. This is in contrast to describing the phenomenon from the point of view of the participant and illustrating his or her unique social and institutional context.

Many research studies within the IS field comprise a single approach, either quantitative or qualitative approaches. Other studies combine qualitative and quantitative research approaches in one study. These are also referred to as mixed method studies (Tashakkori & Teddlie, 2003). Academics advocating the latter type support Cook and Campbell (1979) and Brewer and Hunter (1989) in their criticism on monomethod designs. Cook and Campbell (1979) identify the shortcomings of monomethod design in measuring underlying constructs. They argue that when a construct is measured using only a single method, it then becomes difficult to differentiate the construct from its operational definition, which used in that method. Brewer and Hunter (1989) address the imperfections of monomethod designs and assert that the combination of methods allows the researchers to compensate for the particular flaws of each particular method.

Triangulation plays a major role in the plea for mixed methods (Gable, 1994; Webb et al., 1966). Campbell and Fiske (1959) propose the use of multiple quantitative techniques in the same study. They recommend the use of multiple quantitative methods to measure psychological traits. They argue that the use of a “multitrait-multimethod matrix” ensures that the variance is due to the psychological trait and not due to the method used. Webb (1966) suggests that when multiple measurement processes confirm a proposition, the uncertainty of its interpretation is reduced significantly. Accordingly, he argues that the most persuasive evidence results from a triangulation of measurement processes. Denzin (1978) differentiates between four types of triangulation: (1) Data triangulation, which includes gathering the data through a variety of data sources, (2) Investigator triangulation, which comprises the employment of

multiple researchers to gather and interpret the data, (3) Theoretical triangulation, which refers to the use of more than one theoretical perspective to interpret the data and the results, and (4) methodological triangulation, which is the use of multiple methods to study a problem and gather the data. The fourth type, methodological triangulation, is the most commonly applied within social sciences.

Attwell and Rule (1991) emphasize that each approach 'is incomplete without the other'. Quantitative evidence can save the researcher from being influenced by vivid, but incorrect, notions in qualitative data. Quantitative evidence can strengthen findings when it confirms the findings from qualitative data. The qualitative evidence is valuable for discovering the rationale triggering the relationships revealed by the quantitative data. In recent years, the advantages of mixed-method studies have been increasingly acknowledged. Onwuegbuzie and Leech (2004) argue that researchers adopting mixed methods studies researchers are in a better state to combine empirical precision with descriptive precision. The use of both quantitative and qualitative designs, rather than the use of a single design, enables the researcher to zoom in to microscopic detail or to zoom out to broader scope. Ivankova et al., (2006) point out that the mixing of quantitative and qualitative methods results in higher quality of inferences by integrating the quantitative and qualitative results while discussing the results of the entire study and drawing implications.

This study perceives mixed methods as a procedure for collecting, analyzing and integrating both quantitative and qualitative data within a single study for the purpose of achieving a better understanding of the problem (Ivankova et al., 2006; Onwuegbuzie et al., 2004; Tashakkori et al., 2003). This study combines qualitative case studies and a quantitative field study. The following sections will discuss the unit of analysis and provide justifications for adopting each technique and its design.

4.3 Unit of analysis

The unit of analysis in this study is the dyadic interorganizational relationship. The two organizations are two separate, legally independent organizations that can take decisions autonomously regarding their relationship with their environment.

4.4 Case study research design

Case study research entails methods of extracting causal insights for discovery purposes (Benbasat et al., 1987; Yin, 2003). Spending time watching and discussing issues with involved managers and personnel is a powerful method that enables the researcher to familiarize himself with the experiences of individual. These actions also enable a Weberian type of explanation, i.e. there is more to what happens when somebody acts than merely what the actor intends to do. What occurs in reality is not automatically what the actor wants. Weber refers to this as “adequacy at the level of meaning”. In-depth case studies are suitable for focusing on the level of meaning. This is essential for this research, as trust is viewed as an attitude and an expectation held by an agent.

There are two main objectives for the use of the case study approach. First, the approach is used to test the theoretical and intuitive insights on the causal relationships between the constructs. Second, the approach complements the knowledge-building process by engendering new insights on the causal links between the constructs. Multiple case studies are conducted to achieve these objectives. In order to select the appropriate cases, a number of organizations are contacted for initial interviews in order to select appropriate relationships. Yin (2003) argues that the logic underlying performing multiple case studies should be either literal replication (i.e. predicting similar results from the various cases) or theoretical replication (i.e. predicting contrasting results but for predictable reasons). As a field study will be conducted employing a quantitative analysis, theoretical replication is adopted as a replication logic. Six cases are selected based on the variations of the independent variables. The hypotheses pertain to interorganizational dependence and the three types of interorganizational trust: competence, reliability and openness. Even though the conceptual model does not include hypotheses related to caring-based trust, an additional case study focusing on the influences of that type of trust is included for two reasons. First, the case study is conducted to explore possible influences of caring-based trust on each type of IOS-related resource. The findings of this case study supplement existing studies and enhance the understanding regarding the influences of caring and effect. Second, caring-based trust is included in the conceptual model as a type of trust due to its distinctive characteristics as recognized by various scholars (McAllister, 1995; Williams, 2001). A case study focusing on that type of trust enhances the

quality and comprehensiveness of the findings of the research. The characteristics of the case studies are listed in table 4.1.

Table 4.1: Characteristics of the selected case studies

Common characteristics of all incorporated case studies					
<ul style="list-style-type: none"> • The focus is the use of IOS within a dyadic interorganizational relationship; • The participating organizations should be actively engaged in a dyadic interorganizational relationship; • The participating representatives should be well acquainted with the relationship with the other organization and the used IOS; 					
Case study	Distinctive feature of case study	Participating organizations	Size	Role of each organization	No. of interviewees
1	The existence of competence-based trust	Global Automation Companion	Large	Industrial automation provider	2
		Integrated Logistics	Medium	Storage of products	4
2	The existence of reliability-based trust	HighTech Headsets	Medium	Manufacturing	1
		Road Transport Logistics	Medium	Storage and transportation	3
3	The existence of openness-based trust	Fast Cuisine	Medium	Fast food restaurant	2
		Dealer	Medium	Supplier	2
4	The existence of caring-based trust	Stenazia	Medium	Retailing	1
		Alumifid	Medium	Storage of products	3
5	The existence of high dependence	Fretadia	Small	Manufacturing	1
6	The existence of low dependence	Tilburium	Small	webdesign	2

4.4.1 Data collection

Data is collected from multiple sources to achieve triangulation. Triangulation in data collection pertains to collecting the same or similar facts from multiple sources. This is opposed to collecting different facts from multiple sources. Triangulation in this study is achieved through conducting similar interviews with various people from the same organization and collecting documentation including contracts or service level agreements, data flow diagrams, annual reports, etc. Table 4.2 lists the data sources.

Table 4.2: Sources of data

Source	Data
Semi-structured interviews conducted with operational and strategic management including IT executives	<ul style="list-style-type: none"> - The dependence and types of trust - The various types of investments made in the past and currently being made - The IOS support and capabilities - General relationship context
Company documents (including data-flow diagrams)	<ul style="list-style-type: none"> - The various types of investments made in the past and currently being made - The IOS support and capabilities - General relationship context
Public published information (including annual reports)	<ul style="list-style-type: none"> - The dependence structure specifically within the relationship and generally within the industry - General relationship context

4.4.2 The measurement instrument

The semi-structured interviews are conducted based on a measurement instrument (questionnaire), which aims at measuring the constructs of the theoretical model. The operationalization of the constructs enables the accurate demonstration of how values are measured and determined (Verschuren & Doorewaard, 1999). To acquire the desired level of detail that enables the measurement of the conceptual model, the theoretical constructs are converted into operational variables (Bacharach, 1989) and these variables are converted into a number of measurable indicators (Segers & Hagenaaars, 1990). The indicators are the most concrete level of detail of the constructs and are therefore the basis for constructing the measurement instrument. The variables and indicators are developed using definitions and existing operationalizations found in the literature (table 4.3).

The operational description of the constructs conveys the relationship between the related variables (Zmud & Boynton, 1991). The value of the constructs is determined based on the values of the related variables. Similarly, the values of the variables are determined based on the values of the related indicators. Due to the existence of diverse dimensions of indicators that need to be combined to determine the values of variables, a uniform scale is used. A five-point Likert scale is chosen because it is possible to apply an order in the measurement of all indicators; the intervals, however, are not consistently equal.

Table 4.3: The operationalization of the constructs

Construct	Variables	Number of indicators	References
Interorganizational trust	Competence	2	Hart & Saunders (1998) Mishra (1996)
	Reliability	3	
	Openness	2	
	Caring	1	
Interorganizational dependence	Utility	3	Cox et al. (2002)
	Substitutability	2	
Relationship specificity of IOS-related resources	Physical IOS related resources	2	Nooteboom, & Noorderhaven (1997). Subramani (2004).
	Human-based IOS related resources	2	
	Business-process-IOS related resources	3	
	Domain-knowledge-IOS related resources	3	
IOS Capabilities	Process-based capabilities	4	Subramani & Henderson (1999)
	Knowledge-based capabilities	4	
Strategic benefits	Strategic benefits	5	Subramani & Henderson (1999) Malhotra, Gosain & El Sawy (2005)

The operational descriptions of the constructs and variables, the classification of the indicators and the scales employed can be found in appendix A. The constructs, variables and indicators are labeled with a four-digit code to simplify and clarify the associations. The questionnaire used in the semi-

structured interviews can be found in appendix B. Table 4.4 presents a brief summary of the case-study protocol.

Table 4.4: Case study protocol

Step	Activity	Measures
Getting Started	Research objectives and research questions	Section 1.4
	Possible a priori constructs	Figure 3.2 and section 3.4
	Theory or propositions	Figure 3.2 and section 3.5
Selecting cases	Specified population	Dyadic interorganizational relationships that use IOSs
	Theoretical, not random sampling	Focus on interesting cases
Crafting instruments and protocols	Multiple data collection methods	Semi-structured interviews and documentation
	Qualitative data	Focus on qualitative reasoning
Entering the field	Overlap data collection and analysis	Conducting interviews, reading documents and interpreting data at the same time
	Flexible and opportunistic data collection	Interested companies are included
Analyzing data	Within-case analysis	Evaluating constructs and preliminary proposition evaluation
	Cross-case pattern search using divergent techniques	Elucidate similarities and differences between cases
Shaping hypotheses	Iterative tabulation of evidence for each construct	Data is compared for each case and multiple cases
	Replication, not sampling, logic across cases	Analyzing differences between cases
	Search evidence for “why” behind relationships	Explanation building
Enfolding literature	Comparison with conflicting literature	All the time
Reaching closure	Theoretical saturation when possible	When the insights from cases and (modified) theory do not conflict with cases.

4.5 Field study research design

Field studies are “non-experimental inquiries occurring in natural systems” (Boudreau et al., 2001). A field study facilitates the collection of a relatively large sample of data, i.e. quantitative data. The data collection techniques can include surveys, coded interviews or a variety of other techniques (Rossi &

Wright, 1983). The measurement of quantifiable constructs and variables through such techniques results in large amounts of data, which allows for more rigorous testing and validation of hypotheses and theories (Attewell et al., 1991).

The objective of employing a field study is to allow for rigorous testing of the theoretical causal relationships between the constructs. The concepts of interest are highly intangible in nature and, like most constructs in social research, not directly visible. The measurement of such abstract concepts can be complicated because established measures are often not available (DeVellis, 1991). Such constructs can be measured through constructing customized scales and employing field study research to collect data from a large sample of respondents (DeVellis, 1991). Such data can subsequently be analyzed using statistical tools to determine the accuracy and reliability of the scales and to test the hypothesized relationships between the constructs.

4.5.1 Data collection

The data is collected through a web survey. The sample frame of the survey contains Internet shops based in the Netherlands that sell computer-related products. The questionnaire focuses on their relationship with their transportation companies. These relationships are attractive for this study due to the extensive need for timely and reliable information and reliance on ICT (Vaidyanathan 2005). The geographic location of the Netherlands provides the Dutch transportation industry the prospect of facilitating transportation and distribution to the European mainland, and increased reliance on ICT is subsequently expected to achieve timely communications across long distances. The increased reliance on ICT is favorable in the context of this study.

A major disadvantage of survey employment is the typical low response rate. Dillman (1978; 1999) applies social exchange theory to increase response and reliability of response in survey research. He perceives the process of sending questionnaires to potential respondents, who complete the questionnaire and return it, as a case of social exchange. The theory implies that the actions of individuals are motivated by the return these actions are expected to bring from others (Blau, 1964; Dillman, 1978; Gallegos, 1974; Goyder, 1987). A person is more likely to answer a questionnaire when his perceived costs are lower, his perceived rewards are higher and he trusts that the expected rewards are likely to be delivered. To minimize the social costs for respondents in this particular

survey, the questions are formulated in a clear and concise way and the entire questionnaire takes an average of ten minutes to complete. Social rewards are provided by expressing gratitude and offering the possibility of filling out a separate form in order to acquire a summary of the findings and, if they choose, to receive a benchmark of their answers with those from the entire sample. Trust is established by the use of the university's name and logo. Non-response bias is examined through determining a cut-off-date for the first batch of responses and comparing the results from the second batch.

4.5.2 The measurement instrument

A survey instrument is developed for respondents. The questions in the survey consist of operationalizations of the constructs of the theoretical model. Similar to the case study approach, the survey uses the indicators described in appendix A. The items are obtained by converting the theoretical constructs through operational variables into indicators. These were consequently adapted for the context of interorganizational relationships between Internet shops and transportation companies. To ensure content validity, Lawshe's (1975) quantitative approach is employed by asking a panel (including nine experts in the transportation industry) to indicate whether or not a measurement item (i.e. a question in the survey) within a set of other measurement items is "essential" to the operationalization of each theoretical construct. The items are included when six or more experts indicated that it was indeed essential. Subsequently, a pretest under 20 companies is conducted to observe the reactions of respondents to the questionnaire under realistic conditions. The survey questionnaire can be found in appendix C.

4.6 Chapter Summary

This chapter described the case study research design and the field study research design. The discussion justified the preference for multiple case study research method and the choice of the interorganizational relationships chosen. Data collection methods, sources and instrumentation are described. The choice for a web survey within the field study is justified. A description is provided of the sample frame and the questions included. The next chapter provides a general assessment of the conceptual model.

Chapter 5 Conceptual model assessment

5.1 Introduction

Chapter 3 presented the conceptual model and provided an overview of the propositions and hypotheses. This chapter makes a general assessment of the conceptual model. The objective is to test the general reasoning that higher levels of interorganizational trust and dependence would lead to increased benefits through higher relationship-specificity of the IOS related resources and the subsequent development of IOS capabilities. The assessment will be done using the Structural Equation Modeling (SEM) technique and relying on the data from the quantitative field study discussed in chapter 4.

The next section applies structural equations modeling to the conceptual model. Section 5.3 discusses the empirical data that is used to conduct the analysis. Sections 5.4 and 5.5 present the results of the analysis and their interpretation. Finally, a summary of this chapter is provided.

5.2 Conceptual model and Structural Equations Modeling (SEM)

Within the conceptual model, proposition 1 argues that various types of trust stimulate the employment of different types of IOS-related resources. Proposition 2 argues that interorganizational dependence stimulates the employment of all types of IOS-related resources. Proposition 3 argues that the combinations of different types of IOS-related resources will produce IOS capabilities. Finally proposition 4 argues that IOS capabilities positively affect the attainment of relationship objectives¹.

This chapter aims to provide a general assessment of the conceptual model. Structural Equations Modeling (SEM) is employed to test the statistical conclusion validity (Cook et al., 1979). SEM estimates multiple separate, but interdependent, multiple regression equations. Accordingly, SEM enables the

¹ Proposition 4 refers to strategic benefits. The construct Benefits within the model of this chapter includes the indicators of strategic benefits as well as operational benefits. This is done for the sake of comprehensiveness. Chapter 9 and appendix D discuss each type of benefits separately and show that IOS capabilities have similar influences on both types of benefits.

testing of the conceptual model in a single, systematic and comprehensive analysis by modeling the relationships among multiple independent and dependent constructs simultaneously (Gefen et al., 2000). SEM also allows for incorporating latent constructs and manifest variables into the analysis (Hair et al., 1998). A latent construct is an unobserved hypothesized concept that can only be approximated through measurable values. Manifest variables are determined through data collection methods, such as surveys, from respondents. The distinction between latent constructs and manifest variables is beneficial for this study because it resembles the distinction between constructs, variables and indicators in appendix A. SEM assesses the assumed causation among the set of dependent and independent constructs, i.e. structural model, and the loadings of the indicators on their expected constructs, i.e. measurement model. The constructs of the conceptual model are the latent constructs and for each of these latent constructs, a number of indicators are used (appendix A). The proposed conceptual model is depicted in figure 5.1.

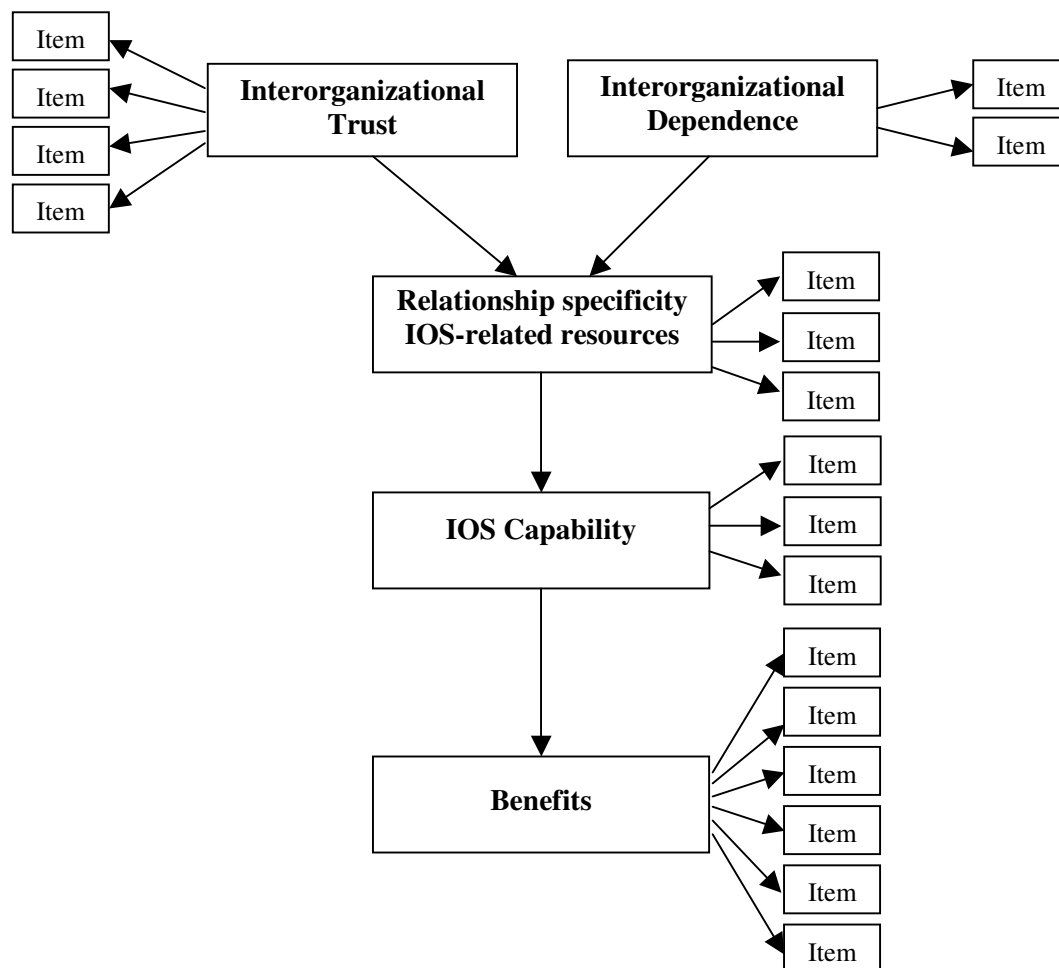


Figure 5.1: Structural Equations Model

5.3 Data and method

The data used to test the conceptual model are gathered by way of web survey. The sample of the survey contains Internet shops offering ICT products within the Netherlands. The methodology of data collection is discussed in chapter four. The number of valid responses is 137 out of 2970 organizations contacted (5 percent response rate).

The respondents were requested to fill in additional data to evaluate their suitability to fill in the survey. The time they have been working for the organization was registered to assess their experience in the present organization. The average experience of respondents is four years and six months. To assess the respondents' experience regarding the particular relationship with the transportation company, they were questioned regarding the total time they have been involved in communications with the particular transportation company. The average time of that experience is two years and ten months.

LISREL (linear structural relationships) is used as a SEM technique because it has particular advantages over other techniques for this research. In the process of estimating the significance level and coefficients of the paths, LISREL reckons with all of the covariance in the data and therefore permits the assessment of all the correlations, shared variance, paths within the model and unidimensionality (Bollen, 1989; Gefen, 2003). LISREL is a SEM technique and accordingly in its general form, it consists of two parts: the measurement model and the structural equation model. The measurement model identifies the relations between the observed measures, i.e. indicators, and their underlying latent constructs. The structural equation model identifies the causal relations between the constructs as put forward by the underlying theory. LISREL provides the opportunity to calculate the maximum likelihood estimates for both models, the measurement model and the structural equation model, simultaneously. However, it is recommended that the measurement model is calculated and fixed before the structural model is estimated (Gerbing & Anderson, 1988; Segars & Grover, 1993). Our study follows this two-stage approach. The findings from these stages can collectively aid in assessing the proposed framework.

The first stage comprises the calculation of the measurement model by conducting LISREL confirmatory analysis (CFA) using maximum likelihood estimation. This enables the evaluation of the convergent and discriminant validity. Compared with LISREL, other methods (such as OLS regression and ANOVA, also referred to as first generation regression models) can produce different outcomes regarding the measurement properties of indicators. The first-generation methods can yield erroneous outcomes regarding the relationships between the latent variables. The methods allow for results that contradict the theory to be ascribed to measurement confounds (Gefen, 2003; Segars et al., 1993). Segars et al. (1993) show how CFA can detect problems in measurement that go undetected when traditional approaches are used.

Some of the guidelines of Anderson et al. (1988) and Gerbing et al. (1988) are followed during the development and evaluation of the measurement model. The measurement model is initially composed of all the indicators loading only to the constructs as discussed in appendix A. The measurement model is subsequently revised by dropping indicators that shared high residual variances with other items. The high residuals between indicators imply that their intercorrelations are not well-modelled and that they do not converge with other indicators to explain the latent construct. The modifications (i.e. dropping of indicators) are done one at a time because each change can affect other parts of the model. Every dropped indicator is cautiously checked to ensure that its residual variance also made sense from a theoretical perspective. In addition, the measurement model is assessed using several measures.

The second stage involves testing the propositions of the conceptual model by means of examining the structural model. Several measures are used to determine the overall fit of the proposed model with the actual data. These measures can be used to assess both the measurement model and the structural model. However, the threshold values differ for each type of model. The first measure is the maximum likelihood chi-square statistic which is considered as a fundamental measure of the overall fit. A small value of the chi-square relative to the degrees of freedom indicates a better fit. The test is between actual and predicted matrices; the aim is therefore to achieve a small value indicating small nonsignificant differences. The statistical nonsignificance does not secure that the correct model is detected but only that observed covariances and correlations fit with the proposed model. LISREL also provides the goodness-of-fit index (GIF). It is nonstatistical measure that can range from 0 to 1. GIF represents the overall degree of fit and is calculated by comparing the

squared residuals from a prediction with the actual data. The degrees of freedom are not adjusted for, however. A higher value implies a better fit. The adjusted goodness-of-fit index (AGFI) is the extension of GFI, and it adjusts for the degrees of freedom. Another measure is the comparative fit index (CFI). It represents a comparison between the estimated model and null. The advantage of CFI is that it is not affected by sample size. Values of CFI lie between 0 and 1.0 as well. Values close to 1.0 indicate a good fit. Lisrel also provides residual measures such as the root mean squared residual (RMR) and the root mean squared error of approximation (RMSEA). Smaller values of RMR and RMSEA are better. SEM is based on the goodness of fit between the sample data and the proposed model. Accordingly, smaller values of residuals imply better model fit.

5.4 Results

As discussed earlier, the measurement model is modified by removing indicators that share a high amount of residual variance with other indicators according to the standard LISREL methodology advocated by Gefen et al. (2000) and Anderson et al. (1988). The loadings of the remaining indicators and their statistical significance are shown in table 5.1. The table also presents descriptive statistics of the items. All items are measured on five-point Likert scales and some items include a sixth choice indicating the non-applicability of the item to the particular respondent. The normality of the measurements is assessed by examining the skewness and kurtosis. Skewness in the range of 2.00 to 3.00 and kurtosis in the range 7.00 to 21.00 indicate the existence of moderate nonnormality. Skewness above 3.00 and kurtosis above 21.00 indicate extreme nonnormality. The skewness and kurtosis of the indicators are provided in table 5.1. The skewness ranges between -1.044 and 1.324 , and the kurtosis ranges between -1.275 and 0.804 . Therefore, it is likely that the indicators approximate normality.

The measurement model is also assessed using the multiple measures discussed in the previous section. The chi-squared is 131.59 with 125 degrees of freedom yielding a p-value of 0.33. The GFI at 0.91, AGFI at 0.88, CFI at 0.99, RMR at 0.05 and the RMSEA at 0.0 are all within acceptable limits for CFA. Only the NFI at 0.88 is slightly outside the benchmarks. It can be adjusted to be within the benchmarks, but that would mean dropping items (Gerbing et al., 1988) and would jeopardize content validity.

Discriminant validity between the constructs is additionally verified by comparing two models: in one of them the correlations between the constructs are allowed to correlated freely, and in the other, the correlations are fixed at 1. A high difference in the chi-square, GFI and CFI values indicates strong evidence of discriminant validity (Byrne, 1998). The difference between the two models for chi-square is 200.94, for GFI is 0.12 and for CFI is 0.18. The high differences indicate the existence of discriminant validity between constructs.

Table 5.1: Composite construct reliabilities, indicator loadings and descriptive statistics

Construct: Interorganizational trust						
Reliability: 0.83						
Items	Standardized loading	t-value	Mean	St. Dev.	Skewness	Kurtosis
1	0.79	10.14	3.77	1.12	-0.822	-0.72
2	0.74	9.35	3.53	1.06	-0.587	-0.163
3	0.68	8.4	3.46	1.26	-0.367	-1.052
4	0.77	9.92	3.9	1.02	-1.044	0.804
Construct: Interorganizational dependence						
Reliability: 0.36						
Items	Standardized loading	t-value	Mean	St. Dev.	Skewness	Kurtosis
1	0.28	4.17	3.23	1.01	-0.382	0.199
2	4.17	8.4	3.05	1.07	-0.177	-0.414
Construct: Relationship-specificity of IOS-related resources						
Reliability: 0.63						
Items	Standardized loading	t-value	Mean	St. Dev.	Skewness	Kurtosis
1	0.61	5.55	2.35	1.54	0.589	-1.252
2	0.77	6.43	2.58	1.97	0.787	-1.034
3	0.4	3.91	2.10	1.47	1.324	0.802
Construct: IOS capabilities						
Reliability: 0.82						
Items	Standardized loading	t-value	Mean	St. Dev.	Skewness	Kurtosis
1	0.64	7.8	2.03	1.25	0.988	-0.114
2	0.78	9.82	1.88	1.04	1.064	0.570
3	0.88	11.34	1.72	0.95	0.961	-0.425
Construct: Benefits						
Reliability: 0.92						
Items	Standardized loading	t-value	Mean	St. Dev.	Skewness	Kurtosis
1	0.69	8.93	2.96	1.42	-0.075	-1.275
2	0.81	11.21	2.63	1.37	0.214	-1.086
3	0.85	12.10	2.58	1.28	0.198	-0.923
4	0.82	11.38	2.82	1.46	0.091	-1.306
5	0.84	11.94	2.87	1.43	0.020	-1.269
6	0.83	11.59	3.36	1.35	-0.423	-0.905

Next, all of the hypothesized propositions are simultaneously tested by means of examining the structural model. The structural model is examined based on the results of the cleansed measurement model. The fit measures are acceptable: The chi-squared is 148.60 with 143 degrees of freedom yielding a p-value of 0.36. The GFI is at 0.90, the AGFI at 0.88, the CFI at 0.99, the RMR at 0.072 and the RMSEA at 0.0. Only the NFI at 0.87 is slightly outside the benchmark. These indicators imply that the empirical data to some extent correspond with the predictions of the theoretical model. Table 5.2 presents information regarding the estimated causal paths and the quality of the model. The implications of the results are discussed in the next section.

Table 5.2: Estimated paths and model fit indicators

	Estimated path	t-value
Interorganizational dependence \Rightarrow Specificity IOS-related resources	0.49	1.05
Interorganizational trust \Rightarrow Specificity IOS-related resources	-0.44	-1.17
Specificity IOS-related resources \Rightarrow IOS capabilities	0.30	2.63
IOS capabilities \Rightarrow Benefits	0.43	3.66
Chi-squared = 148.60, df = 143, p-value = 0.36		
Stand. RMR = 0.072		
RMSEA = 0.0		
GFI = 0.90		
NFI = 0.87, CFI = 0.99, IFI = 0.99		

5.5 Discussion

Many issues can influence the degree of acquiring benefits from IOSs. This study focuses on the indirect influences of trust and dependence on benefits through the employment of relationship-specific IOS-related resources and the development of IOS capabilities. The underlying foundations of this conceptual model are as follows: (1) higher interorganizational trust and dependence increase the use of resources with high relationship-specificity and (2) resources with high relationship-specificity support the development of IOS capabilities that yield benefits. The data provides evidence that dependence influences the use of relationship-specific resources. This corresponds to the insights found in the literature (Cox et al., 2002; Pfeffer et al., 1978). However, interorganizational trust was found to diminish the use of relationship-specific resources. This result contradicts the mainstream of theories in the literature arguing that higher trust increases relationship-specific investments and consequently the use of such assets (Karahannas et al., 1999; Nooteboom, 2002). A very likely explanation can be found by taking into account the

existence of high dependence and conceivably a coercive attitude of transportation companies. This is specific to the context of relationships between Internet shops and transportation companies and hence the results are not generalizable. Furthermore, coercive attitude can have negative influences on trust (Hart et al., 1997). This is not further investigated as the relationship between dependence and trust is beyond the boundaries of this study. The results also reveal that relationship-specific IOS resources have a minor influence on the development of IOS capabilities. A more significant influence was expected. The discrepancy could be explained by taking into account the fact that the LISREL model did not distinguish between various types of resources and capabilities. Therefore, the path coefficient (representing the influences of the relationship-specificity of IOS resources on capabilities) is not accurate and possibly could be improved by distinguishing between various types of resources and capabilities. The conceptual model also predicted a positive impact of the existence of IOS capabilities on the achievement of benefits from the relationship. The results confirm the theoretical prediction in this aspect.

The divergence between the predictions of the conceptual model and the empirical data reveal intriguing opportunities for this research. The following chapters will aim at scrutinizing separately each of the causal relationships between the theoretical constructs. The qualitative data acquired through the case studies will be incorporated to complement the quantitative analysis.

5.6 Chapter summary

This chapter presented a general assessment of the conceptual model. The goodness-of-fit measures indicate that the model has good acceptance, although not all of the predicted causal relationships between the constructs were confirmed. The following chapters will try to resolve these issues by focusing separately on each part of the conceptual model. Chapter 7 will focus on the influences of interorganizational trust on IOS-related resources. Chapter 8 will focus on the interactions between interorganizational dependence and trust. Chapter 9 will focus on the development of IOS capabilities, and chapter 10 will focus on how these capabilities support the achievement of benefits.

Chapter 6 Trust and IOS-related resources

6.1 Introduction

Chapter 5 presented a general assessment of the conceptual model. The model was corroborated, but not all of the predicted causal relationships between the constructs were confirmed. This chapter and the three subsequent chapters present a more in-depth analysis by testing the hypotheses related to each proposition. The objective is to acquire a more accurate understanding by testing the relationships at the variable level -- in contrast to the construct level, which was done in chapter 5. As Bacharach (1989) argued, the falsifiability of theories is dependent on rigorous hypothesis testing, and this is realized by solid measures of the variables.

This chapter focuses on the different types of trust and their specific influences on the various types of IOS-related resources. Section 6.2 presents the theoretical background that is used to develop the hypotheses. The section complements the literature discussed in chapter 2. Section 6.3 presents the data used to test the hypotheses. Section 6.4 discusses an additional case study involving caring-based trust. Section 6.5 discusses the results and their implications. Section 6.6 summarizes this chapter.

6.2 Theoretical background and hypotheses

The studies on trust and interorganizational relationships can often be put into one of two distinct research areas. The first area investigates antecedents and types of trust (Mayer et al., 1995; Sako, 1998). The other area investigates the influences and consequences of trust (Hart et al., 1997; Zaheer et al., 1998). This study combines both areas by distinguishing different types of trust and studying their influences. This section presents a brief literature review of each area and discusses a number of studies that are relevant for our study.

In the distinction between different types of trust, researchers typically combine various disciplines including psychology, sociology and economics. The ample attention from the various disciplines and the complex nature of trust have resulted in diverse interpretations. Dwyer, Schurr and Oh (1987) argue that

interorganizational relationships evolve through five phases, each of which represents a major transition in the way in which parties regard each other.

1. Awareness refers to the recognition that another specific organization is a feasible exchange partner. In this phase, no interaction between the organizations occurs, although each organization may unilaterally position and posture itself to enhance its own attractiveness to a potential business partner.
2. Exploration occurs when potential business partners consider obligations, benefits, burdens and the possibility of exchange. In this phase, partners explore through search and trial. This stage is conceptualized in subprocesses including attraction, communication and bargaining, development and exercise of power, norm development, and expectation development.
3. Expansion refers to the persistent increase in benefits acquired through the relationship and to the increasing interdependence of the business partners. The five subprocesses of the exploration phase occur as well in this stage. The distinction is that joint satisfactions instituted in the previous phase now lead to increased risk taking. Consequently, the range and depth of the mutual dependence increases.
4. Commitment occurs when an implicit or explicit pledge of relational continuity between business partners takes place. The parties should invest significant economic, communication, or other resources into the relationship. The association needs to have some durability over time. The business partners ought to be consistent in their inputs to the association to be able to fulfill each other's expectations.
5. Dissolution refers to the withdrawal or disengagement from the relationship. It is argued that dissolution can occur at any phase. Although termination can be due to various reasons and can have diverse consequences, such issues are not explicitly discussed in their model.

Doney and Cannon (1997) define five trust-building processes that illustrate how trust of a selling organization is established with a buyer organization within an industrial context.

1. Calculative process refers to the calculations of the costs and benefits of a business partner acting in an untrustworthy manner.
2. Predictive process refers to the development of confidence in a business partner's behavior. This occurs through repeated and broader experience with the business partner.

3. Capability process pertains to the evaluation of the ability of the business partner to fulfill its promises and obligations. The focus is on credible evidence of the ability of the business partner.
4. Intentionality process includes evaluating the motivations of the business partner. The focus is on the interpretation of the words and behavior of the business partner.
5. Transference process encompasses the use of proof sources from which trust is transferred to the business partner. The business partner can gain trust through reputation, recommendation or other attributes earned through relationships with other parties.

Mayer, Davis and Schoorman (1995) present a model that considers the characteristics of the trustor as well as the trustee. The trustor's propensity to trust is argued to be a stable factor across various relationships. The propensity affects the likelihood that an actor trusts other actors. It can be thought of as a general willingness to trust. The propensity can differ depending on the experiences, traits and cultural background. Additionally, the model distinguishes three factors of perceived trustworthiness of the trustee (business partner): ability, benevolence and integrity.

1. Ability is the group of skills, competencies and characteristics that enable an actor to have influence within some specific domain. The domain of the ability is specific because it is related to the skills mastered by the actor, as it may be highly competent in some area and not at all in other areas. Ability is related to the cognitive dimension of trust.
2. Benevolence is the degree to which the actor, i.e. trustee, is believed to have care, concern, and willingness to do good to the trustor. For this benevolence to exist alongside the drive for egocentric profit, there is a need for similar, not conflicting, compatible goals between both actors.
3. Integrity refers to obedience to a set of principles by the trustee that renders it dependable and reliable, according to the trustor. The set of principles needs to be acceptable to both parties. This is because an actor who is committed solely to an unacceptable principle (profit seeking at all costs for example) would not be judged high in integrity by the other actor.

Hart and Saunders (1997) follow Mishra (1996) in distinguishing several dimensions of trustworthiness. Trust is perceived as the willingness to be

vulnerable to another business partner, based on the belief that the latter party is competent, open, caring and reliable.

1. Competence refers to the ability of the business partner. The credibility of the business partner improves with competent behavior. Also the ability to interpret information properly and in this to manner support correct and precise decision-making improves the perception of competence.
2. Openness is based on the willingness of the business partner to listen and share information as opposed to controlling the situation and withholding information. The honesty heightens the willingness to improve the relationship; effective changes in the behavior of the business partner are based on honesty.
3. Caring refers to the belief that the business partner will refrain from taking unfair advantage when the opportunity arises. This can occur when the partner makes open-ended commitments to take initiatives for mutual benefit.
4. Reliability refers to the consistency of expected behavior based on the promises of the business partner. Reliability is developed through the accumulation of interactions, specific incidents, problems and events.

Sako (1992; 1998) draws upon transaction cost economics, relational contract theory, sociological approaches to networks and management strategy. She defines trust as an expectation held by an actor that its trading partner will behave in a mutually acceptable manner. The expectation reduces the pool of possible actions and accordingly reduces uncertainty regarding the partner's actions. Three types of trust are distinguished:

1. Contractual trust, which requires a shared moral norm of honesty and promise keeping.
2. Competence trust, which necessitates a shared understanding of professional conduct and technical and managerial standards.
3. Goodwill trust, which is present only when there is a consensus on the principle of fairness, i.e. when the other organization makes an open-ended commitment to take initiatives for mutual benefit while refraining from taking unfair advantage.

All three types require the lack of opportunistic action of the partner as a precondition. Nonetheless, a shift from contractual trust to goodwill trust is argued to necessitate a gradual expansion in the resemblance in beliefs about what is acceptable behavior.

As for the influences of interorganizational trust, prior studies frequently argue that trust operates as a positive source within relations (Currall et al., 2002; Nooteboom, 2004). The influences of trust are complicated by the multiple types discussed previously and the effects of multiple levels (e.g. interpersonal trust (Zaheer et al., 1998) or institutional trust (Pavlou et al., 2003)). Currall and Inkpen (2002) define trust as the “decision to rely on another party (i.e. person, group or firm) under a condition of risk.” Reliance refers to the willingness of a trustor to increase his or her vulnerability to the trustee whose behavior is not under one’s control (Zand, 1972). Risk encompasses the possibility that the trustor will encounter negative outcomes, if the trustee is untrustworthy. Consequently, risk creates a prospect for trust to develop (Rousseau et al., 1998). From this perspective, the measurement of trust has to capture the trustor’s decision to rely on another; trust is consequently seen as an action (Nooteboom et al., 1997).

Research incorporating transaction cost economics usually argues that trust leads to lower transaction costs and is a precursor to the decision to cooperation (Nooteboom, 2004; Williamson, 1975). A higher degree of trust *ex ante* decreases time and efforts spent to bargain and formulate contracts because the business partners are certain that benefits will be fairly divided. Due to trust, business partners do not need to anticipate all future contingencies because adequate adjustments can be made when conditions change. *Ex post*, higher degree of trust can reduce monitoring and enforcement costs due to multiple reasons. The business partners waste fewer resources on monitoring the outcomes of the contract because each partner is convinced that the other will not act opportunistically. If problems occur, a higher degree of trust can reduce the time and resources spent on bargaining and negotiations. A higher degree of trust in the partner organizations entails that it is assumed to be acting in good faith; behaviors are accordingly interpreted more positively (Hill, 1995).

A higher degree of trust is also argued to increase information sharing across organizations. It is expected that the partner organization will be honest; the focal organization will therefore be more willing to communicate sensitive or confidential information such as design issues or production costs (Dyer et al., 2003). The sharing of such information could elicit opportunistic behavior such as sharing the information with the business partner’s competitors or trying to obtain the business partner’s profit margins. Therefore, a higher degree of trust is argued to increase information sharing. A low degree of trust is argued to

trigger the business partner to hold back potentially relevant information that could reveal weaknesses in its products or services. A high degree of trust is also argued to result in voice (i.e. solving the problem cooperatively) rather than exit (i.e. ending the relationship) (Helper, 1991).

The hypotheses pertain to the different types of trust distinguished by Mishra (1996): competence, reliability and openness. Trust based on competence requires a shared understanding of professional conduct and technical and managerial standards. It is based on the perception that the other organization is knowledgeable in a particular domain and maintains a certain level of competence leading to a specific level of standards. Consequently, it is justifiable for the focal organization to rely on the processes performed by the other organization. Moreover, specialization benefits provide various additional benefits such as decreased costs and confirm justifying the reliance on the processes of a more competent organization (Douma et al., 1998). The reliance can be realized by interlinking the processes of the focal organization with the business partner. Interlinking processes entails that the sequence of operations across organizations is shared. According to the needs of the relationship, this can increase the customization of the processes and related communications. Therefore, a higher degree of trust based on competence is argued to increase the relationship-specificity of the IOS-related processes within the focal organization. Alongside the processes, the focal organization may conduct actions to benefit from the relationship with its competent partner. As the actions are performed by employees to coordinate activities (Zaheer et al., 1998), it is expected that a higher degree of trust based on competence can lead to a higher degree of relationship specificity of human-based IOS-related resources. The tight communications with a competent partner demands adjustments and active pursuits from employees to capitalize the potential advantages. These adjustments can vary from informal acquaintances to periodic meetings to discuss new opportunities (Lamb, 2003). Trust mainly based on reliability is related to the extent to which an organization can depend upon and have confidence in the actions of the other actor. A high degree of reliability motivates the focal organization to depend on the actions of the partner to take advantage of possibilities such as just-in-time delivery and agile manufacturing. This can be achieved by interlinking the processes leading to a higher degree of relationship specificity of business-processes and human-based IOS-related resources (Ekerling, 2000). Openness-based trust has an important role in motivating knowledge sharing (Sharratt et al. 2003). If the other actor is perceived to be honest, the willingness to share knowledge is

likely to be greater. To be effective, the sharing of knowledge inherently results in embracing the knowledge of the other organization (Nooteboom, 2002). This increases the relationship-specificity of domain-knowledge IOS-related resources of the focal organization. Moreover, the sharing of knowledge has to be realized by humans. Therefore openness-based trust is also expected to lead to a higher degree of relationship specificity of human-based IOS-related resources. Accordingly, the hypotheses are as follows:

Hypothesis 1a. *competence-based trust* positively affects the use of *business-process* IOS-related resources with high relationship specificity.

Hypothesis 1b. *competence-based trust* positively affects the use of *human-based* IOS-related resources with high relationship specificity.

Hypothesis 1c. *reliability-based trust* positively affects the use of *business-process* IOS-related resources with high relationship specificity.

Hypothesis 1d. *reliability-based trust* positively affects the use of *human-based* IOS-related resources with high relationship specificity.

Hypothesis 1e. *openness-based trust* positively affects the use of *domain-knowledge* IOS-related resources with high relationship specificity.

Hypothesis 1f. *openness-based trust* positively affects the use of *human-based* IOS-related resources with high relationship specificity.

No hypotheses are incorporated regarding the impact of caring-based trust because the impact of that type of trust is ambiguous (Hart et al. 1997; Nooteboom 2002). The caring of one actor towards another can have various foundations and thus have distinctive influences. A general caring for the well being of fellow human beings is different from the caring for a particular human being -- although both types can effect each other. Moreover, there are other types of caring. Investigating the influences of caring would require excavating issues that are outside the main focus of this study.

6.3 Data and Results

The hypotheses are tested using the case study method. The general design was discussed in chapter four. This section presents a brief motivation for using the case study method. This is followed by a description of each case, illustrating

its context, a summary of the collected data and an evaluation of the extent to which the data support the hypotheses.

The case study method facilitates greater understanding of the rich context of the phenomenon under investigation. This makes case studies more suitable for intensive research, including this, where interorganizational trust is investigated in-depth. As trust is perceived as an attitude, the in-depth analysis is needed because other forces beside trust can guide external behavior. Discussing the motivation of the managers and personnel within extended interviews is an effective method that allows the researcher to explore the experiences of the people involved. As explained in chapter four, the weberian approach suits this study because adequacy in the level of meaning is needed to investigate attitudinal trust.

To test the hypotheses, the study incorporates multiple case studies according to the theoretical replication logic: each case is carefully selected so that it “predicts contrasting results but for predictable reasons” (Yin, 2003). Corresponding with the four types of trust, four interorganizational relationships are selected. This section discusses three case studies involving the three types of trust that are incorporated in the conceptual model. The fourth case study, which involves caring-based trust, is discussed in section 6.4. The aspiration for all case studies is to collect data from both sides of the dyad. The analysis for each case study is therefore conducted from two sides. Each case study will now be described briefly².

The relationship between Global Automation Companion and Integrated Logistics

Global Automation Companion (GAC) is a large globally operating industrial automation company based in the US. It has two main operating divisions (control systems and power systems). The Control Systems division is the largest operating division, with sales exceeding \$ 3.5 billion. This division supplies a broad product portfolio consisting of industrial automation products, systems and services that aid their customers in controlling and improving manufacturing processes. The major products include power control and motor management products, processors, input/output devices and multi-vendor automation and information systems. The main competitors of GAC in this area include Siemens, General Electric Company and Mitsubishi. Sales of the Power

² Fictitious firm names are used for all relationships.

Systems division exceed \$ 600 million, and the division's main products include motor breaks, couplings and industrial and engineered motors. The case study focuses on the relationship between the Control Systems division and Integrated Logistics, which manages the storage process of the products designated for Europe, the Middle East and Africa (EMEA). The sales offices of GAC are scattered throughout the EMEA region. Product sales occur through a blend of direct sales, sales through distributors and system integrators.

Integrated Logistics is a subsidiary of a Dutch logistics group of companies. The services of Integrated Logistics include mainly the integration of different types of carriage and logistics and value chain services. Their strategy is to provide their customers all logistics services needed to operate in the EMEA region. Integrated Logistics has a dedicated warehouse for the storage of GAC products. The activities it provides for GAC are mainly warehousing activities.

The trust of GAC EMEA in Integrated Logistics is high and it is mainly based on the competences of Integrated Logistics. To have a high degree of trust based on competence, the organizations need to have a shared understanding of professional conduct and technical and managerial standards. This shared understanding was initially created by collaborations in building the site, and cultivated through the satisfactory performance of Integrated Logistics during the relationship. GAC has the impression that Integrated Logistics has a satisfactory level of openness because it offers all needed information for a strategic cooperation. As for reliability, GAC is satisfied because they are able to promise their own customers certain services that can only be performed with the support of Integrated Logistics. In fact, reliability is documented in the service level agreement and is defined as the percentage of orders that are issued before 2 pm and are accomplished the same day. A progressive target percentage is set periodically and Integrated Logistics has managed to realize that percentage. On the caring dimension, Integrated Logistics is perceived to be very cooperative. They are willing to radically modify business processes based on the needs of GAC EMEA.

The trust of Integrated Logistics in GAC is high and it is mainly based on competence. The executives at Integrated Logistics are proud to be able to service a large organization that has a good reputation of delivering high quality products and services. They rely on the abilities of GAC to provide different types of support and assistance if needed. Integrated Logistics is also

satisfied by the openness of GAC. They are willing to share information regarding their future strategies and participate in annual strategic meetings to discuss the market trends and tactics. This enables Integrated Logistics to accommodate the prospective actions of GAC. As for the cooperativeness of GAC, this is illustrated by an example provided by an executive of Integrated Logistics regarding the willingness of GAC to drastically modify the way they provide information regarding returned products. Initially, Integrated Logistics was facing problems in the processing of products that were returned by the customers of GAC. The products can be returned for various reasons such as erroneous shipment, malfunctions, or simply because the customers are not satisfied. As returned products cannot simply be added to the inventory, Integrated Logistics faced problems in processing them because the returned products arrived unexpectedly and the reason why the products were returned was not known in time. GAC was willing to adjust the policy for returning products, and now requires from its customers to provide certain information beforehand. That information is subsequently communicated to Integrated Logistics. As for the reliability of GAC, it was clear that a higher reliability towards Integrated Logistics will enable Integrated Logistics to provide better service, which will eventually improve the services of GAC towards its own customers. That's why the reliability of GAC towards Integrated Logistics is high and GAC tries to provide the required information in a consistent way.

Communications are conducted through multiple EDI connections between GAC US and Integrated Logistics. Service orders of GAC EMEA are transferred to GAC US and then to Integrated Logistics. After performing the order, Integrated Logistics sends a confirmation to GAC US. The communications pass through the headquarters in the US because the products stored in the warehouse are property of GAC US and stock modifications need to be processed by the financial systems due to the accounting regulations of Sarbanes-Oxley.

To realize the automated exchange of information, GAC conducted various types of investments in IOS-related resources. Regarding the physical IOS-related resources, GAC made significant investments, but these investments were not relationship-specific. The investments were conducted mainly in the ERP system from PeopleSoft to accommodate the business processes. These adaptations were not relationship-specific to facilitate the relationship with Integrated Logistics but were made to suit GAC's internal business processes. These adaptations resulted in a heavily customized ERP system that made it a

complicated matter to update and upgrade. The investments in human-based IOS-related resources are relationship-specific. The setting of the relationship requires the workforces of both organizations to have frequent intensive communications. This is to ensure correct execution of the varied types of orders under the various conditions depicted by the market. This is exemplified in the cross-dock project that GAC initiated aiming at decreasing the minimum stocking period of products after arrival from the US. Prior to the project, the minimum period was 48 hours and the aim was to reduce it to 24 hours. As all changes in the inventory needed to be updated in both the GAC system based in the US and the IS of Integrated Logistics, the project necessitated the collaboration of logistic executives and IT experts on both sides. The investments in business-processes and domain knowledge were relationship-specific as well. As discussed earlier the operational procedures were intermingled and this necessitated far-reaching adaptations by GAC to facilitate the procedures of Integrated Logistics. The domain knowledge related to stocking and warehousing was also influenced by the relationship with Integrated Logistics. This is logical, as the abilities of GAC EMEA are directly influenced by Integrated Logistics. Therefore, it is important for GAC to have knowledge of the abilities and possibilities of Integrated Logistics.

It could be stated that all investments made by Integrated Logistics are relationship-specific. The warehouse is dedicated to GAC and, all investments are accordingly conducted to facilitate a single relationship. However, this study is interested in studying the extent to which the investments are conducted in specialized resources that are customized for the relationship with GAC. The physical IOS-related resources are highly standardized. The Warehouse Management System used by Integrated Logistics, is also used by other organizations. To facilitate the message exchange, minor adjustments are made to the interface, but these changes are insignificant compared to the costs of the entire system. The human-based IOS-related resources are relationship-specific as the management and employees at different levels are specialized in servicing GAC. This is evident in the frequent meetings that occur between strategic, operational and IT executives of both organizations to discuss the various aspects of the relationship. The operational and administrative procedures are discussed regularly and adjusted according to the requirements of GAC. This is exemplified in the elaborate checks that Integrated Logistics had to go through and procedures they had to adjust in order to fulfill the requirements of Sarbanes-Oxley. The domain-knowledge is also customized and it is specific to GAC. The management of Integrated Logistics needs to

understand the market of GAC in order to be able to provide the service and anticipate the potential changes.

Table 6.1: The values of the variables from the perspective of GAC

Construct	
Trust	High, based mainly on competence
Rel.-Spec. of physical IOS-related resources	Low
Rel.-Spec. of human-based IOS-related resources	High
Rel.-Spec. of business-process IOS-related resources	High
Rel.-Spec. of domain-knowledge IOS-related resources	High

Table 6.2: The values of the variables from the perspective of Integrated Logistics

Construct	
Trust	High, based mainly on competence
Rel.-Spec. of physical IOS-related resources	High
Rel.-Spec. of human-based IOS-related resources	High
Rel.-Spec. of business-process IOS-related resources	High
Rel.-Spec. of domain-knowledge IOS-related resources	High

Hypotheses 1a and 1b are supported by both investigated uni-directional dyads of the case study. The high degree of interorganizational trust based on competence positively affects the use of relationship-specific human-based and business-process IOS-related resources. The competence of Integrated Logistics has increased the confidence of the executives of GAC in the relationship. GAC operates globally and only in the EMEA region do they depend on another organization for their entire warehousing needs. In fact, the high level of competence of Integrated Logistics has led GAC to rely on them for critical stock-related processes. The examples of the cross-dock project and returned products mentioned earlier illustrate critical processes. The process of returning products is related to the handling of complaints of customers. The customers of GAC are mostly large multinational corporations that procure relatively large volumes of the sales: their complaints must therefore be taken seriously. The reliance of GAC on the competence of Integrated Logistics to handle this process is an example that confirms hypothesis 1a.

Adherence to the Sarbanes-Oxley Act by GAC has also impacted Integrated Logistics, as they have to fulfill additional requirements and pass through supplementary audits. The executives of Integrated Logistics are proud that all requirements and audits are fulfilled without problems. However, the fulfillment of the additional requirements entails that the employees and executives of Integrated Logistics have additional commitments towards GAC. This increases the relationship-specificity of the human-based IOS-related resources, and corroborates hypothesis 1b.

The relationship between HighTech and Road Transport Logistics(RTL)

HighTech is a designer and manufacturer of lightweight communication headsets and related accessories for the business and consumer markets. The products are sold through various channels including distributors, OEM's, telephone service providers and retailers. The existing relationships with these organizations are not exclusive; sales can therefore increase or decline rapidly. In the last few years the demand for mobile headsets has increased dramatically. The customer mix of HighTech changed accordingly, making a few OEMs and wireless carriers more important. These particularly large customers have unpredictable ordering patterns because they operate in volatile markets. Hightech's greater reliance on fewer large customers therefore results in increased volatility of revenues and earnings for the organization. The case study focuses on the relationship between HighTech EMEA, the subsidiary of HighTech, and Road Transport Logistics (RTL), a warehousing and logistics provider. HighTech EMEA operates in Europe, the Middle East and Africa and has sales offices scattered throughout these regions. The Dutch office has been assigned a central role in managing and coordinating the activities. The products are manufactured in South America and shipped to the warehouse of RTL. The sales offices have real time information regarding the stock and are expected to provide the customers reliable delivery times.

RTL is an organization that offers warehousing and freight transportation services. It has one partly automated warehouse that serves multiple customers. The transportation services include primarily transportation of incoming freight to and outgoing freight from the warehouse. The incoming freight is usually from the airports of Amsterdam and Brussels or the ports of Rotterdam and Antwerp. The outgoing freight usually heads to business organizations within Europe. RTL offers HighTech some value-added activities such as repackaging and product testing.

The trust of HighTech in RTL is high and it is mainly based on reliability. HighTech demands consistently high performance from RTL because the operations in the entire EMEA region are dependent on the performance of RTL. Therefore, yearly strategic meetings prescribe minimum performance levels for RTL. However, the organization performs much better and the informal expectations are an important aspect of the relationship. These expectations can only be realized because RTL has a competence in the services it provides to HighTech. Consequently, the competence of RTL is assessed as high as well. The openness and caring of RTL are assessed as high because the organization is open and provides all required and even additional information to facilitate the relationship.

Also, the trust of RTL in HighTech is high and it is primarily based on reliability. Reliability is one of the main corporate values of HighTech. Within the entire organization reliability is seen as a principal competitive factor that can aid the organization in achieving success in the volatile market by guaranteeing high quality products and proficient customer service. HighTech tries to perform reliably towards its own raw material and services suppliers. RTL believes that reliability is a key characteristic of HighTech as they are very consistent in their business dealings. The openness of HighTech is considered satisfactory, and not high, because it provides only the necessary information and it does not provide any additional information. The caring of HighTech towards RTL was also satisfactory. HighTech complies with the documented procedures in the contracts as much as possible and does not deviate from these procedures.

Communications are conducted through multiple EDI connections. The Mexican HighTech Headsets plant provides RTL information regarding inbound shipments. The Dutch HighTech Headsets office provides RTL information regarding outbound shipments. The communications are conducted following EDIFACT standard. At the side of HighTech the connectivity is established through an additional tool of the enterprise system that translates messages from and into the EDIFACT standard. As the tool was relatively easy to install and without significant costs, the relationship-specificity of physical IOS-related resources is perceived to be low. The human-based IOS-related resources have a high relationship-specificity, as the middle management and operational management meet periodically to discuss the recent developments. The business-process IOS-related resources also have a high degree of relationship-specificity because almost all processes are related to the stock and

need to be coordinated with RTL. The market of headphones is very vibrant due to the rapid progress and versatile use of headphones. This entails that products and packaging-related processes are modified frequently. HighTech needs to discuss these modifications with RTL, which results in the high relationship-specificity of IOS-related business-processes. However, in the case of HighTech the changes in technology and products do not result in a cumulative knowledge building. HighTech does not need to acquire detailed knowledge about the abilities of RTL because the acquired services are not specialized. Therefore, the domain-knowledge IOS-related resources have low relationship-specificity.

At the side of RTL, the use of EDIFACT also did not lead to relationship-specific investments in physical IOS-related resources. The organization uses an integration tool that transforms the messages to and from EDIFACT. The integration tool does not have significant adoption or maintenance costs. The human-based and business-process IOS-related resources have a high degree of relationship-specificity for the same reasons stated above, i.e. the management at different levels meets periodically and to a large extent the business-processes have an interorganizational nature. The knowledge-based IOS-related resources have a low degree of relationship-specificity because RTL doesn't need to accumulate specific knowledge regarding the products and markets of HighTech.

Table 6.3: The values of the variables from the perspective of HighTech

Construct	
Trust	High, based mainly on reliability
Rel.-Spec. of physical IOS-related resources	Low
Rel.-Spec. of human-based IOS-related resources	High
Rel.-Spec. of business-process IOS-related resources	High
Rel.-Spec. of domain-knowledge IOS-related resources	Low

Table 6.4: The values of the variables from the perspective of Road Transport Logistics

Construct	
Trust	High, based mainly on reliability
Rel.-Spec. of physical IOS-related resources	Low
Rel.-Spec. of human-based IOS-related resources	High
Rel.-Spec. of business-process IOS-related resources	High
Rel.-Spec. of domain-knowledge IOS-related resources	Low

Hypotheses 1c and 1d are supported by both uni-directional dyads investigated in the case study. Reliability is seen to be related to competence, as both organizations require a specific level of ability to be able to consistently perform as expected. The combination of high quality performance and rapid development of new products makes reliability a key characteristic. Every actor should be able to realize its promises in the various conditions of the market. To do that, the processes of each organization are customized according to its business partner and the representatives of both organizations frequently meet to discuss the changing market conditions.

The relationship between Fast Cuisine and Dealer

Fast Cuisine is a member of an international chain of fast-food service retailers. The strategy of the chain is to achieve good growth and attractive returns on a continuous basis. The fast-food industry has as a critical characteristic the standardized nature of the business. For Fast Cuisine, standardization entails decreasing the scope of human judgment and substituting it with technical devices. Fast Cuisine relies extensively on IT to achieve consistency. All devices are well developed to make it reasonably easy to train new employees and make them achieve maximum efficiency in a short time.

Although there is a high level of standardization at the chain level, there are significant differences between the restaurants in terms of the variance in the quantity and assortment of products. The location of a Fast Cuisine restaurant in the center of a small city means that the target customers are mainly shopping people. Therefore, products targeting teenagers and families with children are most frequently sold. The number of guests in the restaurant is difficult to predict because it is dependent on the shopping crowd in the city centre. Except on weekends, which are usually busy, the demand is highly volatile and difficult to predict. The process of food preparation is complex because consistent service needs to be delivered at the various levels of demand (that is the time between ordering and delivery must be minimized). The wastage of products must be minimized as well because it diminishes profits. The production processes within the restaurant and the collaboration with suppliers are therefore essential for the success of operations.

The case study focuses on the relationship between Fast Cuisine and its supplier Dealer. Dealer is a member of a German group of more than 30 organizations specialized in various types of logistics. Dealer is specialized in

delivering food and non-food products to fast-food restaurants, supermarkets and cinema chains. It has one warehouse at a central location in the Netherlands, and more than 20 refrigerated trucks that conduct multiple deliveries daily. To achieve a “one-stop shopping” strategy, Dealer offers a software package and complementary IT support to its customers to facilitate the ordering process.

The trust of Fast Cuisine in Dealer is mainly based on openness. The relationship is founded on shared objectives. When certain targets are not achieved, both sides experience the consequences. For example, failure to deliver on time damages Fast Cuisine because stock could reach critical levels; failure damages Dealer because the planning of consequent deliveries needs to be adjusted. Fast Cuisine assesses the competence and reliability of Dealer according to pre-determined performance criteria. The scanning of product labels is part of the standard delivery procedure and produces sufficient data to assess performance. Such data include percentages of on-time deliveries and erroneous deliveries. The data show that Dealer performs at expected satisfactory levels. Furthermore, Fast Cuisine is convinced that Dealer cares about the interests of the restaurant. The managers can provide various accounts of problems within the relationship that have been resolved through the efforts of Dealer.

The trust of Dealer in Fast Cuisine is also mainly based on openness. There is a high level of information sharing regarding strategic objectives. Each organization has distinctive objectives, but the discussions between executives are aimed at finding joint targets for the short- and long term. These joint targets increase the willingness to be open. On the dimensions of competence and reliability, Dealer assesses Fast Cuisine to be sufficient as well. The chain of Fast Cuisine operates globally in a successful way because they promise their customers consistent high quality service. That kind of service entails that members should have high competence and perform reliably. The level of care of Fast Cuisine towards Dealer was also assessed as sufficient, due to the open communications that engender a common vision towards the future.

The IOS is mainly used for daily ordering and occasionally for historical analysis and future forecasts. Consequently, interorganizational communications mostly comprise the daily orders, which consist of filling in a fixed list of products. These communications are conducted through dial-up connections using existing phone lines. Dealer provides the software to all its

fast-food customer restaurants. Thus, neither Dealer nor Fast Cuisine employs relationship-specific physical IOS-related resources. Specific employees of Fast Cuisine conduct the ordering. These employees needed initial training regarding the processes conducted at Dealer so they can anticipate the actions conducted at Dealer. The specialized knowledge indicates that Fast Cuisine employs relationship-specific knowledge-based IOS-related resources to facilitate the relationship. Dealer conducts investments as well in relationship-specific knowledge-based IOS-related resources. A data analyst of Dealer has to examine and analyze the ordering patterns of Fast Cuisine and investigate any occurring problems. Due to the nature of the analyzed information, the obtained knowledge is specific to Fast Cuisine. Furthermore, both Fast Cuisine and Dealer conduct investments in human-based IOS-related resources, evidenced by their executives meeting on a regular basis to discuss the short-term plans because there are regular campaigns involving special meals and deals. Meetings at the executive level are conducted because when Fast Cuisine plans a campaign, the need the cooperation of Dealer because such a campaign can radically alter the ordering patterns.

Table 6.5: The values of the variables from the perspective of Fast Cuisine

Construct	
Trust	High, based mainly on openness
Rel.-Spec. of physical IOS-related resources	Low
Rel.-Spec. of human-based IOS-related resources	High
Rel.-Spec. of business-process IOS-related resources	Low
Rel.-Spec. of domain-knowledge IOS-related resources	High

Table 6.6: The values of the variables from the perspective of Dealer

Construct	
Trust	High, based mainly on openness
Rel.-Spec. of physical IOS-related resources	Low
Rel.-Spec. of human-based IOS-related resources	High
Rel.-Spec. of business-process IOS-related resources	Low
Rel.-Spec. of domain-knowledge IOS-related resources	High

Hypotheses 1e and 1f are supported by both uni-directional dyads in the case study. The influences of trust, which is mainly based on openness, on human-based and domain-knowledge-based IOS-related resources, were distinctively perceived. The openness of Fast Cuisine enabled Dealer to analyze the available historical information and to develop knowledge that is specific for the interorganizational relationship. Similarly, the openness of Dealer enabled Fast Cuisine to discuss the forthcoming promotions. Fast Cuisine took the risk that competitors could acquire the sensitive information it provided because the gains acquired from cooperation with Dealer were much higher. However, in both cases the human-based and domain-knowledge-based resources complemented each other. A specialized analyst at Dealer conducted the analysis on the historical information provided by Fast Cuisine and produced useful knowledge that is used by both parties. Similarly, the discussions between both organizations regarding future promotions produced knowledge that is highly valuable regarding the short- and long-term future prospects.

This section discussed three case studies involving the three different types of trust related to the hypotheses. The hypotheses are tested, and the findings indicate that the data generally coincides with the expectations. Competence-based trust and reliability-based trust are found to increase the relationship-specificity of both business-process and human-based IOS-related resources used. Openness-based trust is found to increase the relationship-specificity of both domain-knowledge IOS-related resources used. Hence, all of the hypotheses are supported:

Hypothesis 1a. *competence-based trust* positively effects the use of *business-process* IOS-related resources with high relationship specificity.

Hypothesis 1b. *competence-based trust* positively effects the use of *human-based* IOS-related resources with high relationship specificity.

Hypothesis 1c. *reliability-based trust* positively effects the use of *business-process* IOS-related resources with high relationship specificity.

Hypothesis 1d. *reliability-based trust* positively effects the use of *human-based* IOS-related resources with high relationship specificity.

Hypothesis 1e. *openness-based trust* positively effects the use of *domain-knowledge* IOS-related resources with high relationship specificity.

Hypothesis 1f. *openness-based trust* positively effects the use of *human-based* IOS-related resources with high relationship specificity.

6.4 Caring-based Trust

The caring-based trust in the business partner is a complex concept that is influenced by and can influence various factors. This section describes a case study that involves caring-based trust and investigates its influences on the distinctive types of IOS-related resources. The objective is to try to acquire greater understanding of the concept of caring and its influences on the different types of IOS-related resources.

The relationship between Stenazia and Alumifid

Stenazia is an European online retailer of computer and electronic products to corporate and individual consumer markets. Its business model consists of purchasing directly from manufacturers and selling directly to end customers over the Internet. Stenazia has approximately 1 million registered customers and the turnover exceeds 200 million euro. In 2005, direct sales to individual customers made up more than sixty percent of total turnover. In 2004, Stenazia implemented a new enterprise resource planning system from SAP. The system increased the functionalities of the websites of Stenazia and enhanced the effectiveness of procurement. The case study focuses on the relationship between Stenazia BV, the subsidiary of Stenazia in the Netherlands, and Alumifid, a warehousing and logistics services provider. Stenazia B.V. serves the markets of the UK and the Netherlands. The strategy of Stenazia BV is to focus on each of the local markets it is serving and to develop a higher profile among potential customers. It aims at operationalizing the strategy through providing customers high quality services and enabling them to offer feedback. The positive feedback is highlighted on the website to attract new customers.

The products for the Dutch and UK market are stored at the warehouse of Alumifid. Alumifid is an organization that provides warehousing services. It has one warehouse and 85 employees. The warehouse is partly automated, and is used to store products of multiple customers. The target customers of Alumifid mainly include organizations that outsource their warehousing activities. Alumifid aims at distinguishing itself through high quality service, and the executives argue that customers are willing to pay a higher fee for superior service. Stenazia is one of the top three customers of Alumifid and stores 1,400 product lines at Alumifid's warehouse.

The trust of Stenazia in Alumifid is high and it is mainly based on caring. The caring was developed during the initial stages of the relationship and it has not declined since. The relationship was developed in several stages. The first stage comprised a relatively small pilot, after which the performance was discussed. Based on these discussions, targets for the subsequent stages were set. The subsequent stages comprised cumulative additions of warehousing services. Stenazia was pleased by the adaptive willingness that Alumifid demonstrated. Moreover, to have a high level of caring, openness was essential. Stenazia found Alumifid to be sincere in conveying the performance and admitting limitations. In cases of low performance, Alumifid was willing to provide information regarding the reasons. That did not decrease their competence in the eyes of Stenazia. The executives at Stenazia think that they have a clear idea of the competence of Alumifid, and therefore they believe that it is acceptable not to be able to solve all problems when difficulties arise. The reliability of Alumifid increased during the course of the relationship because Alumifid was willing to adapt to the demands of Stenazia, thereby improving its responses.

The trust of Alumifid in Stenazia is high, and it mainly relies on the caring attitude of Stenazia towards Alumifid. Stenazia developed the relationship in a manner that nurtured that type of trust. Stenazia was willing to provide Alumifid with the required assistance and time in order to ensure Alumifid developed the required expertise. This collaborative stance conveyed also the competence and reliability of Stenazia. Stenazia has a high level of competence in its business dealings and wanted to ensure that Alumifid would match that level. The consistency in business dealings was emphasized from the initial stages of the relationship. The executives of Alumifid argued that since Stenazia required a specific service level entailing high reliability from Alumifid, Alumifid required Stenazia to have high reliability as well. Stenazia's reliability was measured through objective measures including the percentage of orders received on time and percentage of orders containing mistakes.

The sales office of Stenazia BV in the Netherlands serves customers of both the Dutch and the UK market. There is a high level of integration between the front-end systems that host and manage the websites and the back-end systems that maintain inventory levels and communications with Alumifid. Customers can obtain up-to-date information regarding the availability of products. The

orders of customers are communicated directly to Alumifid. This is realized through more than 20 Internet-EDI connections between Stenazia BV and Alumifid. Various interorganizational processes are supported by the EDI connections including the stock information, buying information and billing. On the side of Stenazia, the relationship-specificity of physical IOS-related resources is low even though EDI connections are employed. This is due to the use of standards that are available and, if necessary, real time integration tools to enhance connectivity. The tools are relatively cheap and reusable. The relationship-specificity of human-based IOS-related resources is high because the employees and executives of Stenazia frequently meet their counterparts in Alumifid to discuss the state of affairs. The relationship-specificity of IOS-related business processes is also high due to the tight coupling of the information exchange with the regular business processes. For example, the standard operating procedure of processing customer orders depends on the information received from Alumifid because the confirmation sent to the customer includes accurate estimated arrival times. The relationship-specificity of knowledge-based IOS-related resources is also high because in the course of the relationship Stenazia appropriated significant knowledge about the abilities and limitations of Alumifid. That information is highly relationship-specific and has low value outside the relationship.

Alumifid uses XML-based messaging between the applications in the warehouse. Since Internet-EDI conversion to XML is relatively inexpensive, there were no significant relationship-specific investments in physical IOS-related resources at the side of Alumifid, either. The investments in human-based IOS-related resources are more relationship-specific due to the frequent meetings at the operational and strategic levels between representatives of both organizations. The investments in process-based IOS-related resources also have high relationship-specificity because the operating procedures regarding storage are strongly connected to the operations conducted by Stenazia. Certain products require specific last-minute modifications according to customer orders, such as the installation of video cards in desktop computers. Such procedures are conducted in coordination with Stenazia. Furthermore, for Alumifid to be able to perform such procedures in addition to the warehousing services, additional technical knowledge of computers and electronics is necessary. The market for technical products is vibrant and products are renewed several times a year. This implies that Alumifid needs to maintain up-to-date information about these advancements. Therefore, the investments of

Alumifid in the domain-knowledge IOS-related resources are perceived to be high.

Table 6.7: The values of the variables from the perspective of Stenazia

Construct	
Trust	High, based mainly on caring
Rel.-Spec. of physical IOS-related resources	Low
Rel.-Spec. of human-based IOS-related resources	High
Rel.-Spec. of business-process IOS-related resources	High
Rel.-Spec. of domain-knowledge IOS-related resources	High

Table 6.8: The values of the variables from the perspective of Alumifid

Construct	
Trust	High, based mainly on caring
Rel.-Spec. of physical IOS-related resources	Low
Rel.-Spec. of human-based IOS-related resources	High
Rel.-Spec. of business-process IOS-related resources	High
Rel.-Spec. of domain-knowledge IOS-related resources	High

Hence, the trust mainly based on caring is found to positively influence relationship-specificity for three types of IOS-related resources. The findings indicate that caring can effect human-based, business-process, and domain-knowledge IOS related resources. Caring and affect can have various influences that occur through multiple mechanisms and paths (McAllister, 1995; Williams, 2001). The case study does not scrutinize these mechanisms and paths because as they are outside the focus of this study. Future research can investigate the paths and extent of these influences.

6.5 Discussion

The analysis of the case studies supports the hypotheses and produces interesting results regarding the distinctive influences of the various types of trust. Trust mainly based on competence has similar influences to trust mainly based on reliability. The foundations of each type can explain this similarity. Thus, when an organization is perceived to be competent, the performance it delivers is expected to be reliable and vice-versa: when an organization can maintain reliable performance indicates that it has competence. The influences of both types of trust are therefore focused on activities that ensure proficient

consistent performance. The increased relationship-specificity of business-process IOS-related resources indicates that the business processes are interlinked across the organizations. The linkage between processes ensures that the processes are “buffered” from the environment to a certain extent (the processes deal with other processes that produce predictable consistent behavior). The interorganizational interlinkage of processes yields additional inertia because all changes need to be approved and executed by both organizations. The employees and management of the organizations deal with the uncertainty of the environment. They convene frequently to discuss the changes in the environment, the difficulties these changes create for the relationship, and how to cope with these difficulties. They also meet to discuss how novel potential benefits can be obtained by combining the competences of the business partners. Hence, the human-based resources are critical components in ensuring the consistent high performance.

Openness is not simply providing a plethora of information. The case studies indicate that two aspects determine openness. First, an organization is perceived to be open when it provides all the necessary information for the boundary-crossing activities. It may seem logical and expected from an organization to provide its partner organization with all the information they need to perform activities. However, the organization may be hesitant to provide the information and may impose limitations on the relationship. Therefore, the willingness to provide information, and the extent of the information itself, particularly sensitive information, are determinant for the perception of openness. The second determinant is the willingness to share additional information with the intention of improving the relationship. Even though that information may not be used instantly, simply the willingness to provide the information is appreciated by the partner organization.

6.6 Chapter summary

This chapter discusses the distinctive influences of the various types of interorganizational trust on the IOS-related resources. It is found that trust mainly based on competence has similar effects to trust mainly based on reliability, as both influence the human-based and business-process IOS-related resources. Trust mainly based on openness is found to influence the human-based and knowledge-based IOS-related resources.

The following chapter will discuss the influences of interorganizational dependence on the relationship-specificity of the various types of IOS-related resources.

Chapter 7 Dependence and IOS-related resources

7.1 Introduction

The objective of this chapter is to discuss the influences of interorganizational dependence on the various types of IOS-related resources. Dependence can be attributed to various causes and have diverse influences. Section 7.2 discusses the literature regarding interorganizational dependence related to this study. The section complements the literature discussed in chapter 3. Section 7.3 presents the data used to test the hypotheses and explores to what extent the data corroborate the expectations. Section 7.4 discusses the implications of the empirical results. Section 7.5 summarizes the chapter.

7.2 Theoretical background and hypotheses

The publication of Pfeffer & Salancik (1978) offered a unified theory of dependence at the organizational level. Their main proposition is that the endurance and effectiveness of organizations increase when they reduce their dependence and acquire or control critical resources from the environment. Dependence is determined through particular characteristics pertaining to the interorganizational relationship and general structural characteristics pertaining to the entire environment. The dependence of a specific organization on another particular organization is determined by three factors. First is the importance and criticality of a needed resource relative to the magnitude of the exchange. Criticality entails the ability of an organization to continue functioning in case the resource is absent or the market for output diminishes. The second factor is the level of discretion an organization has over the use and allocation of a resource. The control of a resource is established based on possession, access, ability for actual use, and the ability to modify the rules that effect these criteria. Third is the availability of alternatives of the resource. Notwithstanding the evident interest of numerous scholars in the resource dependence theory, only a few empirical studies test and extend the resource dependence theory (Pfeffer & Salancik, 2003). The general structural characteristics pertaining to the environment and affecting dependence include the concentration of power, the availability of essential resources and the level of interconnectedness between organizations. These characteristics are outside the scope of this study.

At the dyadic level, higher dependence of an organization makes it more vulnerable to exploitation by the dominant business partner. Therefore, organizations try to decrease their dependence. The different factors for dependence, which are discussed above, entail that different strategies can be employed. For example, Maloni et al. (2000) discuss how dependence based on expert knowledge affects the automotive industry. The large manufacturers are dependent on their suppliers because the latter have a more accurate knowledge base about the products they supply. Through their role in coordinating design and production, the manufacturers have in turn decreased their dependence and improved their own expertise by becoming knowledge brokers for their various suppliers.

Cox (2001) discusses dependence from a supply chain perspective, arguing that an organization can have sustainable success by buying cheap and selling dear (i.e. by effectively managing its position vis-a-vis suppliers and customers). On the supply side, this is done when an organization knows how to own and control critical resources that create possibilities to increase customer dependency and lock-in. He argues that suppliers could achieve sustainable, above-normal returns by closing the market to competitors or creating opaque supply markets. On the procurement side, an organization should ensure that its suppliers do not acquire the value it has created from its customers. This pertains to acquiring the required resources at the quality required and with the lowest total cost possible. Accordingly, Cox concludes that buying and selling are two key competencies complementing the competence of adding value to inputs and outputs, which is more frequently discussed in the literature.

Dependence is closely related with power within exercised social exchanges in general and interorganizational relationships in particular. Emerson (1962) indicates that the relative dependence between two actors within an exchange relationship determines their relative power. Dahl (1957) defines power by arguing that A has power over B to the extent that he can get B to do something that B would otherwise not do. Research on power has shown that power entails the ability to cause an actor to perform an action that it would otherwise not perform (Cox, 2001; Pfeffer et al., 1978) and consequently creates constraints for the freedom and autonomy of the actor. This clarifies to some extent the negative undertone triggered by the concept of power. There are also persuasive arguments emphasizing the positive effects of being dependent. Dyer (1996) argues that organizations can seek efficiency advantages by

creating relationship-specific assets and that these advantages vary according to the task environment. Nooteboom et al. (2000) argue that increased dependence can also increase the unique value of the focal organization towards the partner. This makes the partner dependent, and reduces the partner's incentives to behave opportunistically.

Pettigrew (1972) and Markus (1983) discuss the influences of dependence and power on designing and employing information systems. Research in this area advocates that political pressure affects IS adoption and use (Robey & Markus, 1984). Teo et al. (2003) adopt an institutional perspective and illustrate that coercive pressures (i.e. formal and informal pressures exerted on dependent organizations) can lead to greater intent to adopt structures or programs that serve the interest of dominant organizations. Other studies illustrate how specific IOSs are adopted by dependent organizations to facilitate the interorganizational relationship (Hart et al., 1997; Hart & Saunders, 1998; Iacovou et al., 1995; Premkumar & Ramamurthy, 1995; Ratnasingam, 2001).

Qiu et al. (2004) argue that higher dependence is associated with IOSs that are used for strategic purposes. In the case of low dependence, business partners can use IOSs such as automated supply chain systems to coordinate workflows across organizations. The system of the downstream organization can automatically place an order when stock levels reach a certain threshold. This requires participants to open processes and to share information. In the case of high dependence, more tightly coupled business partners don't restrict the use of the IOS to communicate routine data, but use the IOS to enhance the decision making process at the strategy level. This category includes forms of cooperation such as networks (Bradley & Nolan, 1998). The increased dependence and tight coupling can yield competitive advantages such as improvement of products and services, higher speed to market and the creation of valuable knowledge (Gosain et al., 2004; Malhotra et al., 2005).

Accordingly, the existing interorganizational dependence is expected to influence the use of the IOS. Dependent organizations employ relationship-specific IOS-related resources due to various reasons (such as fulfillment of requirements of the partner organization or realization of proprietary information exchange). The context of the relationship prescribes the types of IOS-related resources employed. It is expected that dependence affects all types of IOS-related resources distinguished, i.e. physical, human-based, business-process and domain-knowledge IOS-related resources. The dependent

organization can be forced to use certain physical IOS-related resources, such as software or communication equipment, that are preferred by the dominant organizations. The dominant organization may prefer these resources for various reasons (such as higher security or easier connectivity with internal information systems). The dependent organization may also be impelled to have high relationship-specificity of human-based IOS-related resources. The employees and managers of the dependent organization can feel the obligation to meet frequently with their counterparts at the dominant organization. The meetings would aim at discussing the current conditions of the environment and how the business partners can react to such conditions. The reactions of the business partners would be more focused and favorable to the objectives of the dominant organizations. The dependent organization can be influenced to use relationship-specific business-process IOS-related resources. The dominant organization can require specific operational and administrative procedures that are more efficient and effective for its particular objectives. The dependent organization would need to facilitate these requirements to maintain the relationship. The dependent organization is also expected to use more relationship-specific knowledge-based IOS-related resources. This can be done at the request of the dominant organization or voluntarily by the dependent organization. The dominant organization may demand the use of a specific method for financial calculations of the costs of products and services. The objective of the dominant organization may include the reduction of administrative costs and it doesn't always need to be the enforcement of lower prices. The dominant organization can also pressure the dependent organization to develop new products using information that is specific to the dominant organization. This pressure is exerted by the dominant organization to enhance its products and services to its own customers. The dependent organization may voluntarily choose to adopt the above-mentioned financial methods or use information that is specific to the dominant organization for various reasons. If the dominant organization is successful in acquiring a larger market share and increasing its operations, the dependent organization can indirectly benefit from the additional business activities. The dependent organization may voluntarily use particular and specific information to satisfy the dominant partner and prevent it from switching to another relationship. Accordingly, the hypotheses are as follows:

Hypothesis 2a. High dependence on the other organization positively affects the use of *physical* IOS-related resources with high relationship specificity.

Hypothesis 2b. High dependence on the other organization positively affects the use of *human-based* IOS-related resources with high relationship specificity.

Hypothesis 2c. High dependence on the other organization positively affects the use of *business-process* IOS-related resources with high relationship specificity.

Hypothesis 2d. High dependence on the other organization positively affects the use of *domain-knowledge* IOS-related resources with high relationship specificity.

7.3 Data and results

The hypotheses are tested using both case study and field study methods. The general design and data collection for each strategy are discussed in chapter four. This section discusses the findings of each approach by presenting a brief motivation for employing the approach, describing the context of data collection, summarizing the collected data, and evaluating whether the data support the hypotheses.

7.3.1 Case studies

The design of case studies allows the researcher to investigate phenomena in their real-life context. The investigation of contextual conditions is important within research incorporating dependence. Earlier studies (Cox et al., 2002; Pfeffer et al., 1978) distinguished various determinants of dependence. These determinants aid in focusing the data collection. The utilization of semi-structured interviews, however allows for distinguishing other influential determinants in the investigated interorganizational relationships. Each determinant can be scrutinized, and its magnitude and influences can be discovered. Two case studies (i.e. two interorganizational relationships) are employed in this chapter's analysis. The analysis follows the multiple case study design methodology; more specifically, theoretical replication is used (i.e. predicting contrasting results, but for predictable reasons). The first case study examines a relationship entailing high dependence, whereas the second case study examines a relationship entailing low dependence. The context of each case study will be briefly described next.

The relationship of Fretadia with Phoselot

Phoselot is a large US-based organization that operates several types of merchandise stores in North America. The merchandise stores consist mainly of discount stores and department stores. The products include everyday essentials and fashionable merchandise. Furthermore, Phoselot provides financial services to its customers, such as credit cards, with the objective of complementing its retail segments. The combined yearly revenue is more than 40 billion dollars. The large diversity of merchandise results in a large number of suppliers. Phoselot requires vendors to comply with rules and audits prescribed by the government as well as additional rules and audits to ensure compliance to standards that Phoselot sets for itself.

Fretadia has been a supplier of Phoselot for the past four years. Fretadia is an organization specialized in designing and manufacturing stylish home and bathroom accessories. Based in the Netherlands, with production facilities in Hong Kong, Fretadia has yearly revenues exceeding one million euros. Fretadia's customers consist mainly of retailers specialized in upscale stylish products. Fretadia is dependent on Phoselot because it is one of its main customers. Phoselot's orders are characterized by their large volume. Consequently, the manufacturing capabilities of Fretadia are fully utilized. Fretadia tries to fulfill the requirements of Phoselot because the loss of its orders would otherwise have a significant impact on business. Replacing Phoselot would be difficult for Fretadia. Although the products are commodity products, and other buyers could be interested, it would be difficult to find buyers that would procure similar amounts under the same conditions.

Communications are conducted through an extranet that Phoselot has developed to communicate with its numerous suppliers. The system is linked with Phoselot's ERP system and provides plentiful up-to-date information and performance metrics regarding previous and current stock levels, the percentage of damaged products and future predictions. Phoselot also uses the system to perform reverse auctions whereby it initially permits only reliable suppliers to participate and subsequently displays its future procurement contracts for commodity products. The suppliers competitively bid on supplying the product for the lowest price. Fretadia has been successful in acquiring supply contracts for the past three years.

The extranet is accessible through the Internet using standard web modules and a virtual private network. Accordingly, Fretadia doesn't need to conduct

relationship-specific investments in physical IOS related resources. Phoselot is satisfied with the possibility of acquiring all information through the standard web interface. Investments in human-based IOS-related resources are relatively low as well. There are no frequent meetings between employees and management of both organizations. There is also no need to have special experience or training to conduct communications. The system is easy to use, and Phoselot provides support in case of technical problems. The investments in business processes are more relationship-specific. Phoselot has requested specific packaging and shipping procedures. Fretadia's manufacturing plant in Hong Kong needs to adjust procedures to fulfill these requirements. The investments in domain-knowledge IOS-related resources are also relationship-specific. Fretadia has to invest in analyzing the specific customer preferences of the US market. That was needed to issue a competitive bid during the auction. Furthermore, Fretadia can increase its domain knowledge through the analysis of the large amount of information provided by the IOS. However, Fretadia has not conducted such an analysis because it would not provide any additional benefits at the present time.

This case study is based on several interviews with senior management of Fretadia. Unfortunately, it was not possible to conduct interviews with employees or representatives of Phoselot. The gathered data therefore provide information regarding the relationship from the perspective of Fretadia only. Table 7.1 summarizes the values of the variables for this case study from the perspective of Fretadia.

Table 7.1: The values of the variables from the perspective of Fretadia

Construct	
Dependence	High
Rel.-Spec. of physical IOS-related resources	Low
Rel.-Spec. of human-based IOS-related resources	Low
Rel.-Spec. of business-process IOS-related resources	High
Rel.-Spec. of domain-knowledge IOS-related resources	High

The high dependence of Fretadia on Phoselot did not positively effect the relationship-specificity of either physical or human-based IOS-related resources. These results contradict hypotheses 2a and 2b. The availability of web modules diminishes the need to employ relationship-specific physical IOS-related resources. The web modules are linked to the back-office and ERP systems of Phoselot and can provide detailed information online at any time.

This is appreciated by Fretadia, and is viewed as a major advantage for doing business with a large business partner. The results also contradict the expectation regarding human-based IOS-related resources. Even though Fretadia is highly dependent on Phoselot, the human-based resources are not relationship-specific. Two potential explanations exist for the reasons why employees and management do not meet frequently and coordinate activities. First, the nature of the traded products (i.e. commodity products) enables the partners to design contracts that reckon with major contingencies, thereby eliminating the necessity of frequent meetings. Second, information exchange through the IOS reduces the need for human contact. The linkage of the IOS with the back-office and ERP systems of Phoselot enables the IOS to provide up-to-date information continuously. This explanation is in line with research suggesting that IT facilitates the exchange of rich information and eliminates the need for frequent face-to-face meetings (Larsen & McInerney, 2002).

The high dependence does positively affect the relationship-specificity of business-process and domain-knowledge IOS-related resources. These results support hypotheses 2c and 2d. The large orders of Phoselot compel Fretadia to customize its business processes and domain knowledge according to the relationship. Fretadia has the ability to further customize the domain knowledge by performing additional analysis on the information provided by the IOS. Although the analysis could have positive impacts on products and deliveries, Fretadia does not conduct the analysis because the benefits would be seized by Phoselot. Phoselot, as a large customer, has significant power over its suppliers. It has adopted a coercive posture and aims at attaining all possible benefits. Fretadia continues to supply Phoselot because it is an attractive customer, but Fretadia doesn't pursue additional efforts that would benefit Phoselot only.

Tilburiun Webdesign and Glusetan ISP

Tilburiun is a small organization that develops websites for SMEs. It offers various services including web design and graphical design services. Its clients consist of small- and medium-sized organizations. Its core competence is the design and programming of websites. The importance of websites for businesses is significant because websites constitute a valuable channel for selling to and communicating with customers and are an important channel for communicating with the general public (Bellizzi, 2000). The design of effective websites is highly interlinked with understanding the beliefs and reactions of end customers to websites. Designers use various web-design elements to

convey information. The elements are based on distinctive technologies. A tight relationship therefore exists between the technologies used, website effectiveness and end-customer stickiness to the website (Song & Zahedi, 2005). Since Tilburiun serves different types of SMEs, which have diverse customers, Tilburiun must therefore employ different web-design techniques.

To be able to offer a broad package of services to its customers, Tilburiun acquires complementary services (including domain registration and hosting) from Glusetan ISP. Glusetan is an organization specialized in domain-name registration and hosting services. Operating in France, Belgium and the Netherlands, Glusetan serves corporate and private customers. Private customers can register domain names and obtain hosting services. The corporate customers can be divided into two types. The first contains organizations that acquire services for their own needs (e.g. hosting of the own corporate website). These organizations have needs similar to those of the private customers. The second type includes organizations that offer related services and complement their own services with those provided by Glusetan. These organizations are similar to Tilburiun in size and can provide other services such as web-integrated applications and marketing advice.

The market for domain-name registration and web-hosting services experienced key changes after the bursting of the IT bubble. The market is a transparent global market characterized by numerous suppliers and customers demanding high service levels and low prices. Furthermore, novel services and technologies emerge frequently, and web-hosting providers need to be able to offer such services rapidly. Tilburiun Webdesign and Glusetan ISP are not compelled to conduct business with each other, as they can choose from a large number of potential business partners. Accordingly, Tilburiun is not dependent on Glusetan because Tilburiun can choose any one of the numerous other providers. Not all providers can offer the same services and the exact same quality, however. Tilburiun can easily choose another provider from the numerous number of providers, and still obtain similar utility.

Communications are conducted through a system developed by Glusetan ISP to communicate with its customers. Since the system is accessible through the Internet, there is no need for Tilburiun to conduct any relationship-specific investments in physical IOS-related resources. The services are highly standardized, which means that communications are typically standardized. For each type of service, Glusetan has developed a fixed form and procedure that

needs to be pursued. Due to the high level of standardization, Tilburiun does not need to invest in either relationship-specific human-based resources, customization of business processes or specific domain-knowledge.

Table 7.2: The values of the variables from the perspective of Tilburiun Webdesign

Construct	
Dependence	Low
Rel.-Spec. of physical IOS-related resources	Low
Rel.-Spec. of human-based IOS-related resources	Low
Rel.-Spec. of business-process IOS-related resources	Low
Rel.-Spec. of domain-knowledge IOS-related resources	Low

The low dependence of Tilburiun Webdesign on Glusetan ISP is accompanied with low relationship-specificity of the four distinguished types of resources (i.e. physical, human-based, business-process and domain-knowledge IOS-related resources). These results support hypotheses 2a, 2b, 2c and 2d. The relationship is typical within a market characterized by fierce competition and relatively easy entry. If Glusetan demands additional requirements, Tilburiun would switch to another supplier.

This section discussed two case studies involving high- and low interorganizational dependence. The hypotheses related to the second proposition were tested, and the findings indicate that high dependence positively influences the relationship-specificity of business-process and domain-knowledge IOS-related resources. The following hypotheses are thus supported by the case studies:

Hypothesis 2c. High dependence on the other organization positively affects the use of *business-process* IOS-related resources with high relationship specificity.

Hypothesis 2d. High dependence on the other organization positively affects the use of *domain-knowledge* IOS-related resources with high relationship specificity.

Hypotheses 2a and 2b are not supported. Hypothesis 2a is rejected because higher interorganizational dependence does not compel the organization to use relationship-specific physical IOS-related resources. This is due to the commoditization of physical IT resources including the infrastructure used for

the communication of information across organizations. All organizations can use state-of-the-art technology and adopt the common communication standards used within the industry. Hypothesis 2b is rejected because higher interorganizational dependence does not compel the organization to use relationship-specific human-based IOS-related resources. This can be due to the nature of the relationship investigated and the products traded, or the availability of large amounts of digitized explicit information that can replace the need for human communications.

7.3.2 Field study

The objective of this study is to test the hypotheses discussed in the previous section. Quantitative field study design provides effective tools for testing the proposed theory. As discussed in chapter 5, a quantitative field study permits the collection of a wide range of information from a relatively large number of respondents. This increases the external validity of the proposed theory. The data are collected using an Internet survey among Internet shops according to the methodology described in chapter 5. The measures are then briefly described.

Independent variable

Interorganizational dependence is determined by measuring the degree of resource criticality or the existence of alternative providers. The resource in the context of this survey is the transportation service. The utility is assessed by inquiring into the importance of the services provided and the offering of new services that are useful to the Internet shop. The substitutability is measured by inquiring into the existence of other suitable transportation companies, the degree of cooperation between transportation companies and the extent to which the Internet shop has knowledge of the transport sector.

Dependent variables

The relationship-specificity of physical IOS-related resources is measured using three proxies. The first proxy is comprised of the IT investments that are conducted to communicate with the transportation company. Such investments can include computers or barcode printers. Second is the extent to which communication equipment can be used with other transportation companies. Third is the extent to which the location plays a role in communications with the transportation company. The relationship-specificity of human-based

resources is measured using two proxies. First is the familiarity of the employees of the Internet shop with the transportation companies. The second proxy is comprised of the technical IT skills required from the employees of the Internet shop in order to realize communications with the transport company. The relationship-specificity of business-process IOS-related resources is measured by determining the specificity of the administrative procedures such as manufacturing and the operational procedures related to IT such as packaging. The relationship-specificity of domain-knowledge IOS-related resources is measured by inquiring into the specificity of the IT knowledge required for communications regarding the planning of new products, delivery of products and price calculations.

Control variables

Investment in relationship-specific resources can also be influenced by interorganizational trust, uncertainty, complexity and frequency (Douma et al., 1998; Nooteboom, 2004). Each of these dimensions is assessed and incorporated into the analysis.

Table 7.3 presents descriptive statistics and correlation values for variables related to the hypotheses. The hypotheses are tested using the multiple regression method. Each hypothesis is tested separately because it concerns a distinct dependent variable.

Table 7.3: Pearson correlation matrix

Variable	Mean	S.D.	1	2	3	4	5
1. Dependence	3.17	0.91	1				
2. Rel.-Spec. of physical IOS-related resources	2.64	0.94	0.10	1			
3. Rel.-Spec. of human-based IOS-related resources	2.70	1.20	0.22	0.22	1		
4. Rel.-Spec. of business-process IOS-related resources	2.36	1.30	0.16	0.20	0.28	1	
5. Rel.-Spec. of domain-knowledge IOS-related resources	1.92	1.16	0.16	0.18	0.20	0.41	1

The results of the regression analysis are presented in table 7.4. The models (1), (2), (3) and (4) correspond with hypotheses 2a, 2b, 2c and 2d respectively. The control variables are included in all regression specifications. For the sake of conciseness, the coefficient estimates are not reported. In model (1) it can be seen that the coefficient of dependence is not significant. This means that dependence doesn't have a significant effect on the relationship-specificity of physical IOS-related resources; this contradicts hypothesis 2a. In models (2)

and (3) it can be seen that the coefficients of dependence are significant. This means that dependence does have significant positive effects on the relationship-specificity of human-based and business-process IOS-related resources; This is consistent with hypotheses 2b and 2c. In model (4) the coefficient of dependence is significant at the 0.1 level; therefore can be also interpreted as dependence having a significant positive effect on the relationship-specificity of domain-knowledge IOS-related resources.

Table 7.4: The standardized coefficients of the regression analysis

Independent variables Dependent variables	Model 1 Rel.-Spec. of physical IOS-related resources	Model 2 Rel.-Spec. of human-based IOS-related resources	Model 3 Rel.-Spec. of business-process IOS-related resources	Model 4 Rel.-Spec. of domain-knowledge IOS-related resources
Dependence	.092	.259*	.148*	.177*
Uncertainty	-.148	-.466*	-.194	-.213
Complexity	.236	.508*	.084	.001
Frequency	.036	.000	.158*	.039
Trust	-.102	.017	-.127	-.052
Significance entire model	.449	.006*	.089*	.081*

* $p < .05$; ** $p < .1$

The following hypotheses are therefore supported by the field study:

Hypothesis 2b. High dependence on the other organization positively affects the use of *human-based* IOS-related resources with high relationship specificity.

Hypothesis 2c. High dependence on the other organization positively affects the use of *business-process* IOS-related resources with high relationship specificity.

Hypothesis 2d. High dependence on the other organization positively affects the use of *domain-knowledge* IOS-related resources with high relationship specificity.

7.4 Discussion

The findings of the case studies and the field study indicate that high dependence does not positively affect the relationship-specificity of physical IOS-related resources. The case study organizations are satisfied with the existing IT standards for communications, which seem to be very effective in terms of enabling connectivity. The organizations can utilize the connectivity to communicate a wide range of information without the need to use relationship-specific physical IOS-related resources. The Internet shops participating in the field study may have the same reasons for avoiding the use of relationship-specific physical IOS-related resources. The organizations use IT standards to avoid investments in proprietary physical IT infrastructures. Moreover, the Internet shops have the expertise and technical know-how to communicate electronically with their various customers. Although their communications with customers have different characteristics, the Internet shops can use their expertise to facilitate the communications with the transport organization. The findings of the case studies and field study regarding the influences on human-based resources do not coincide. The case studies found no influence, while the survey indicated the existence of a positive influence. This could be explained by the types of interorganizational relationships examined. The procurement of commodity products doesn't necessitate specific IT knowledge for communications, whereas transportation orders can require intensive communications and result in specific knowledge about the other organization. The findings regarding the influences on the relationship-specificity of business-process IOS-related resources coincide with the expectations for both the case studies and the survey. They support the increasingly advocated notion of tight supply chains where organizations are dependent on other organizations and are closely interlinked through cross-organizational business processes. The findings regarding the influences on the relationship-specificity of domain-knowledge IOS-related resources coincide with the hypothesized expectations for both case studies and the field study. A higher dependence compels the focal organization to increase its knowledge about the partner organization, for two possible reasons. First, the dependent organization can be forced by the powerful partner to invest in relationship-specific knowledge. The dependent organization will adhere, due to its weak position. Second, the dependent organization may try to increase its knowledge about its partner in order to search for possibilities to decrease its dependence.

7.5 Chapter summary

This chapter discussed the influences of interorganizational dependence on the relationship-specificity of the various types of IOS-related resources. It is found that high dependence does not positively affect the relationship-specificity of physical IOS-related resources, while it does positively affect the relationship-specificity of business-process and domain-knowledge IOS-related resources. Since the influences of dependence on human-based IOS-related resources were conflicting, no definite conclusion can be formulated. The following chapter will discuss the influences of interorganizational trust on the relationship-specificity of the various types of IOS-related resources.

Chapter 8 IOS-related resources and IOS capabilities

8.1 Introduction

The objective of this chapter is to discuss how the various types of IOS-related resources affect the existence of IOS capabilities. The previous two chapters discussed the influences of interorganizational trust and dependence on the use of IOS-related resources. The findings indicate that organizations utilize different types of resources to facilitate communications. The organizations combine these resources to achieve successful communications within the relationship. This chapter examines how the IOS-related resources are combined, more particularly what types of IOS-related resources are used to achieve certain IOS capabilities.

The chapter is organized as follows. Section 8.2 provides a more in-depth discussion of the resource-based view (RBV). The section complements the discussion in chapter 2. Section 8.3 presents the data used to test the hypotheses and discusses whether the data support the expectations. Section 8.4 discusses the implications of the empirical results. Section 8.5 provides a short conclusion for this chapter.

8.2 Theoretical background and hypotheses

The resource-based view emphasizes the internal aspects of organizations in obtaining a strategic advantage. An organization's "competitive advantage is defined by a bundle of unique resources and relationships" (Rumelt, 1984). Within an interorganizational perspective the RBV has been employed to examine mergers and acquisitions (Harrison et al., 1991), strategic alliances (Das & Teng, 2000; Eisenhardt & Schoonhoven, 1996; Ireland et al., 2002), and CEO characteristics in managing international relationships (Roth, 1995). Eisenhardt et al. (1996) suggest two reasons that drive organizations to the development of alliances. The first is when organizations are in need of resources -- usually when they are in vulnerable strategic situations because they are competing in emergent or highly competitive markets or because they are endeavoring pioneering technical strategies. A second reason driving the development of alliances is when organizations possess valuable resources that can be shared. This occurs usually when large, experienced, and well-

connected top management teams lead the formation of alliances. Das and Teng (2000) discuss the rational, formation, structure and performance aspects of interorganizational relationships from a RBV perspective. The rationale is formed by the value-creation potential of organizational resources that are pooled together. Two motives underlie this rationale. First, organizations can obtain and gain access to resources of other organizations. Second, organizations can retain and keep their own valuable resources securely within the organization. The formation of interorganizational relationships relies on the possession of critical resources by either of the organizations. Consequently, organizations are more likely to be interested in forming relationships with a business partner that possesses resources that are characterized with imperfect mobility, imitability and substitutability. The choice of relationship structure is based on two types of resources: property- and knowledge-based resources. Property-based resources are legal properties owned by organizations, including physical resources, human resources, etc. Knowledge-based resources refer to an organization's intangible know-how and skills. The performance of relationships is influenced by the effective integration of the business partner's valuable resources. Accordingly, Das and Teng provide an argument regarding how the resource profiles of partner organizations determine the type of alliance developed.

Penrose (1959), which is argued to be one of the founders of resource-based view, argues that the diversity between organizations results from different mixtures of various resources. Applying this logic to interorganizational relationships, it is argued that the combination of resources of both organizations results in exclusive characteristics that can be attributed to the relationship. The focus of this study is on process-based and knowledge-based advantages from combining the resources.

Stevens (1989) argues that the interlinking of business processes across organizational borders is a requirement for success. The development of integrated activities removes the boundaries and barriers between organizations and improves their functionality (Romano, 2003). Donk et al. (2005) distinguish between two aspects related to process integration: scope and level. The scope of integration entails the number of areas in which cooperation is developed. Most attention within the supply management literature is paid to purchasing and supply activities such as transportation and logistics (Tan, 2001). Likewise, the creation of successful manufacturing processes and logistics operations across organizations can provide a competitive weapon that

is difficult to duplicate by competitors (Anderson & Katz, 1998). The level of integration entails the extent of integration across organizations. This applies to the areas and processes that are part of scope. For example, shifting the customer-order decoupling point (CODP) well across the boundary to the supplier organization yields a high level of integration (Van der Vlist et al., 1997). The manufacturing and assembly processes become more flexible and more responsive to fluctuations in demand. An example of a low level of integration is providing the supplier information about promotional actions only. Narasimhan (1998) argues that higher degrees of integration between organizations can result in increased competitive advantage.

Another reason for organizations to develop relationships is to improve their knowledge and learning abilities (Nooteboom, 2004; O'Callaghan et al., 2006). Organizations cautiously select the business partners that possess the needed resource profiles and learn by intensifying their relationships with them (Jones et al., 1998). Cohen et al. (1990) focus on the relationship between the organization and its environment and argue that the ability to recognize the value of new, external information is determined by the organization's level of prior knowledge. This ability is referred to as absorptive capacity. More specifically, the prior related knowledge and diversity of backgrounds of individual employees affect the organization's absorptive capacity. The development of absorptive capacity is therefore path dependent, and the lack of investment in a particular area of knowledge can exclude future developments in that area. Accordingly, the acquisition of knowledge from a specific business partner can be one of the main reasons for the development of dyadic interorganizational relationships (Hamel, 1991; Kogut, 1988; Salk et al., 2003). Tiemessen et al. (1997) distinguish three processes for knowledge transfer within interorganizational relationships. The first process entails the movement of knowledge between the business partners. It essentially requires accepting what the other organization does. This process is discussed extensively in the literature (Hamel, 1991; Kogut & Zander, 1993; Simonin, 2004). The second process is transformation, and it entails the extension of existing knowledge and the creation of new knowledge. This is exemplified by the collaboration of multinational corporations with local partners in order to adopt knowledge and adapt to the local environment. This process allows the management team to improve specific abilities of its own that are useful in the novel local environment. The third process is harvesting, which entails salvaging the knowledge created within the relationship by the business partners so it can be evoked and employed in other applications. Inkpen et al. (1998) argue that

knowledge creation can be a significant payoff of relationships. An organization should regard the information and knowledge possessed by its partner, at least to certain extent, as valuable. They argued that dynamic interactions at various levels create the knowledge. The employees form a growing community that extends, amplifies and internalizes the knowledge. Ahuja (2000) discusses the development of relationships through collaborations within direct and indirect ties. Direct ties serve as sources of tangible resources and information. Indirect ties serve mainly as sources of information only. The indirect ties have low maintenance costs and can serve as a mechanism for occasional knowledge spillover; they add significantly to the organization's innovation output. Accordingly, the mainstream view in the literature contends that effective knowledge sharing and transfer is determined by cooperative social interactions and exchanges between partners (Janowicz, 2004; O'Callaghan et al., 2006; Plaskoff, 2003). This requires joint decision-making and mutual commitment by the individuals of each organization.

Polanyi (1958) differentiated between explicit and tacit knowledge. Explicit knowledge includes facts that are codifiable into a formalized language such as words, numbers or logical expressions. This type of knowledge is transferable without loss of integrity. Through digitization, messages can be manipulated and transmitted easily. The digital revolution has fundamentally altered the availability of information and explicit knowledge in time and space (Bane et al., 1998). It is possible to make the information available at all times at relatively low costs, rather than only when it is convenient for the knowledge owner to distribute it. Tacit knowledge is highly context-specific and hard to formalize and communicate (Nonaka, 1994). Due to the difficulty in documentation, tacit knowledge is difficult to transfer across organizations. Mutual respect complemented with willingness to accommodate each other's values at the personal level is important for an organization to acquire tacit knowledge from its partner (Inkpen, 1998). A cooperative mode of behavior by the employees and management is more likely to produce a harmonious relationship that allows for the transfer and sharing of knowledge within the relationship (Muthusamy & White, 2005). The previously described arguments and reasoning in the literature lead to the following hypotheses:

Hypothesis 3a. Incorporating *business-process* specific IOS-related resources that have a high degree of relationship-specificity positively affects *process-based* IOS capabilities.

Hypothesis 3b. Incorporating *domain-knowledge* IOS-related resources that have a high degree of relationship-specificity positively affects *knowledge-based* IOS capabilities.

Hypothesis 3c. Incorporating *human-based* IOS related resources that have a high degree of relationship-specificity positively affects *process-based* IOS capabilities.

Hypothesis 3d. Incorporating *human-based* IOS related resources that have a high degree of relationship-specificity positively affects *knowledge-based* IOS capabilities.

8.3 Data and results

The hypotheses are tested on data collected from multiple case studies and a field study. The design of the methods followed is discussed in chapter 4. This section discusses the findings of each method and analyzes whether the data confirm the hypotheses.

8.3.1 Case studies

Case studies enable the investigation of contemporary events. The design of case studies has to do with the inclusion of particular sources of evidence, such as interviews and direct observation, that focus on current state of affairs. Determination of the existence of IOS capabilities necessitates inspecting the current advantages from the usage of different types of IOS-related resources. The focus is on the realization of the advantages. In-depth interviews can provide interesting insights concerning the existence and types of advantages. Furthermore, the possibility of collecting data from both sides of the dyadic relationship makes it possible to verify whether both sides perceive the advantages. Sections 7.3 and 8.3 discussed the context of the case studies and described the general background and the resources used within each interorganizational relationship. This section discusses the existence of IOS capabilities within each relationship and whether the findings support the hypotheses.

The relationship between Global Automation Companion and Integrated Logistics

The main objectives of communications between GAC and Integrated Logistics are twofold: ensuring flawless interlinkage of processes and exchanging market information and knowledge. The flawless interlinkage of processes is essential

for daily operations. All of the activities of GAC that require service parts or small products can be performed only when Integrated Logistics executes the actions in the predetermined sequence agreed upon by both parties. For example, when a sales agent of GAC confirms a sales order with a customer, GAC issues an order to Integrated Logistics to prepare the product for shipping. As Integrated Logistics prepares the product, GAC arranges for the product to be shipped to the customer; the product should then be shipped within hours after confirming the sales order to the customer. There are more than 1000 orders daily. In case of interruptions, Integrated logistics discuss all details with GAC, including what items are being picked up, how much and when. This allows both parties to manage the end customers' orders and adjust the shipping schedule when needed. This collaboration is possible due to the tight coordination between internal processes and the processes of the partner. Accordingly, it is argued that GAC and Integrated Logistics have developed process-based IOS capabilities within the interorganizational relationship.

The exchange of information and knowledge between organizations is conducted in order to realize two main aims. The market GAC is serving is volatile and has seasonal characteristics. Therefore, the IOS is used to exchange extensive information regarding past market trends, future forecasts, the analysis of that information and the expected impacts on the relationship. GAC is limited by the abilities of Integrated Logistics. Therefore GAC needs to have detailed information regarding Integrated Logistics' abilities and how it is planning to cope with the market changes. The exchange of market information is also beneficial for Integrated Logistics as it obtains future forecasts from its customer. The second aim of exchanging information is the improvement of the relationship. As the activities are tightly coupled across the organizations, realization of any improvements is reliant on the cooperation of both organizations. To be able to design and plan any modifications, each organization needs to have in-depth knowledge about the activities conducted by the other and the underlying reasons for performing these activities. The cross-dock project discussed in chapter 7 is an example of the need of GAC to have detailed information of both the business and IT-related aspects in order to realize modifications.

Table 8.1: The values in the relationship between GAC and Integrated Logistics

IOS Capability		
Process-based		Existing
Knowledge-based		Existing
Relationship-specificity IOS-related resources (discussed in chapter 7)		
From GAC perspective	Physical resources	Low
	Human-based resources	High
	Business-process resources	High
	Domain-knowledge resources	High
From Integrated Logistics perspective	Physical resources	High
	Human-based resources	High
	Business-process resources	High
	Domain-knowledge resources	High

Hypotheses 3a, 3b, 3c and 3d are all supported in this case study. The high relationship-specificity of human-based and process-based IOS-related resources have resulted in process-based IOS capabilities. The successful execution of orders is attained by the interlinkage of processes between GAC and Integrated Logistics and the frequent meetings between employees of both organizations to discuss the performance and execution of these processes. Similarly, the organizations share knowledge regarding market developments in order to determine possible courses of action. This knowledge sharing and transfer is done by distributing information through the IOS, complemented with meetings at the executive level.

The relationship between HighTech and Road Transport Logistics (RTL)

The sales offices of HighTech need to have reliable information regarding the stock levels in order to issue reliable expected delivery times. When a sales office confirms an order of an end customer, it communicated the order to RTL. Then, the sequence of actions is fixed according to a predetermined protocol. The sequence includes all actions that need to be performed both by HighTech and RTL. The interlinkage of processes between HighTech and RTL is realized through the customization of the processes at the warehouse of RTL, customization of the ordering processes of HighTech, intensive communications facilitated by the IOS and periodic meetings by middle- and operational management.

The fixed sequence of actions is perceived as evidence of the existence of a process-based IOS capability. Due to the fixed sequence of actions, each organization has a reliable expectation of the performance of the other organization. These mutual expectations are important. HighTech can deliver reliable service to its customers. The main customers of HighTech are large customers operating in volatile markets. The reliable service appeals to them, as they obtain more stability in their environment. Thompson (1967) argues that organizations try to decrease the uncertainty in their environment and try to protect the technical core of the organization. A possible strategy for protecting the technical core is creating buffers with the environment. The relationship with RTL can be seen as a buffer from the perspective of HighTech because RTL provides consistently reliable service.

A knowledge-based IOS capability is not found within the relationship. There is no exchange or transfer of knowledge between the business partners. The expertise of HighTech is not needed by RTL because Hightech's expertise is limited to the design and manufacturing of headsets and related products. RTL does not utilize the expertise of HighTech regarding sales and customer preferences because for the operational procedures there are no significant differences for RTL between the different products. All products are treated in a similar way, and they have no unusual necessities requirements, such as cooling.

Table 8.2: The values in the relationship between HighTech and Road Transport Logistics

IOS Capability		
Process-based		Existing
Knowledge-based		Not-Existing
Relationship-specificity IOS-related resources (discussed in chapter 7)		
From HighTech perspective	Physical resources	Low
	Human-based resources	High
	Business-process resources	High
	Domain-knowledge resources	Low
From Integrated Logistics perspective	Physical resources	Low
	Human-based resources	High
	Business-process resources	High
	Domain-knowledge resources	Low

Hypotheses 3a, 3b and 3c are supported, but hypothesis 3d is not supported in this case study. The frequent meetings of the middle management and operational management of both organizations (i.e. human-based resources) and the coordination of business processes by both organizations (process-based resources), have resulted in a common sequence of actions that can be perceived as a process-based IOS capability.

HighTech and RTL don't pursue actively the sharing of expertise and knowledge. Therefore, the frequent meetings of the management of both organizations (i.e. human-based resources) do not necessarily result in the sharing of knowledge and expertise (i.e. knowledge-based IOS capability). The absence of dedicated investments by HighTech to customize its resources in a way that enable them to acquire the expertise knowledge of RTL (and vice-versa) inhibits the knowledge transfer.

The relationship between Fast Cuisine and Dealer

Fast Cuisine plans and coordinates the promotional activities and introduction of new products in coordination with Dealer. Dealer has general knowledge of the fast-food market and has accumulated specific knowledge regarding the particular market of Fast Cuisine by employing a data analyst that explores the ordering patterns. The expertise and knowledge obtained by the data analyst concerns the relationship and is used to solve only problems that occur and to improve the execution of the orders. This demonstrates that a knowledge-based IOS capability is developed within the relationship. Fast Cuisine appreciates the contributions of the data analyst because, due to his suggestions, certain practices have been implemented that prevent stock levels reaching critical thresholds. For example, the ordering done by Fast Cuisine is usually based on past data. Based on a proposition by Dealer, Fast Cuisine currently conducts additionally specific checks before placing the orders. For example, the additional checks include verification of whether the ordered quantities related to a specific product are ordered in the right proportions.

The deliveries of products occur on a daily basis according to a predetermined procedure. However, there are deviations from the procedure by both organizations and such deviations don't have major consequences. An example of such a deviation is the ordering time. Although the orders for next-day deliveries should be sent before 3 pm the day before, there are no major

consequences if the orders are delayed by a one or two hours. However, the orders do need to be received before 5.30 pm because official working hours are until 6 pm in the Netherlands. This lack of precision in following procedures demonstrates the non-existence of a process-based IOS capability.

Table 8.3: The values in the relationship between Fast Cuisine and Dealer

IOS Capability		
Process-based		Not existing
Knowledge-based		Existing
Relationship-specificity IOS-related resources (discussed in chapter 7)		
From Fast Cuisine perspective	Physical resources	Low
	Human-based resources	High
	Business-process resources	Low
	Domain-knowledge resources	High
From Dealer perspective	Physical resources	Low
	Human-based resources	High
	Business-process resources	Low
	Domain-knowledge resources	High

Hypotheses 3a, 3b and 3d are supported, but hypothesis 3c is not supported in this case study. The knowledge-based IOS capabilities are existing and were developed by employing a combination of frequent meetings of executives of both organizations (i.e. human-based resources), and the efforts of the data analyst to improve the ordering system (i.e. knowledge-based resources). The process-based IOS capabilities do not exist, although human-based resources have a high degree of relationship-specificity, contradicting hypothesis 3c. This can be explained by the low degree of relationship-specificity of IOS-related business-process resources. The human efforts are aimed at the knowledge sharing and transfer and not at coordinating and managing the cross organizational processes.

The relationship between Stenazia and Alumifid

Stenazia sells computer and electronics products. The market for computer and electronic products is dynamic, and products are renewed a few times a year. This implies that stocking facilities should be flexible and fluctuations ought not impede operations. Within the relationship, the organizations try to react to these fluctuations using various tactics. The cross-organizational processes are accurate and highly flexible. Such processes include, for example, the last

minute modifications that need to be performed according to end customer's wishes at the time of ordering. Stenazia issues the confirmation of the order including expected delivery time, but Alumifid has to execute these modifications. Alumifid executes the requested modifications and ensures that the product is ready for delivery within hours. This process is performed continually on a wide range of products. This capability of rapidly reacting to market demands is perceived as a process-based IOS capability within the context of this relationship.

The capability of rapidly reacting to market demands also requires from both organizations to transfer and share the knowledge of the market effectively. The communication of end-customer orders by Stenazia to Alumifid is not sufficient. Alumifid needs to have technical knowledge of computer and electronics products and be familiar with the products of Stenazia. The options that Stenazia offers to its customers are made possible by the abilities of Alumifid. Therefore, the capability of rapid reaction to market demands also entails a knowledge-based IOS capability in the context of this relationship.

Table 8.4: The values in the relationship between Stenazia and Alumifid

IOS Capability		
Process-based		
Existing		
Knowledge-based		
Existing		
Relationship-specificity IOS-related resources (discussed in chapter 7)		
From Stenazia perspective	Physical resources	Low
	Human-based resources	High
	Business-process resources	High
	Domain-knowledge resources	High
From Alumifid perspective	Physical resources	Low
	Human-based resources	High
	Business-process resources	High
	Domain-knowledge resources	High

Hypotheses 3a, 3b, 3c and 3d are supported in this case study. Various types of resources have enabled the knowledge-based and process-based IOS capability of rapid reaction to market demands. First, the organizations have successfully interlinked organizational processes across organizational borders. Second, the organizations share specific domain knowledge (e.g. technical specifications of

products). Third, the frequent meetings at the operational and strategic levels ensure the smooth interlinkage of processes and effective knowledge transfer.

The relationship of Fretadia with Phoselot

The deliveries of stylish home and bathroom accessories by Fretadia to Phoselot occur on a regular basis. The orders are issued every week, and products are typically manufactured within two weeks and delivered to Phoselot's agent in Hong Kong. Subsequently, the products are shipped to the US and arrive approximately four weeks later. The long time span between ordering the products and their reaching their destination in the US implies that short-term market fluctuations have to be absorbed by keeping a buffer stock. The existence of both the long time span and the buffer stock indicates that the functioning of the relationship is not realized through a tight interlinkage of processes. Therefore, we can argue that no process-based IOS capability exists within the relationship.

The stylish home and bathroom accessories have commodity characteristics and no significant changes occur to the products after the contracts have been fixed. The organizations have no need to exchange information regarding the latest customer preferences. The communication of large amounts of information through the IOS does not imply knowledge exchange or transfer. This is because both parties use the information to perform the current customer orders and do not utilize the information for long-term purposes. The information is collected by the ERP of Phoselot and is offered to Fretadia, but there is no enduring objective. Therefore, it can be argued that no knowledge-based IOS capability exists within the relationship.

Table 8.5: The values in the relationship between Fretadia and Phoselot

IOS Capability		
Process-based		
Not existing		
Knowledge-based		
Not existing		
Relationship-specificity IOS-related resources		
(discussed in chapter 7)		
From Fretadia perspective	Physical resources	Low
	Human-based resources	Low
	Business-process resources	High
	Domain-knowledge resources	High

Hypotheses 3c and 3d are supported, but hypotheses 3a and 3b are not supported in this case study. The lack of meetings and coordination between employees and management of both organizations coincides with the lack of tight interlinkage of business processes and the transfer of knowledge. Consequently, it can be argued that the low degree of relationship-specific IOS-related human-based resources has hampered the development of process-based and knowledge-based IOS capabilities.

The customization of packaging and shipping processes on the side of Fretadia is not equivalent to the interlinkage of business processes. The high relationship-specificity of IOS-related business processes is not sufficient to produce process-based IOS capabilities. Similarly, the investments Fretadia makes into analyzing specific preferences of the market of Phoselot are not sufficient for the transfer of knowledge across the organizations. The high relationship-specificity of IOS-related domain-knowledge resources within human-based support does not produce knowledge-based IOS capabilities.

Tilburiun Webdesign and Glusetan ISP

Tilburiun acquires services from Glusetan that require the communication of explicit digital information. Accordingly, no customization is applied to the information-exchange procedures, and the IOS is used to fasten the communications. Aside from the speed advantages, no additional advantages are acquired from the use of the IOS. The processes of the organizations are not interlinked. Tilburiun perceives each process conducted by Glusetan as a black box because Tilburiun doesn't know what happens after it conveys the information. This applies to Glusetan as well; it has no information on the processes of Tilburiun. Furthermore, neither knowledge transfer nor knowledge sharing occurs between Tilburiun and Glusetan. The information that is communicated concerns particular customers and transactions. Once the transactions are completed, the value of the information diminishes. Therefore, the continuous exchange of information doesn't accumulate in such a way that it enhances the knowledge of the organizations.

Table 8.6: The values in the relationship between Tilburium Webdesign and Glusetan ISP

IOS Capability		
<hr/>		
Process-based		Not existing
Knowledge-based		Not existing
<hr/>		
Relationship-specificity IOS-related resources		
(discussed in chapter 7)		
<hr/>		
From Tilburium perspective	Physical resources	Low
	Human-based resources	Low
	Business-process resources	Low
	Domain-knowledge resources	Low
<hr/>		

Hypotheses 3a, 3b, 3c and 3d are not contradicted in this case study. The low relationship-specificity of the different types of IOS-related resources has resulted in the non-existence of IOS capabilities. The organizations are unwilling to develop the IOS capabilities because they don't seem to offer the relationship any major advantages. The current information exchange satisfies the requirements of both organizations.

This section discussed six case studies and examined how the combination of different types of IOS-related resources affects the existence of IOS capabilities. The hypotheses related to the third proposition were tested, and the findings mostly indicate support for the hypotheses. Few contradictions have been found between the hypotheses and the cases. These contradictions can be attributed to context specific circumstances of the case studies. Hence, we argue that the case studies provide sufficient support for the hypotheses.

Hypothesis 3a. Incorporating *business-process* specific IOS-related resources that have a high degree of relationship-specificity positively affects *process-based* IOS capabilities.

Hypothesis 3b. Incorporating *domain-knowledge* IOS-related resources that have a high degree of relationship-specificity positively affects *knowledge-based* IOS capabilities.

Hypothesis 3c. Incorporating *human-based* IOS-related resources that have a high degree of relationship-specificity positively affects *process-based* IOS capabilities.

Hypothesis 3d. Incorporating *human-based* IOS-related resources that have a high degree of relationship-specificity positively affects *knowledge-based* IOS capabilities.

8.3.2 Field study

This section describes testing the hypotheses, which were discussed in the previous section, using a quantitative field study. A field study can produce interesting insights into the relationship between IOS-related resources and IOS capabilities due to two reasons. First, a field study is useful in dealing with currently observable phenomena. The questions focus on the current situation -- i.e. the current use of specific resources and the advantages currently obtained. Second, the field study yields measurable evidence on the relationship between IOS-related resources and IOS capabilities. Hence, the evidence can be analyzed using accepted rigorous techniques. The data are gathered by means of an Internet survey, following the methodology described in chapter 4.

Independent variables

The independent variables include the relationship-specificity of three different types of IOS-related resources. The three types are human-based, business-process and domain-knowledge IOS-related resources. Measurement of the independent variables is discussed in section 8.3.2. These variables are discussed in that section as dependent variables.

Dependent variables

The dependent variables include the process-based and knowledge-based IOS capabilities. The existence of process-based IOS capabilities is determined based on the average of four indicators: (1) the degree to which the IOS supports order processing, invoicing and settling accounts, (2) the degree to which the IOS supports exchange of shipment and delivery information, (3) the degree to which the IOS supports integration of production planning and forecasting with supplier and (4) the degree to which the IOS supports enabling coordinated responses between the organizations to unexpected disruptions or events. The existence of knowledge-based IOS capabilities is as well determined based on the average of four indicators: (1) the degree to which the IOS supports leveraging the organizations' expertise to create new business opportunities, (2) the degree to which the IOS supports understanding sales and end-customer preferences, (3) the degree to which the IOS supports understanding market trends in the freight transport sector, and (4) the degree

to which the IOS supports integrating functions such as designs and manufacturing between the organizations.

Control variables

The development of IOS capabilities can be influenced by various factors that affect interorganizational relationships. Douma et al. (1998) argue that uncertainty, complexity and frequency can affect the functioning of interorganizational relationships. The investments conducted by the business partner affect the functioning and success of the IOS. Therefore, uncertainty, complexity, frequency and IOS-related resources used by the partner are incorporated as control variables in the analysis.

The descriptive statistics and correlation values between the variables are depicted in table 8.7. The hypotheses are tested using the multiple regression method. Hypotheses H3a and H3c are tested separately from hypotheses H3b and H3d because each pair has a distinct dependent variable. Hypotheses H3a and H3c have process-based IOS capabilities as the dependent variable. H3b and H3d have knowledge-based IOS capabilities as the dependent variable.

Table 8.7: Pearson correlation matrix

Variable	Mean	S.D.	1	2	3	4	5
1. Rel.-Spec. of human-based IOS-related resources	2.70	1.20	1				
2. Rel.-Spec. of business-process IOS-related resources	2.36	1.30	0.28	1			
3. Rel.-Spec. of domain-knowledge IOS-related resources	1.92	1.16	0.20	0.41	1		
4. Existence of process-based IOS capabilities	2.39	1.02	0.27	0.09	0.24	1	
5. Existence of knowledge-based IOS capabilities	1.84	0.87	0.21	0.20	0.20	0.58	1

The results of the regression analysis are presented in table 8.8. The control variables are included in all regression specifications. The results indicate that the relationship-specificity of business-process IOS-related resources has no significant influence on the existence of process-based IOS capabilities. This does not support hypothesis 3a. A possible explanation can be that transport organizations provide the majority of the IOS-related resources required for the interorganizational process-based capabilities. This is confirmed by the fact that IOS-related resources used by the partner do have a significant impact on the process-based IOS capabilities. The relationship-specificity of human-based

IOS-related resources does have a significant influence on the existence of process-based IOS capabilities. This supports hypothesis 3c.

Table 8.8: The standardized coefficients of the regression analysis

Variables	Existence of process-based IOS capabilities	Existence of knowledge-based IOS capabilities
Rel.-Spec. of human-based IOS-related resources	0.253**	.098
Rel.-Spec. of business-process IOS-related resources	0.008	
Rel.-Spec. of domain-knowledge IOS-related resources		0.193**
Uncertainty	.013	-.017
Complexity	-.130	.027
Frequency	.038	-.070
IOS related resources used by the partner	.018	.298
Significance entire model	.118	.001

* $p < .05$; ** $p < .1$

The relationship-specificity of both domain-knowledge and human-based IOS-related resources has significant influence on the existence of knowledge-based IOS capabilities. These findings support hypotheses 3b and 3d. Furthermore, note that the IOS-related resources provided by the transport organization also significantly influence the existence of knowledge-based IOS capabilities.

The following hypotheses are thus supported by the field study:

Hypothesis 3b. Incorporating *domain-knowledge* IOS-related resources that have a high degree of relationship-specificity positively affects *knowledge-based* IOS capabilities.

Hypothesis 3c. Incorporating *human-based* IOS-related resources that have a high degree of relationship-specificity positively affects *process-based* IOS capabilities.

8.4 Discussion

The findings of the case studies and the field study coincide in showing that human-based IOS-related resources are necessary for the development of process-based IOS capabilities. Human cognitive and social skills are essential for the successful interlinkage of business processes. The results suggest that both organizations need to customize their processes and give consent to their employees to meet regularly or frequently. The efforts carried out by the employees ensure that changes within the environment are absorbed by the relationship. Customers, suppliers, governments or various other parties can trigger changes within the environment of the relationship. The employees and management of the organizations perceive these changes in the environment, and can discuss how the relationship should evolve to accommodate these changes. The findings of the case studies and the field study do not coincide regarding the influences of business-process IOS-related resources on the existence of IOS capabilities. The field study finds positive but insignificant influence, whereas the majority of case studies find a positive influence from the use of business-process IOS-related resources on the existence of process-based IOS capabilities. The difference can be explained by the fact that transport organizations may rely on relationship-specific human-based communications rather than customized business processes to achieve process-based IOS capabilities. The successful interlinkage in that case occurs through human communication channels and the business processes remain flexible. This enables the relationship to remain flexible and adaptable to the changing market needs.

The effective sharing and transfer of knowledge across organizations occurs when the domain knowledge within each organization is adapted and customized for the relationship. The findings of the case studies and the field study indicate that the relationship-specificity of domain-knowledge IOS-related resources positively influences the existence of knowledge-based IOS capabilities. The customization is accomplished by ensuring that the knowledge within the focal organization is attuned to the business partner. Hence, the difference in the gap of knowledge is decreased. The findings regarding the influences of human-based IOS related resources on knowledge-based IOS capabilities are mixed. This can be explained by the type of knowledge that is transferred and shared within the relationships. When the information can be codified and communicated electronically, then the organizations have no need for major human interaction in the transfer and sharing of related databases and

knowledge depositories. The findings of the field study indicate that Internet shops do not require relationship-specific human cognitive and social skills to develop knowledge-based capabilities. This is because the transportation and logistics information can be codified and is therefore electronically communicated using the existing IT infrastructure. However, when the information and knowledge resides primarily with people, then the employees and management of each organization need to become acquainted with their counterparts in other organization, gradually absorbing the expertise and knowledge residing in the other organization. The findings of the case studies therefore indicate that relationship-specific human-based IOS capabilities are required for the transfer of this type of knowledge. The employees acquired specific knowledge in order to be able to communicate with their counterparts. The meetings between employees cultivated effective communications. The differentiation between tacit and explicit information and knowledge provides a possible explanation for the differences in the findings.

8.5 Chapter summary

This chapter discussed the development of IOS capabilities within interorganizational relationships. The findings indicate the need for human-based IOS-related resources, which must be accompanied by the customisation of either business-process or domain-knowledge IOS-related resources in order to produce process-based or knowledge-based IOS capabilities, respectively. The following chapter will discuss how IOS capabilities influence the acquisition of operational and strategic benefits within interorganizational relationships.

Chapter 9 IOS capabilities and strategic benefits

9.1 Introduction

This chapter discusses how the existence of IOS capabilities influences the attainment of strategic benefits. The organizations develop abilities and competencies through the use of the IOS within the relationship. This can affect performance and may benefit the organizations. This chapter examines the strategic influences of IOS capabilities.

Section 9.2 discusses of operational and strategic benefits of interorganizational relationships. The section complements the literature review in chapter 2. Section 9.3 discusses the testing of the hypotheses using data collected from the case studies and the field study. Section 9.4 discusses the empirical findings. Section 9.5 summarizes the chapter.

9.2 Theoretical background and hypotheses

Organizations develop interorganizational relationships to pursue various objectives. Performance within relationships differs according to the context of the relationship (Barringer et al., 2000). Hence, the value and benefits obtained from IOSs differ. The benefits from interorganizational relationships can be classified as either more strategically or operationally oriented benefits (Craighead et al., 2006; Mukhopadhyay et al., 2002; Subramani, 2004). Some studies distinguish between the benefits acquired by each of the participating organizations (Delporte-Vermeiren et al., 2004; Straub et al., 2004). The focus of this study, however, is on the aggregate of the benefits acquired by both organizations within the dyadic relationship -- and more particularly, the role of IOSs in enabling the achievement of these benefits. This focus coincides with viewing the dyadic interorganizational relationship as the unit of analysis of the research. The following sections briefly discuss the operational and strategic benefits of interorganizational relationships.

9.2.1 Operational benefits

The interorganizational relationship at the operational level can be perceived as one organization providing products or services in exchange for

recompensation from the other organization. Potential benefits at the operational level include cost reduction, data error elimination, rapid invoicing, customer responsiveness improvement, efficiency gains, product quality monitoring and automation of boundary-crossing processes (Cash et al., 1985; Chatfield & Bjorn-Andersen, 1997; Johnston & Vitale, 1988; Subramani, 2004). Previous studies report varying levels of operational benefits due to the use of IOSs (Mukhopadhyay et al., 1995). Ahmad et al. (2001) argue that the IOS, and particularly EDI, provides cross organizational integration by means of exchange of information. When information is shared and disseminated in a timely fashion, the transacting organizations are able to react to the latest changes and accordingly achieve a higher delivery performance. Mukhopadhyay et al. (2002) focus on the financial aspects and argue that the electronic transfer of information can hasten the payment procedure. Payment authorization within an organization depends on a number of issues. However, as far as the information exchange is concerned, the arrival of the invoice triggers the payment-authorization process. The electronic transfer of this information thus enables the authorization process to start at an earlier time than under manual transfer. Chen et al. (2000) argue that the sharing of demand data enables the supplier to enhance the forecast precision and hence to decrease the total inventory levels and costs. Lee et al. (2000) assert that even under the assumption that the supplier bears the full cost of guaranteeing reliable supply, the supplier can obtain inventory reduction and cost reduction with information sharing. They argue that the reductions are even larger when the demand within the market is highly variable. Other studies support the idea that developing processes and sharing information increase the operational benefits gained from the relationship (Lee et al., 1997; Malhotra et al., 2005).

9.2.2 Strategic benefits

The use of IOSs can also yield strategic benefits such as increased innovation abilities, enhanced bargaining power, and richer understanding of the partner and market (Bakos et al., 1986; Cash et al., 1985; Johnston et al., 1988; Subramani, 2004). Mukhopadhyay et al. (2002) argue that strategic gains are accrued directly (strengthening the interorganizational relationship or indirectly (accumulating significant operational benefits that eventually lead to additional strategic benefits). Malhotra et al. (2005) distinguish various supply-chain partnership configurations based on interlinked processes and information-system infrastructures that facilitate partner-enabled market-knowledge creation. Similarly, Subramani (2004) includes the ability to develop new

business opportunities as a strategic benefit acquired from interlinkage of business processes and domain knowledge.

Organizations cooperate in order to gain strategic benefits in various areas such as technology, products and markets (Yoshino & Rangan, 1995). For example, the alignment of organizations enables them to cooperate and coordinate activities closely. When they accomplish this in a successful manner, organizations waste less time and effort (Balsmeier & Voisin, 1996). Cooperation with suppliers has been emphasized in previous studies (Barret & Konsynski, 1982). Suppliers offering assistance in the product-design phase can offer better synergies of components and technology, can contribute to better design assessment and more efficient design choices (Tan et al., 2002). Organizations can select a limited number of important business partners that are willing to share the responsibility (Clemons et al., 1993).

Recently, increased emphasis has been placed on the strategic benefits of knowledge sharing and on partner-enabled knowledge creation for long-term advantage (Malhorta et al., 2005; Subramani et al., 2003). Knowledge-intensive cooperative social contexts among employees, business units and business partners have been distinguished (Chen et al., 2005). These contexts are favorable to the creation, coordination, transfer and integration of knowledge to achieve continual value innovation (Goshal et al., 1996). Hult et al. (2002; 2004) argue that when an organization shares information and knowledge it can increase its efficiency of operations and will have more information about the business partner's needs and preferences. This will eventually minimize the time required for order fulfillment.

This study focuses on the influences of process-based and knowledge-based IOS capabilities in the attainment of strategic benefits. Process-based IOS capabilities comprise the successful interlinkage of business-processes across organizations. An important aspect of this type of capability is order planning integration, which enables the organizations to increase the speed of delivering products and services to customers. Order planning is an essential feature of the relationship with customers, and better integration would consequently yield distinctive strategic advantage. The interlinkage of business processes also enables coordinated responses between the organizations in case of unexpected disruptions or events. When the responses are coordinated successfully, the quality of the services delivered to end customers does not fluctuate. Uncertainty is one of the main characteristics of the current environment, and

customers therefore value suppliers that can provide stable and secure products and services. Process-based capabilities are therefore expected to improve performance and to positively influence the attainment of strategic advantage. The knowledge-based IOS capabilities comprise the ability to transfer and share knowledge across organizations. This enables each of the organizations to increase its expertise through the utilization of the expertise of the business partner. This can have various effects such as an enhanced understanding of market trends or the generation of new business opportunities. The enhanced understanding of the market enables the organizations to anticipate more accurately the developments within the market and to provide the necessary reactions. The acquired expertise can also enable the organization to increase the scope of the services that it provides to its customers. It can provide a more comprehensive package consisting of complementary and related services. The offering of such services may enhance the relationship with customers and may thus yield strategic benefits. Hence, the following propositions are proposed:

Hypothesis 4a. Process-based IOS capabilities positively affect the attainment of strategic benefits.

Hypothesis 4b. Knowledge-based IOS capabilities positively affect the attainment of strategic benefits.

9.2.3 Data and results

Multiple case studies and a field study provide the data for testing the hypotheses. Chapter 4 discussed the design of the methods pursued. This section presents the findings of each method and discusses the extent to which the data confirm the hypotheses.

9.2.4 Case studies

The case study method enables the in-depth examination of the phenomena under investigation. The use of semi-structured interviews facilitates the focus on particular aspects of the interorganizational relationship -- in this case, the existence of IOS capabilities and the operational and strategic benefits obtained. At the same time, there is some leeway in determining to what extent the various aspects should be investigated. Interorganizational relationships are different and have diverse objectives. Accordingly, the freedom to focus on particular aspects and to assign them more significance is beneficial for the study. Section 9.3 discusses the existence of IOS capabilities within each of the

interorganizational relationships investigated. This section discusses the operational and strategic benefits within each relationship and the extent to which the findings support the hypotheses.

The relationship between Global Automation Companion and Integrated Logistics

The relationship offers operational and strategic benefits for both GAC and Integrated Logistics. The intensive information exchange leads to lower transaction costs. This offers operational benefits including being able to meet the progressive cost targets. These targets ensure that the logistics costs remain at levels comparable to those of competition within the industry. The intensive information exchange also enables more accurate forecasts, which in turn produces other operational benefits. The occupancy of the warehouse can be improved by more effective arrangement of the inventory. Better forecasts also improve employee productivity by enhancing the planning of working hours and ensuring the availability of capable employees.

On a strategic level, GAC is able to offer more reliable and faster delivery of products to its customers in the EMEA region. The reliability of services and products is of essential importance in GAC's market. GAC is perceived as a successful player because it can realize high-quality performance consistently. The organization promotes its reliability and ability to fulfill orders rapidly to its existing and potential customers in order to attain new business opportunities. For Integrated Logistics, the satisfaction of its sole customer has strategic importance. This eventually has led to GAC extending the contract and prolonging the relationship.

Table 9.1: The values in the relationship between GAC and Integrated Logistics

Benefits	
Strategic benefits	Existing
IOS capabilities	
(discussed in chapter 8)	
Process-based	Existing
Knowledge-based	Existing

Hypotheses 4a and 4b are both supported in this case study. The interlinkage of processes and the sharing of knowledge improve reliability. As argued earlier, higher reliability has strategic importance within the market in which GAC operates. From the perspective of Integrated Logistics, the interlinkage of processes and the transfer of knowledge have resulted in prolongation of the existence of the organization. The benefits GAC acquires from the relationship motivate it to prolong the relationship. As GAC is its sole customer, Integrated Logistics finds prolongation of the relationship of strategic importance.

The relationship between HighTech and Road Transport Logistics (RTL)

The relationship provides operational and strategic benefits to both HighTech and RTL. The interlinkage of business processes and the accompanying information exchange enable RTL to achieve greater efficiency and effectiveness in its daily operations. RTL is able to fulfill the orders of HighTech more rapidly. The products of HighTech need to be delivered on time, although deviations of several hours do not have major impacts. The ability of RTL to offer warehousing activities that enhance the final delivery times is therefore perceived as an operational benefit.

The strategic benefits attained from the relationship include ease in obtaining the large orders of the large customers that are present within the market in which HighTech operates. These large orders generate significant turnover and profits for both HighTech and RTL. HighTech is able to succeed in obtaining these orders because they offer high quality products and reliable delivery times. The interorganizational relationship with RTL is an important factor that enables HighTech to realize the reliable delivery times. The warehousing activities are an essential part of the procedures between receiving customer orders and delivering the products.

Table 9.2: The values in the relationship between HighTech and Road Transport Logistics

Benefits	
Strategic benefits	Existing
IOS capabilities	
(discussed in chapter 8)	
Process-based	Existing
Knowledge-based	Not - Existing

Hypothesis 4a is supported, but hypothesis 4b is not supported by the case study. The interlinkage of business processes across HighTech and RTL enable adherence to a predetermined protocol. This successful adherence to the sequence of actions constitutes the process-based IOS capability. This capability makes it possible to realize rapid and reliable delivery times, which improves the services delivered by HighTech and yields strategic benefits. Although the knowledge-based IOS capability is not present within this relationship, the organizations nevertheless attain strategic benefits from the relationship and from the information exchange through the IOS. This contradicts hypothesis 4b. The strategic benefits are attained in another way (i.e. the process-based IOS capability) -- one that is more appropriate within the context of the interorganizational relationship.

The relationship between Fast Cuisine and Dealer

Fast Cuisine and Dealer attain both operational and strategic benefits from their relationship. Transaction costs are lower compared to the situation when the orders were manually communicated through fax. Apart from the obvious decline in the volume of paperwork, also the errors in paperwork causing delays in the delivery process have been eliminated. The online connectivity increases productivity by diminishing waste of time and resources by conducting unnecessary activities. For example, when communications were previously conducted by fax, every message was required to have a title page that include specific information to ensure that the message was delivered to the right person in the other organization. The messages now are handled electronically by the system, and choosing the correct header field is sufficient for ensuring the correct transfer and handling of the message.

The organizations share a significant amount of information regarding their market, and they coordinate activities according to the available information. The coordination allows Fast Cuisine to manage its inventory levels, thereby preventing Fast Cuisine from suffering additional inventory costs. Dealer is able to enhance its planning abilities concerning the daily delivery schedules of its trucks. It has more than 50 trucks that need to deliver varying amounts of products to different places. The enhanced planning yields significant efficiency gains for both organizations.

The combination of knowledge and expertise allows the organizations to develop strategic long-term plans. These plans can contribute to the strategic objectives of both Fast Cuisine and Dealer. Fast Cuisine is able to achieve good

growth and attractive returns. Dealer is able to improve its relationship with one of its most important customers. The plans affect the strategy of Fast Cuisine as it determines the types of promotional activities in which it will engage. Fast Cuisine directs these promotional activities at its customers. The frequency and quality of these activities directly impact the turnover, profits and consumer image of Fast Cuisine. As for Dealer, the growth of Fast Cuisine yields additional orders that need to be fulfilled. The relationship thus produces strategic benefits to both organizations.

Table 9.3: The values in the relationship between Fast Cuisine and Dealer

Benefits	
Strategic benefits	Existing
IOS capabilities	
(discussed in chapter 8)	
Process-based	Not - Existing
Knowledge-based	Existing

Hypothesis 4a is not supported, but hypothesis 4b is supported by the case study. The lack of existence of process-based IOS capabilities combined with the attainment of strategic benefits does not coincide with the expectations. This can be explained by the fact that the relationship does not require the tight interlinkage of business processes to realize its objectives. However, the successful transfer and sharing of knowledge across organizations (knowledge-based IOS capability) did have a major impact on realizing the strategic objectives. Note that the shared knowledge regarding the market was tacit and possessed primarily by the employees and management of both organizations. When the expertise is applied to novel market conditions, multiple interpretations can arise and the effects of the expertise may consequently be ambiguous. The employees and management, including the data analyst, need to meet and discuss the issues in order to come to a common understanding.

The relationship between Stenazia and Alumifid

Stenazia and Alumifid attain operational and strategic benefits from their relationship. The intensive communications enable the organizations to achieve various efficiency advantages such as increased inventory accuracy and reduced order pickup time. These efficiency advantages result in lower

transaction costs. Considering the large number of transactions, a decrease in transaction costs entails significant operational profits.

The relationship enables Stenazia to provide timely deliveries of customized products. This is a strategic objective that allows Stenazia to achieve a competitive advantage. Also Alumifid attaches strategic importance to the realization of that objective, since Stenazia is an important customer. The delivery of customized products entails last-minute modifications in the shipping and packaging of products. The customers perceive the service of modifying the packaging of the products without significant time delays as an order winner (i.e. the characteristic of a product or service that wins an order and is considered the final aspect in the purchasing decision). The market of computer and electronic products has a competitive nature. Providing additional attractive services to customers can enable the organization to keep up with the competition. However, the order-winner characteristic provides Stenazia the opportunity to achieve a competitive advantage.

Table 9.4: The values in the relationship between Stenazia and Alumifid

Benefits	
Strategic benefits	Existing
IOS capabilities	
(discussed in chapter 8)	
Process-based	Existing
Knowledge-based	Existing

Hypotheses 4a and 4b are both supported by the case study. The existence of process-based IOS capabilities enables the attainment of strategic benefits. The interlinkage of business processes leads to a high level of accuracy and flexibility in delivering products. These services provide a competitive advantage and consequently also yield strategic benefit. As argued earlier, these services are also supported by the knowledge-based IOS capabilities. Stenazia and Alumifid need to share specific knowledge in order to be able to offer these services. On the one hand, Stenazia needs to have accurate information regarding the performance abilities of Alumifid; on the other hand, Alumifid needs to have accurate information regarding the products and technologies offered by Stenazia.

The relationship of Fretadia with Phoselot

The benefits obtained from the relationship through the use of the IOS include only operational benefits. The communication of a large volume of information is not costly. Accordingly, Phoselot offers Fretadia ample information concerning the inventory levels, historical data and forecasts. The information includes the total inventory of the organization as well as detailed information per store. Fretadia utilizes only a minor part of the information received -- more particularly, the information regarding the new orders placed by Phoselot. This indicates that the IOS is used to increase the speed of order processing.

Even though ample information is communicated, the IOS does not support attaining strategic benefits such as enhancing the interorganizational relationship or better understanding of end-customer preferences. As argued in chapter 8, analysis of the information provided by the IOS can provide important insights. These insights can lead to strategic benefits. Fretadia does not conduct the analysis, however, and no strategic benefits are obtained from information exchange.

Table 9.5: The values in the relationship of Fretadia with Phoselot

Benefits	
Strategic benefits	Not - Existing
IOS capabilities	
(discussed in chapter 8)	
Process-based	Not - Existing
Knowledge-based	Not - Existing

Hypotheses 4a and 4b are both supported in this case study. The lack of existence of both process-based and knowledge-based IOS capabilities have resulted in the lack of strategic benefits attained within the relationship from the information exchange. The peculiar fact is that the IOS provides the opportunity to gain knowledge and attain strategic benefits, but the organizations do not conduct the efforts necessary to obtain these benefits.

The relationship of Tilburiun Webdesign and Glusetan ISP

The use of the IOS has produced operational benefits to both Tilburiun and Glusetan. Tilburiun can process the orders of its customers more rapidly. It is able to register new websites using the automated system of Glusetan without

the need of interference by the employees of Glusetan. Generally, there are no disruptions and the entire process of registering a website takes a few minutes. The automation of the procedures also decreases the transaction costs. Tilburiun needs only to fill in the fields, and completing the procedure takes a few minutes. Glusetan does not need to do anything except maintaining the system and intervening in case of disruptions.

The benefits discussed above and all other benefits produced by the system have neither a strategic nature nor provide a distinctive competitive advantage. The market of domain-name registration and web hosting is highly competitive. Rapid transaction completion and low costs are common. The used IOS enables Tilburiun and Glusetan to keep up with the competition.

Table 9.6: The values in the relationship of Tilburiun Webdesign and Glusetan ISP

Benefits	
Strategic benefits	Not - Existing
IOS capabilities	
(discussed in chapter 8)	
Process-based	Not - Existing
Knowledge-based	Not - Existing

This case study supports both hypotheses 4a and 4b. Process-based and knowledge-based IOS capabilities do not exist. No strategic benefits are obtained from the information exchange within the relationship.

This section discussed six case studies and examined how IOS capabilities influence the attainment of strategic benefits. Within the six case studies, each hypothesis was supported five times and rejected only once. Thus, the findings of the case studies mostly indicate the support for the hypotheses:

Hypothesis 4a. Process-based IOS capabilities positively affect the attainment of strategic benefits.

Hypothesis 4b. Knowledge-based IOS capabilities positively affect the attainment of strategic benefits.

9.2.5 Field study

This section discusses testing the hypotheses using a quantitative field study. A field study permits the collection of a wide range of information from a relatively large number of respondents. This increases the generalization of the results of the study and makes it possible to apply them to other situations outside the particular research context of this specific study. The data is collected from respondents representing Internet shops, using an Internet survey. The methodology of the field study is described in chapter 5.

Independent variables

The independent variables include the process-based and knowledge-based IOS capabilities. The indicators used for measurement of the independent variables are discussed in section 8.3.2. These variables are discussed in that section as dependent variables.

Dependent variable

The dependent variable is the strategic benefits obtained from the interorganizational relationship. The extent of strategic benefits is determined based on five indicators: (1) The degree of creating/improving a competitive advantage, (2) The degree of improving the understanding of customer needs, (3) The degree of improving the relationships with end customers, (4) The degree of improving information transfer, and (5) The degree of improving (transport) services.

Control variables

The attainment of strategic benefits from interorganizational relationships can be influenced by different factors. The uncertainty of the market, the complexity of the services, the frequency of conducting transactions and the period of the relationship are argued to influence the benefits attained from the relationship (Douma et al., 1998). These factors are therefore incorporated as control variables in the analysis.

Table 9.7 presents the descriptive statistics and correlation values of the variables related to the hypotheses. The multiple regression method is used to test the hypotheses.

Table 9.7: Pearson correlation matrix

Variable	Mean	S.D.	1	2	3
1. Existence of process-based IOS capabilities	2.39	1.02	1		
2. Existence of knowledge-based IOS capabilities	1.85	0.87	0.58	1	
3. Strategic benefits	2.86	1.18	0.39	0.37	1

The results of the regression analysis are depicted in table 9.8. The results show that the existence of both process-based and knowledge-based IOS capabilities significantly influence the attainment of strategic benefits. These results support hypotheses 4a and 4b. Process-based capabilities have an important influence on the relationship. Transport services can be improved significantly by smoother order processing, more effective exchange of shipment and delivery information, and better integration of planning and forecasting with suppliers. It appears, however that the transfer and sharing of knowledge have slightly more influence. The transfer of knowledge yields several advantages such as the creation of new business opportunities, better understanding of market trends and end-customer preferences or integration of more complex processes such as manufacturing and design with the suppliers.

Table 9.8: The standardized coefficients of the regression analysis

Variables	Strategic benefits
Existence of process-based IOS capabilities	0.232*
Existence of knowledge-based IOS capabilities	0.232*
Uncertainty	-.149
Complexity	.242
Frequency	.210
Period of relationship	.005
Significance entire model	.000

* $p < .05$; ** $p < .1$

Accordingly, both hypotheses related to proposition 4 are supported by the field study:

Hypothesis 4a. Process-based IOS capabilities positively influence the attainment of strategic benefits.

Hypothesis 4b. Knowledge-based IOS capabilities positively influence the attainment of strategic benefits.

A similar regression is conducted to assess the relationship between operational benefits and the independent variables described above. The results of the regression can be found in appendix D. The findings support earlier studies indicating that tight cross-organizational interlinkage and the sharing of knowledge positively influence the attainment of operational benefits (Gosain et al., 2004; Malhotra et al., 2005). However, the influences of knowledge sharing do not have a significant influence on the attainment of operational benefits, according to our data.

9.3 Discussion

The findings of the case studies and the field study indicate that process-based and knowledge-based IOS capabilities positively influence the attainment of operational benefits. More specifically, the process-based IOS capabilities are found to increase the rapidity of transactions and the efficiency of stock management. This is furthermore supported by knowledge-based IOS capabilities. The sharing of knowledge and the understanding of market trends further enhance coordination of the activities across the organizations.

The findings also indicate that process-based IOS capabilities positively influence the attainment of strategic benefits. The process-based capabilities (such as exchange of product information and the integration of order planning and forecasts) enable the organizations to improve the understanding of customer needs and the relationship with the customer. This study does not differentiate between the direct and indirect attainment of strategic benefits. However, it is reasonable to assume that the understanding of customer needs will in due course improve the entire relationship with the customer.

The knowledge-based IOS capabilities are found to positively influence the attainment of strategic benefits as well. The successful sharing and transfer of

knowledge improve the amount of knowledge and expertise within each organization. This can have various influences in terms of understanding market developments and creating new business opportunities within the relationship. These influences have strategic impact because they affect the relationship with customers and can produce competitive advantages. The knowledge acquired by the organizations can be applied to other relationships. The transfer of knowledge within a particular IOR can therefore produce strategic benefits not directly related to the relationship.

9.4 Chapter Summary

This chapter discussed the influences of the existence of IOS capabilities. The discussion focused more particularly on how such capabilities affected operational and strategic benefits. The findings of the case studies and the field study indicate that both process-based and knowledge-based IOS capabilities positively influence the attainment of operational and strategic benefits.

10.1 Introduction

This chapter summarizes the thesis and provides insights regarding the contributions of the research to academics and practice. The conclusions of this research are based on the findings of a literature review, multiple case studies and a field study. The insights found in the literature highlight the important influences of trust and dependence on the use of IOSs. The participants in the case studies agreed that trust is necessary for conducting business in general, and the use of IOSs, in particular. The participants of the field study indicated that dependence can have a substantial influence on the information exchange within the relationship. Furthermore, the study analyzes the influences of using various types of resources on the success of information exchange and the attainment of strategic benefits.

This chapter contains the following sections. Section 10.2 discusses the background of the research and how it relates to the two research questions. Section 10.3 briefly describes the research approach followed. This section also briefly summarizes the key findings for each of the research questions. Section 10.4 discusses the contributions of this research. These contributions are divided into contributions to theory and to practice. Section 10.5 enumerates the limitations of this study and provides possible directions for future research.

10.2 Background of the research

This study focuses on the use of IOSs within dyadic relationships. IOSs are used within different contexts and types of relationships. The first objective of this study is to examine the influences of two important attributes of relationships, trust and dependence. The literature on information management and strategic alliances provides numerous arguments mostly asserting that higher levels of trust and dependence improve the information exchange and the strategic importance of relationships. Trust is argued to increase positive expectations and to diminish opportunistic behavior. These factors improve the willingness of business partners to exchange information and rely on the IOS. Similarly, dependence coincides with the increased reliance between the business partners and consequently the overlap of their organizational

objectives. Furthermore, a dependent organization is more vulnerable to exploitation and accordingly needs to follow the demands of the dominant business partner.

Academics and practitioners agree that information systems, including IOSs, should be used to facilitate broader organizational objectives. Accordingly, the investments and use of IOS-related resources within any specific relationship rely on the context and the objectives of the relationship. A tight relationship, where business partners cooperate closely, has different information exchange requirements than a loose relationship, where business partners prefer to remain flexible. The various types of relationships yield various types of IOSs, which are realized using different resources. Since IT investments can be done by any organization, IT resources, including IOS related resources, have become commoditized (Carr, 2003); nevertheless, the importance of IT in producing distinctive competitive advantage is emphasized (Choudhury, 1997; Powell et al., 1997; Subramani, 2004). Accordingly, the second objective of this study is to investigate how IOS-related resources assist in the attainment of strategic objectives. The two objectives can be achieved by answering the following research questions:

Research question 1: How do dependence and different types of trust influence the different types of IOS-related resources?

Research question 2: How do different types of IOS-related resources influence the attainment of strategic benefits?

10.3 Summary of key findings

The research questions are answered by following a research approach consisting of multiple stages. The first stage includes a literature review that provides in-depth comprehensive information on the phenomena investigated and an understanding of the current avenues of research. The examined literature covers a variety of related areas including IORs, IOSs, trust, dependence and the resource-based view. The second stage of this study comprises the development of the conceptual model based on the insights obtained from the literature. The model distinguishes particular constructs and variables related to the phenomena under investigation. The model also offers specific propositions and hypotheses (i.e. the expected relationships between the constructs and variables, respectively). The third stage consists of the development of a rigorous research design. This study adopts a positivist

philosophy, and the view that a scientific theory can be empirically falsified. To increase the validity of the results, this study follows the triangulation principle and pursues a mixed approach. This is realized by combining a quantitative field study and multiple qualitative case studies. The field study permits the collection of data from a large amount of respondents representing their respective organizations. The analysis of the data obtained from the field study strengthens the generalization of the results. The case studies permit the collection of rich and in-depth data from relatively few respondents. The analysis of the case study data strengthens the understanding of the causal links between the constructs and variables.

Structural equations modeling (particularly LISREL) is utilized to test the statistical significance of the support of the quantitative data to the conceptual model. The assessment measures of the LISREL model indicate that the empirical data generally correspond with the predictions, although the specific propositions are not entirely corroborated. Subsequently, the hypotheses related to each proposition are tested to obtain a more thorough understanding. Both quantitative and qualitative data are used to test the hypotheses related to each proposition. The following sections provide the results of the analysis and an answer to each of the research questions.

10.3.1 Research question 1

The first research question concerns the influences of trust and dependence on the use of IOS-related resources. This study investigates the influences of the different types of trust by examining the data obtained from the qualitative case studies. Trust is perceived as an attitude or an expectation held by an organization that its business partner will behave in a mutually acceptable manner. The conceptual model includes the three types of trust: competence, openness and reliability. The perception of the partner as competent and, accordingly, having competence-based trust in the partner, positively affects the use of relationship-specific business processes and human-based IOS-related resources. High competence motivates the focal organization to rely on the business processes of the business partner. This reliance is realized by customizing the business processes and the related information exchange. The recognition of competence entails the pursuit and sharing of technical standards. These common technical standards facilitate the interlinkage of business processes across organizations. Another influence of competence-based trust is the frequent meetings between employees and management of

both organizations. They meet to coordinate the activities and processes across the organizations. They also meet to discuss how the combination of the competences of the business partners can facilitate the attainment of novel potential benefits.

The second type of trust involves perceiving the business partner as having high reliability. This reliability-based trust positively affects the use of relationship-specific business processes and human-based IOS-related resources. High reliability indicates that the partner organization can achieve consistent performance and uphold professional criteria. This induces the focal organization to comply with the requests of the partner organization and to optimize the business processes to complement the processes of the partner organization. The customization and effective interlinkage of processes generate additional value within the relationship. This value can be realized by the cooperation of employees and managers with their counterparts. The interlinkage of activities across organizations produces additional inertia, as modifications of activities need to be approved and implemented by both organizations. The main additional value of human-based resources includes the efforts of people (i.e. employees and managers) in recognizing the need for specific adaptation and managing the successful implementation of these changes.

Openness-based trust, which entails the perception of openness, increases the relationship-specificity of knowledge-based and human-based IOS-related resources. The perception of openness is argued to increase information sharing, which creates value when it leads to the creation of new information and knowledge for the particular relationship. The creation of such knowledge is possible when each organization is willing to open its boundaries towards the business partner by making more information available and, at the same time, absorbing information from the partner organization. The employees and managers of both organizations make this process possible. Managers at the executive level usually take the decision to reveal the information to the partner organization. The tactical and operational employees make a significant contribution toward the creation of new knowledge.

Previous studies and the literature discussing caring-based trust have identified various differing influences. This can be caused by the fact that this type of trust is affected by various other factors, such as a general tendency for caring and the personal propensity for caring, more than the other three types of trust

discussed earlier. This study includes a case study involving caring-based trust in order to improve the understanding of its influences on the different types of IOS-related resources. Caring-based trust is seen to positively influence the relationship-specificity of human-based, business-process, and domain-knowledge IOS-related resources. The frequent meetings of employees and management of both organizations are the primary driver of the caring. Depending on the context and the requirements, information is shared and business processes are interlinked across the organizations.

The findings indicate that interorganizational dependence can have a positive influence on the relationship-specificity of human-based, business-process, and knowledge-based IOS-related resources. Dependence does not influence the relationship-specificity of physical IOS-related resources. The latter can be effected by the commoditization of IT resources and the existence of effective communication infrastructures that utilize existing IT technologies. Dependent organizations are not compelled to invest and use relationship-specific resources because such options are economically unattractive for both the dependent and the dominant organizations.

The influences of dependence on human-based IOS-related resources are mixed. This can be due to other characteristics of the business relationship, such as the traded products and the tacitness of information. For example, when the traded products are commodities, then it is easier to describe the product characteristics more explicitly. The explicit information can be communicated more efficiently and effectively using computerized systems (i.e. mainly physical IOS-related resources), although frequent meetings of employees and managers (i.e. human-based IOS related resources) are more effective for the communication of tacit information.

Dependence has a positive influence on the relationship-specificity of business-process IOS-related resources used. The dominant organization can impose its requirements on the dependent organization. It can insist on the adoption of specific business processes, which are favorable to the dominant organization. However, the dominant organization can also have a supportive role in the transition and continuation of these processes. The dependent organization can take advantage of the expertise and the resources of the dominant organization. The costs do not need to be entirely borne by the dependent organization, which may render the higher relationship-specific business-process IOS-related resources more attractive.

Finally, dependence positively influences the relationship-specificity of knowledge-based IOS-related resources. The dependent organization can feel obligated to embrace specialized knowledge concerning the other organization. The dependent organization can do this either by acquiring information and knowledge specifically applicable to the dominant organization or by relinquishing sensitive internal knowledge and sharing it with the business partner. Both of these activities result in relationship-specific domain-knowledge IOS-related resources.

10.3.2 Research question 2

The second research question concerns the attainment of strategic benefits through the use of different types of IOS-related resources. This study utilizes a resource-based perspective in answering this question and examines whether the use of specific IOS-related resources influences the existence of two particular IOS capabilities and, subsequently, how these capabilities influence the attainment of strategic benefits.

Two distinctive IOS capabilities are distinguished: process-based and knowledge-based IOS capabilities. This study examines how the relationship-specificity of two types of IOS-related resources (namely, business processes and human-based) affects the existence of process-based IOS capability. The findings indicate that the increased relationship-specificity of business-process IOS-related resources do not always correspond with the existence of process-based IOS capabilities. The existence of such capabilities may depend on other factors. However, when both organizations customize their processes according to the objectives and requirements of the relationship, successful interlinkage of the processes is more likely. The design of internal business processes in cooperation with the partner can significantly increase the efficiency and effectiveness of cross-organizational processes. The immediate outcomes of such cooperation may include eliminating duplicate procedures and agreeing on unified standards. Long-term outcomes of the cooperation may include the development of shared expertise concerning these specific business processes. The findings indicate that the use of relationship-specific human-based IOS related resources has a positive influence on the existence of process-based IOS capabilities. This means that human skills are important in the successful interlinkage of business processes. The tight interlinkage across organizations can be sensitive to environmental changes. Employees and managers of both

organizations are best equipped to notice these changes. Accordingly, they need to discuss continuously the changes in the environment and to agree on shared courses of action. The efforts of employees and managers in maintaining the common understanding within the relationship are essential for preserving a beneficial interorganizational cooperation.

This study also examines the influences of knowledge-based and human-based IOS-related resources on the existence of knowledge-based IOS capabilities. The findings show that domain-knowledge IOS-related resources have positive influences. The effective sharing and transfer of information and knowledge is improved when the domain knowledge within each organization is tailored to the requirements of the relationship (i.e. higher relationship-specificity of domain-knowledge IOS-related resources). If the information and knowledge of the focal organization is customized to fit and complement the knowledge of the partner organization, then the likeliness of successful and effective information and knowledge transfer is higher. The findings regarding the influences of human-based IOS related are mixed. The inconsistency can be explained by differentiating between the different types of knowledge. On the one hand, when the information and knowledge can be codified then it is easier to transfer it electronically. The communications can occur using the existing physical infrastructure. In that case, the customization of the databases and knowledge (i.e. high relationship-specificity of domain-knowledge IOS-related resources) is sufficient for the existence of knowledge-based IOS capabilities. On the other hand, when the information and knowledge have a tacit nature, the human dimension becomes more important. The human-based resources (in the form frequent meetings and discussions between employees and managers of both organizations) facilitate the knowledge sharing and transfer in various ways. Frequent meetings enable the sharing of experiences and points of view regarding the current issues within the relationship. Social contact is important in decreasing the cognitive distance, which enables a more successful transfer of tacit information and knowledge. Discussions are important in deciding what aspect of the available knowledge is applicable and how it should be applied in different situations. Common understanding is essential for converting the theoretical associations to practical and real solutions. The distinction between tacit and explicit knowledge is a viable explanation of the mixed findings.

The findings indicate that the IOS capabilities positively influence the attainment of strategic benefits. This occurs in different ways, depending on the objectives of the relationship and on the type of IOS capability. Process-based

capabilities enhance information exchange regarding order processing, the integration of order planning and coordination in the execution of orders. These activities directly influence the performance of the organizations and the quality of the products and services provided to the customers. Through dissemination of order information and integration of order planning, the business partners create an environment that enables order fulfillment to be more effective and efficient. Each organization obtains better and richer information regarding future orders, which decreases the risk of encountering surprises and enables the organization to enhance its internal planning. This will result in improving the schedules of working hours and ensuring the availability of capable employees. Organizations can intensify their cooperation by coordinating the execution of orders. This can yield various benefits. Order processing is faster, due to the avoidance of unnecessary delays. The effective organization and interlinkage of activities enhances the quality of services. The enhanced coordination increases the flexibility and improves the reactions to environmental changes. These benefits are important for the relationship with customers, and can have strategic influences.

The knowledge-based IOS capabilities can positively influence the attainment of strategic benefits in various ways. The sharing of information increases the knowledge within each organization regarding the abilities and limitations of the business partner. This is important, as competitive advantage is increasingly gained through competition between groups of allied organizations rather than between individual organizations. Accordingly, accurate and up-to-date information regarding the abilities of the partner enables the focal organization to enhance the decision-making process. A second way of achieving strategic benefits from the transfer and sharing of information between the organizations is the integration of knowledge streams and depositories. This includes various developments. For example, organizations can increase the effectiveness of information-intensive activities. Each organization can utilize the knowledge of its business partner to improve its own actions. The focal organization needs to internalize the knowledge and become skilled in that knowledge in order to be able to utilize it effectively. Therefore, the sharing of knowledge within the relationship increases the organizational learning abilities and can facilitate the achievement of a competitive advantage. A third way that can lead to the attainment of strategic advantages is the use of the abilities of the business partner to search the environment for potential business opportunities. The information provided by the partner can complement the information acquired by the focal organization. This will increase the possibilities of finding

attractive opportunities that are achievable through the cooperation with the business partner.

10.4 Research contributions

This study makes several contributions to theory and practice. These contributions are discussed in the following two sections.

10.4.1 Contributions to theory

The literature on interorganizational relationships is extensive and contains various distinctive streams. This study builds on multiple streams. The stream of strategic alliance management focuses on the strategic long-term cooperative arrangements between organizations (Ireland et al., 2002), and particular studies within that stream focus on the sharing of resources (Hitt et al., 2000). Here it is argued that the management of the relationship and the use of appropriate resources by each organization play important roles in the achievement of strategic benefits. This study focuses on how strategic benefits are achieved. The examination of the causal relationship between IOS capabilities and strategic benefits complements earlier studies and provides a conceptualization relying on the dynamic compliance with requirements of the environment through information exchange. The distinction between operational and strategic benefits enables the distinction between different levels of influences. Mukhopadhyay et al. (2002) examine the influences of electronic integration on the operational and strategic level. This study provides a more detailed analysis by focusing on the relationship-specificity and distinguishing between different types of IOS related resources.

As discussed in chapter 6, the literature on trust can be divided into two distinctive streams; the first stream encompasses literature discussing the different types of trust and the second stream encompasses literature discussing the influences of trust. This study combines both streams by examining the distinctive influences of various types of trust. The combination of the two streams enables our study to offer two contributions in this area. The first is the support for the opinion prevalent within theory that trust exists within relationships. That opinion argues that trust can have substantial influences on economic behaviour (Ring & Van de Ven, 1994). The opposing opinion argues that trust is an elusive notion and it should be avoided in the process of modeling economic interactions (Williamson, 1993). The empirical findings in

this study suggest that even though organizations are principally calculative, they can expect to achieve additional value by increasing their vulnerability and hence trusting particular business partners. The causes of trust are not investigated in this study and no insights can therefore be provided on the development of trust. The findings do suggest, however that the existence of particular types of trust can provide the opportunity to increase cooperation and obtain additional value. The second contribution obtained from combining the two streams encompasses the ability to discriminate between the influences of various social mechanisms. Rice et al. (1991), following Pfeffer et al. (1978), argue that social information processing theory “postulates that individuals may be influenced by cues from others about what to attend to, how to value the salient dimensions of workplace phenomena, and how others evaluate the same phenomena”. The communication network of an individual human being or organization encompasses contacts with various actors. These contacts expose the individual to external information, attitudes and behavior. Social information processing theory argues that socially constructed meaning regarding an individual’s tasks, an individual’s past experiences concerning the tasks, and other objective characteristics of the work environment affect perceptions, assessments, attitude formation and behavior (Rice et al., 1991). The insights provided by our study can be used to enrich the understanding regarding the formation of attitudes and behavior. Competence and reliability-based trust are found to have distinctive influences from openness-based trust. These distinctive influences can be used to explain particular attitudes and behaviors of individuals and organizations.

This study has common characteristics with the literature on organizational networks (Grandori & Soda, 1995; Jarillo, 1993; Van Alstyne, 1997). A network organization can be conceived of as a group of separate firms, each retaining its own authority in major budgeting and pricing matters, to function as integral parts of a greater organization (Ching et al., 1996; Estrin, 1985). A sociological behavioral view emphasizes the social relations between persons, positions and organizations, and their influences (Fulk, 2001; Hovorka & Larsen, 2006). Network organizations facilitate the interaction of people with different backgrounds belonging to various organizations. Individuals and organizations are confronted with information, attitudes and behavior. Issues related to trust and dependence between the various organizations can play a major role in the information exchange within the network. The insights from this study can clarify the types of trust and the types of IOS-related resources that are required to achieve certain objectives through the network.

This study contributes also to the knowledge management literature. Advocates of knowledge management argue that an organization needs to utilize its existing knowledge and develop new knowledge that positively influences its competitive position (Conner & Prahalad, 1996; Grant, 1996; Massey et al., 2002; Sherif & Xing, 2006). To access new knowledge, organizations increasingly need to enter alliances or to become a member of a community of organizations and institutions. The new focus on interorganizational context deeply affects the strategy of knowledge management (Chung et al., 2004; Ciborra & Andreu, 2002). Within a successful alliance, the knowledge is shared across separate organizations and new knowledge is created. This study has two contributions to this area of knowledge management literature. First, it provides an in-depth discussion and conceptualization of the influences of trust on IOS-related resources that are involved in the knowledge management process. Trust has been emphasized to be an important determinant of knowledge transfer (Ichijo et al., 2000; Sarker, 2005; Sculanski et al., 2004). Our study indicates that particularly openness-based trust has a major influence on knowledge transfer in terms of diffusing organizational boundaries and facilitating the sharing of information. The second contribution involves providing insights regarding the success of knowledge sharing and transfer. The development of these capabilities as well as their potential strategic influences is examined. This study suggests that physical IT resources do not require customization to secure the success of knowledge transfer. Organizations can use existing technologies and standards to transfer explicit information and knowledge. Furthermore, the efforts of employees and managers need to complement the customization of the knowledge repository within the organizations to achieve a successful transfer of tacit information and knowledge as well. Previous studies assert that recurrent communication facilitates the development of shared meaning, which supports the process of knowledge transfer (Davenport & Prusak, 1998; Sarker, 2005). This study confirms that assertion, and complements it by arguing that these communications need to be complemented with the customization of internal information and knowledge repository within each organization.

10.4.2 Contributions to practice

Businesses are facing increasingly competitive environments. This can be attributed to various factors including globalization of markets, the rapidness of environmental change and increased uncertainty. Organizations are utilizing

their relationships with other organizations and actors to cope with the competitive environment. This study focuses on a number of essential characteristics of strategic relationships and analyses some of the relationships between these characteristics. A key strength of this study is that the participants in the case studies and the field study are practitioners who have first-hand experience with the phenomena under investigation. Accordingly, this study is rooted in theoretical frameworks but assigns to practitioners an essential role in the attainment of the findings.

This study focuses on information-exchange-related issues. This is an important aspect of present-day interorganizational collaboration. The contemporary society is demanding continuous and rapid change, and organizations collaborate in order to increase their ability in realizing that objective. The use of information technology is essential in achieving successful and effective information exchange. This study contributes to this area by arguing that IT-related resources can be valuable, and can offer various advantages ranging from increasing flexibility of interorganizational processes to more effective information transfer. The study distinguishes between different types of IT-related resources. This distinction is imperative for organizations, as there is an increasing call for organizations to account for IT investments. The findings indicate that there is no particular need to invest and use customized IT hardware and software to achieve successful information exchange. The use of existing widespread technological standards provides the organizations ample opportunities for communication.

The efforts of employees and managers decisively influence the realization of successful information exchange that yields strategic benefits. This can be due to multiple reasons. First, the transfer of information and knowledge can occur within a cross-functional interorganizational team – a group consisting of members from both organizations and coming from multiple functional areas such as engineering, sales and manufacturing. The interorganizational composition increases the amount of information available to solve problems and facilitates the successful transfer of information across organizational borders. The cross-functional composition increases the opportunity of combining diverse skills and abilities to combine information and to create knowledge in novel ways. A second reason arguing for the importance of efforts of employees and managers is the cognitive ability of people to deal with the complex environment. Employees and managers can notice and take advantage of emerging opportunities. Although information technology has

achieved considerable progress, it is still far away from competing with human cognitive capacities in dealing with the complex environment. A third reason supporting the importance of the efforts of employees and management is the tacitness of the knowledge. Tacit knowledge is difficult to codify and thus resides mainly within the heads of people. The process of knowledge creation within each organization is more successful when it incorporates and builds upon the existing knowledge of the business partner. Accordingly, interaction between people is essential for the communication and development of tacit knowledge. The employees and managers of each organization need to understand the knowledge of the partner organization in order to be able to complement it.

This study focuses on interorganizational trust and dependence, which are two important aspects of relationships. Organizations initiate different types of relationships; consequently, the levels of trust and dependence differ according to the context of the relationship. Trust plays an essential role in a wide spectrum of human interactions and has particular importance within business relationships. The distinction between different types of trust is relevant to practitioners, who habitually differentiate between different relationships. This study produces insights regarding the opportunities that can be achieved when a certain type of trust is present. The business environment produces various challenges for organizations, which makes it useful to know how to take advantage of the existing business relationships. Managers can use the insights of this study to determine which type of trust is required to achieve successful information exchange and strategic benefits.

10.5 Limitations and future research

This study has several limitations that can serve as possible directions for future research. First, the findings are restricted by the research context, which focuses on dyadic interorganizational relationships. Organizations initiate and develop other types of interorganizational relationships, such as cartels, associations, and interlocking boards of directors. Within these contexts, trust and dependence have different meanings and influences. The findings of our study therefore cannot be generalized to all types of interorganizational relationships. However, the abstract conceptualization of the distinctive types of trust may provide some suggestions regarding the influences of trust in other types of relationships.

Other limitations stem from the complex and multidimensional nature of trust. This study focuses on the influences of several types of trust. The study does not examine the development of trust. The trust-building process is path dependent, and is influenced by various potential factors. Such factors include culture (Hofstede, 2001), existing institutions (Pavlou et al., 2003), involved risk (Bohnet & Zeckhauser, 2004) and power (Hart et al., 1997). This study does not incorporate any of these factors to analyze the development of trust. Future studies may investigate the factors involved in the longitudinal development of trust and the use of the IOS-related resources distinguished in our study. Furthermore, this study does not include other types of trust that are distinguished in the literature such as integrity (Mayer et al., 1995) or contractual-based trust (Sako, 1998). Future research may investigate the specific influences of other types of trust on the IOS-related resources distinguished in our study. Another limitation of this study is that it doesn't investigate the relationship between interorganizational trust and dependence. The conceptual model focuses only on their influences. Future research can develop and build on the findings of this study by investigating the relationship between dependence and different types of trust.

This study does not investigate organizations that use relationship-specific physical IOS-related resources. This can be a limitation because organizations can use relationship-specific physical IOS resources such as proprietary EDI systems and messaging formats for various purposes such as increasing the security of processes or more reliable information transfer. The particular reasons that lead to the use of physical IOS-related resources are perhaps outside the scope of this study. Future research may explore possible reasons for using such resources and whether these reasons are affected by trust and dependence.

This study investigates the attainment of strategic benefits through two types of IOS capabilities, process-based and knowledge-based. These two types resemble the categorization of two patterns of information systems use, exploration and exploitation, suggested by earlier studies (March, 1991; Subramani, 2004). As there are various types of interorganizational relationships, it is possible that strategic benefits are acquired through other ways and types of IOS capabilities than the two types investigated in this study. Future research can pursue a more explorative approach and try to reveal other types of IOS capabilities. This can lead to contributions that complement this

study in terms of determining the criteria for successful interorganizational information exchanges and the scope of benefits attained from such exchanges.

10.6 Conclusions

The first objective of this study has been to examine the influences of dependence and different types of trust on the use of different types of IOS-related resources. The findings indicate that dependence can influence the efforts of individuals, the interlinkage of business processes and the transfer of information within the dyadic relationship. The findings also show that when trust is based on perceptions of competence or reliability, the organizations customize their internal processes to interact with the processes of the business partner, and the efforts of individuals serve to facilitate the interlinkage of these processes. When trust is based on perceptions of openness, the organizations customize their information and knowledge repositories according to the business partner, and the efforts of individuals serve to facilitate these activities.

The second objective is to understand how the different types of IOS-related resources facilitate the attainment of strategic benefits. The findings indicate that organizations need to combine different types of resources to achieve successful information exchange. The customization of business processes and the efforts of individuals to facilitate these processes positively influence the successful interlinkage of processes. Similarly, the customization of the information and knowledge repository within each organization, complemented by efforts of individuals to facilitate these activities, positively influences the successful transfer and sharing of information and knowledge. The successful interlinkage of business processes and the successful sharing of knowledge positively influence the attainment of strategic benefits.

Appendix A

Measuring The Constructs

This appendix describes how the constructs of the model are measured. Each construct is represented by one or more variables. Each variable will be assessed using particular indicators. The objective is to formulate for each indicator a specific question that can be asked during the interviews.

Conceptual Model Constructs	
Construct	Variables
1000 Interorganizational Trust	1100 Competence 1200 Openness 1300 Caring 1400 Reliability
2000 Interorganizational dependence	2100 The utility of the buyer towards the supplier 2200 The substitutability of the buyer 2300 The buyer's cost of information 2400 sustainability/cost ratio of scarcity mechanism 2500 The utility of good or service for the buyer
3000 Relationship specificity of IOS related resources	3100 Relationship-specificity of physical IOS related resources 3200 Relationship-specificity of human IOS related resources 3300 Relationship-specificity of business-process IOS related resources 3400 Relationship-specificity of domain-knowledgeIOS related resources
4000 IOS capabilities	4100 Process-based IOS capabilities 4200 Knowledge-based IOS capabilities
5000 Strategic benefits	5100 Strategic benefits
Other constructs	
Construct	Variables
6000 Controls	6100 Complexity of products/services 6200 Uncertainty of products/services 6300 Size of the business partner 6400 Frequency of transactions
7000 Operational benefits	7100 Operational benefits

1000 Interorganizational Trust

The variables:

1100 Competence

1200 Openness

1300 Caring

1400 Reliability

Operational description:

Interorganizational trust is determined by the belief of an organization regarding the degree to which its business partner is perceived to be competent, open, caring and reliable in the context of the relationship.

Value determination:

Low Interorganizational trust results from low levels of all four variables 1100, 1200, 1300 and 1400.

Competence-based trust results from a high level of competence.

Openness-based trust results from a high level of openness.

Caring-based trust results from a high level of caring.

Reliability-based trust results from a high level of reliability.

Reference:

Mishra, Aneil K. 1996. Organizational Responses to Crisis: The Centrality of Trust. In R. Kramer & T. Tyler (Eds.) *Trust in Organizations*. Beverly Hills: Sage.

1100 Competence*Indicators:*

- 1110 The ability of the business partner in accurately and efficiently processing transaction information
- 1120 The honesty and accuracy of deadlines set by the business partner

Operational description

Competence is determined by the perception that the business partner is able to accurately and efficiently process transaction information and the perception of honesty and accuracy in setting deadlines.

Measurement method:

Please indicate to what extent you agree with each of the following statements:

1110: The business partner is competent in accurately and efficiently processing transaction information

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

1120: The business partner is honest and accurate when setting deadlines.

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

Value determination for field study:

The level of competence is determined by the average of the indicators 111 and 112.

$$1100 = (1110 + 1120) / 2$$

Competence is high when $1100 \geq 4$

Competence is low when $1100 \leq 3$

Reference:

Hart, P. and C. Saunders. "Power and Trust: Critical Factors in the Adoption and Use of Electronic Data Interchange," Organization Science, Vol. 8, No. 1, pp. 23-42, 1997.

1200 Openness

Indicators:

1210 The willingness of the business partner to share information

1220 The business partner's honesty in business dealings

Operational description

Openness is determined by the degree to which the business partner is perceived to be willing to share information and the degree to which it is perceived to be honest in its business dealings

Measurement method:

Please indicate to what extent you agree with each of the following statements:

1210: The business partner is willing to share information

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

1220: The business partner is honest in his business dealings

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

Value determination for field study:

The value of openness is determined by the average of the indicators 1210 and 1220

$$1200 = (1210 + 1220) / 2$$

Openness is high when $1200 \geq 4$

Openness is low when $1200 \leq 3$

Reference:

Hart, P. and C. Saunders. "Power and Trust: Critical Factors in the Adoption and Use of Electronic Data Interchange," *Organization Science*, Vol. 8, No. 1, pp. 23-42, 1997.

1300 Caring*Indicators:*

1310 The follow-through in delivering on promises made by the business partner

Operational description

Caring is determined by the degree to which the business partner is perceived to follow-through in delivering on promises made.

Measurement method:

Please indicate to what extent you agree with the following statement:

1310: The business partner follows-through in delivering on promises made by him.

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

Value determination:

Caring is high when $1310 \geq 4$

Caring is low when $1310 \leq 3$

Reference:

Hart, P. and C. Saunders. "Power and Trust: Critical Factors in the Adoption and Use of Electronic Data Interchange," Organization Science, Vol. 8, No. 1, pp. 23-42, 1997.

1400 Reliability

Indicators:

- 1410 The reliability of the information provided by the business partner
- 1420 The business partner's adherence to agreements
- 1430 The business partner's consistency in business dealings

Operational description

Reliability of the business partner is determined by the degree of reliability of the information provided by the partner, the partner's adherence to agreements and the business partner's consistency in business dealings.

Measurement method:

Please indicate to what extent you agree with each of the following statements:

1410: The information provided by the business partner is reliable

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

1420: The business partner adheres to agreements

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

1430: The business partner is consistent in business dealings

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

Value determination:

The value of reliability is determined by the average of the three indicators 1410, 1420, and 1430.

$$1400 = (1410 + 1420 + 1430) / 3$$

Reliability is high when $1400 \geq 4$

Reliability is low when $1400 \leq 3$

Reference:

Hart, P. and C. Saunders. "Power and Trust: Critical Factors in the Adoption and Use of Electronic Data Interchange," *Organization Science*, Vol. 8, No. 1, pp. 23-42, 1997.

2000 Interorganizational Dependence

2000_{sup} The dependence of the supplier on the buyer

2000_{buy} The dependence of the buyer on the supplier

The variables

2100 The utility of the business partner towards the focal organization

2200 The substitutability of the business partner

2300 The business partner's cost of information

2400 sustainability/cost ratio of scarcity mechanism

2500 The utility of good or service for the buyer

Operational Description:

According to Cox et. al (2002) the interorganizational dependence of a supplier on a buyer should be measured using different variables than the interorganizational dependence of a buyer on a supplier.

In case the focal organization is the supplier, the dependence on the business partner is determined by assessing the utility of the business partner towards the focal organization, the substitutability of the business partner and the business partner's cost of information.

The dependence of the buyer on the supplier is determined by the sustainability/cost ratio of the scarcity mechanism adopted by the supplier and the utility of the good or service for the buyer.

Value determination

In case the focal organization is the supplier, the dependence on the business partner is high when any of the variables (2100, 2200, 2300) is determined to be high.

The dependence of the buyer on the supplier is high when one of the two variables 2400 and 2500 is determined to be high.

Reference:

Cox A., Ireland P., Lonsdale C., Sanderson J. and Watson G. (2002) Supply Chains, Markets and Power. London: Routledge.

2100 The utility of the business partner towards the focal organization

Indicators:

2110 The volume of the business partner's spend relative to the focal organization's total sales revenue

2111 The product dimension of the volume

2112 The number of products (types) the business partner buys

2113 The total number of products offer by the focal organization

2115 The percentage of the total sales accomplished through the business partner

2120 The frequency of the business partner's spend (i.e. predictability)

2130 The complexity of the offered products

Operational description

The utility of the customer towards the supplier is determined by three elements: the volume of the business partner's expenditure relative to the supplier's total sales revenue; the frequency of the business partner's expenditure; and the complexity of the offered products.

The Volume has two dimensions: a product and a transactional dimension. The product dimension involves the relationship between the breadth of the products offered by the focal organization and the purchased products by the business partner. The transactional dimension involves the relationship between the business partner's purchases and the focal organization's total revenue stream. Frequency involves the rate of recurrence of transactions. The complexity of the products involves the costs associated with servicing the contract.

Measurement method:

2112: How many types of products does the business partner buys?

2113: How many types of products does your company sell in total?

2115: What is the percentage of your total sales accomplished through this buyer?

2121: How frequent does this buyer conduct business with your company?

5-point Likert scale: 1 = less than once per month, 2 = monthly, 3 = weekly, 4 = 2-3 x per week, 5 = daily)

2131: To what extent do you perceive the product to be complex?

5-point Likert scale: 1 = very simple, 5 = very complex

Value determination:

The value of the utility of the business partner (customer) towards the focal organization is high when both 2110 and 2120 are high and 2130 is low.

$$2111 = (2111a / 2111b)$$

$$2115 = (2116 / 2117)$$

$$211i = (2111 + 2112) / 2$$

2110 is high when $211i \geq 0.5$

2110 is low when $211i < 0.5$

$212i = 1$, if 2121 = less than once per month

$212i = 2$, if 2121 = monthly

$212i = 3$, if 2121 = weekly

$212i = 4$, if 2121 = 2 – 3 x per week

$212i = 5$, if 2121 = daily

2120 is high when $212i \geq 3$

2120 is low when $212i \leq 2$

2130 is high when $2131 \geq 3$

2130 is low when $2131 \leq 2$

2100 is low when at least two of the variables 2110, 2120 and 2130 are low

2100 is high when at least two of the variables 2110, 2120, 2130 are high

Reference:

Cox A., Ireland P., Lonsdale C., Sanderson J. and Watson G. (2002) Supply Chains, Markets and Power. London: Routledge.

2200 The substitutability of the business partner

Indicators:

2210 The number of potential buyers within the market

2220 The competitiveness of the market

Operational description

The substitutability of the business partner is concerned with the issue of buyer scarcity for the supplier and it is determined by the number of potential buyers within the market and the competitiveness of the market.

Measurement method:

2210: With how many other buyers can your company conduct the same type of business as with this buyer?

5-point Likert scale: 1=none, , 5= many companies

2220: How competitive do you consider the suppliers within the market you are operating in?

5-point Likert scale: 1 = uncompetitive, 5 = very competitive

Value determination

The degree of substitutability of the buyer is determined by the average of the number of potential buyers within the market and the competitive position of the supplier amongst potential supplier.

$$2200 = (2210 + 2220) / 2$$

Reference:

Cox A., Ireland P., Lonsdale C., Sanderson J. and Watson G. (2002) Supply Chains, Markets and Power. London: Routledge.

2300 The business partner's cost of information*Indicators:*

2310 The business partner's search costs

2320 The business partner's monitoring costs

2120 The frequency of the business partner's spend

Operational description:

The business partner's cost of information is determined by the combination of the business partner's search costs, monitoring costs and the frequency of transactions. All three factors can effect the overall buyer's cost of information.

Measurement method:

2310: How high do you consider the business partner's search costs before conducting the transaction?

5-point Likert scale: 1 = extremely low, 5 = extremely high

2320: How high do you consider the business partner's monitoring costs after conducting the transaction?

5-point Likert scale: 1 = extremely low, 5 = extremely high

2120: How frequent does the business partner conduct business with your company?

5-point Likert scale: 1 = less than once per month, 2 = monthly, 3 = weekly, 4 = 2-3 x per week, 5 = daily)

Value determination:

The value of the business partner's cost of information is the average of the indicators 2310, 2320 and 2330.

$$2300 = (2310 + 2320 + 2330) / 3$$

Reference:

Cox A., Ireland P., Lonsdale C., Sanderson J. and Watson G. (2002) Supply Chains, Markets and Power. London: Routledge.

2400 sustainability/cost ratio of scarcity mechanism

Indicators:

2410 The type of scarcity mechanism adopted by the business partner (supplier)

Operational description:

The sustainability/cost ratio of the scarcity mechanism is determined by the type of scarcity mechanism adopted.

Measurement method:

2411: Which, if any, of the following strategies does your business partner use to distinguish himself from other suppliers:

- No strategy
- Creating information asymmetry between supplier and buyer
- Innovation
- Collusion between suppliers (e.g. cartel)
- Owning essential property rights (e.g. licence or patent)
- Conducting dedicated investments to produce this particular product
- Having natural monopoly

Value determination:

The value of sustainability/cost ratio of scarcity mechanism is determined as follows:

2410 = extremely low, if 2411 = no scarcity mechanism adopted

2410 = significantly low, if 2411 = information asymmetry

2410 = moderately low, if 2411 = innovation

2410 = average, if 2411 = supplier collusion

2410 = moderately high, if 2411 = property rights

2410 = significantly high, if 2411 = dedicated investments

2410 = Extremely high, if 2411 = natural monopoly

Reference:

Cox A., Ireland P., Lonsdale C., Sanderson J. and Watson G. (2002) Supply Chains, Markets and Power. London: Routledge³.

³ The indicators are described on p. 45-46. Suitable questions have been formulated to measure the indicators.

2500 The utility of good or service

Indicators:

2510 The operational importance of good or service

2511 Indispensability of the resource

2512 Volume of purchases

2520 The commercial importance of good or service

Operational description:

Utility is a function of both the operation and commercial importance of a good or service for the focal organization (buyer). The operational importance of a good or service concerns the degree to which it can be replaced by a substitute resource or dispensed with altogether and the volume of purchases conducted. Commercial importance refers to whether a particular good or service is used by the focal organization in a primary or a support activity (and what it contributes overall to the revenue and cost profile of the company.)

Measurement method:

2511: How critical is the product offered by the business partner for your company

5-point Likert scale is used: 1 = insignificant, 5 = extremely critical

2512: what percentage out of your total purchasing costs goes to this business partner?

2521: To what extent does the exchanged product/service from the supplier contribute to your organization's main business activities (where the most revenue come from)?

5-point Likert scale: 1 = support activity, 5 = primary activity

Value determination:

The degree of utility is high when either of the indicators 2510 or 2520 is high.

2510 = high, when (2511 \geq 4) and (2512 \geq 15%)

2510 = low, when (2511 \leq 3) and (2512 \leq 14 %)

2520 = high, when (2510 \geq 3)

Reference:

Cox A., Ireland P., Lonsdale C., Sanderson J. and Watson G. (2002) Supply Chains, Markets and Power. London: Routledge.

3000 Relationship specificity of IOS related resources

The variables:

3100 Relationship-specificity of physical IOS related resources

3200 Relationship-specificity of human IOS related resources

3300 Relationship-specificity of business-process IOS related resources

3400 Relationship-specificity of domain Knowledge IOS related resources

Operational description:

The relationship specificity of IOS related resources is determined by the relationship-specificity of the physical IOS related resources, relationship-specificity of the human IOS related resources ,relationship-specificity of the business-process IOS related resources and relationship-specificity of the domain-knowledge IOS related resources. Physical IOS related resources include the tangible IOS related resources. Business-process and domain-knowledge IOS related resources include the intangible IOS enabled resources.

Value determination:

The relationship specificity of IOS related resources is determined by the average of the relationship-specificity of the physical IOS related resources, human IOS related resources, business-process IOS related resources and domain-knowledge IOS related resources

$$3000 = (3100 + 3200 + 3300 + 3400) / 4$$

Reference:

Subramani, M.R., and Venkatraman, N. (2003). Safeguarding Investments in Asymmetric Interorganizational Relationships: Theory and Evidence. Academy of Management Journal, 46 (1)pp 46-62.

3100 Relation-specificity of physical IOS related resources

Indicators:

3110 The volume of the conducted IT investments to facilitate communications

3120 The possibility of reusing the communication devices with other business partners

Operational description:

The relationship-specificity of the physical IOS related resources is determined by the average of the volume of IT investments, which are conducted to facilitate communications, and the possibility of reusing the communication devices with other business partners.

Measurement method:

Please indicate to what extent you agree with each of the following statements:

3110: The focal organization conducted IT investments to facilitate communications with the business partner (new computers, barcode printers, etc.)

5-point Likert scale: 1 = relatively similar as with other buyers/suppliers; 3 = moderately customized 5 = significantly customized

3120: Our communication devices can be used to facilitate communications with other business partners as well.

5-point Likert scale: 1 = relatively similar as with other buyers/suppliers; 3 = moderately customized 5 = significantly customized

Value determination:

The relation-specificity of physical IOS related resources is determined by the average of the two indicators 3110 and 3120.

$$3100 = (3110 + 3120) / 2$$

Reference:

Subramani, M.R., and Venkatraman, N. (2003). Safeguarding Investments in Asymmetric Interorganizational Relationships: Theory and Evidence. *Academy of Management Journal*, 46 (1)pp 46-62.

3200 Relation-specificity of human IOS related resources*Indicators:*

3210 The specific IT knowledge required by workers to be able to communicate with the business partner.

3220 The specific business knowledge required by workers to be able to communicate with the business partner.

Operational description:

The relationship-specificity of the human IOS related resources is determined by the specific IT knowledge and specific business knowledge required by workers of the focal organization to communicate with the business partner.

Measurement method:

Please indicate to what extent you agree with each of the following statements:

3210: Our workers require specific IT knowledge to be able to communicate with the business partner.

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

3220: Our workers require specific business knowledge to be able to communicate with the business partner.

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

Value determination:

The relation-specificity of human IOS related resources is determined by the average of the two indicators 3210 and 3220.

$$3200 = (3210 + 3220) / 2$$

Reference:

Subramani, M.R., and Venkatraman, N. (2003). Safeguarding Investments in Asymmetric Interorganizational Relationships: Theory and Evidence. *Academy of Management Journal*, 46 (1)pp 46-62.

3300 Relationship-specificity of business-process IOS related resources

Indicators:

3310 Relationship-specificity of the software and applications

3320 Relationship-specificity of administrative procedures

3330 Relationship-specificity of operating procedures

Operational description:

Relationship-specificity of business-Business IOS related resources is determined by the relationship-specificity of the software and applications, administrative procedures and operating procedures.

Measurement method:

3310: The extent to which the *software and applications* used (e.g. billing, inventory management, EDI, etc.) in exchanging products/services with the business-partner are relatively similar or are significantly different from what you use with other business partners.

5-point Likert scale: 1 = relatively similar as with other buyers/suppliers; 3 = moderately customized 5 = significantly customized

3320: The extent to which the *administrative procedures* used (e.g. vendor selection, cost accounting procedures, etc.) in exchanging products/services with the business-partner are relatively similar or are significantly different from what you use with other business partners.

5-point Likert scale: 1 = relatively similar as with other buyers/suppliers; 3 = moderately customized 5 = significantly customized

3330: The extent to which the *operating procedures* used (e.g. manufacturing, bar-coding, packaging, shipping procedures, etc.) in exchanging products/services with the business-partner are relatively similar or are significantly different from what you use with other business partners.

5-point Likert scale: 1 = relatively similar as with other buyers/suppliers; 3 = moderately customized 5 = significantly customized

Value determination:

The relationship-specificity of business-process IOS related resources is the average of the three indicators 3310, 3320 and 3330.

$$3300 = (3310 + 3320 + 3330) / 3$$

Reference:

Subramani, M.R., and Venkatraman, N. (2003). Safeguarding Investments in Asymmetric Interorganizational Relationships: Theory and Evidence. *Academy of Management Journal*, 46 (1)pp 46-62.

3400 Relationship-specificity of domain-knowledge IOS related resources

Indicators:

3410 Relationships-specificity of knowledge and understanding used in planning for products and programs

3420 Relationships-specificity of knowledge and understanding used in product conceptualization and design

3430 Relationships-specificity of knowledge and understanding used in determining product pricing

Operational description:

Relationship-specificity of domain-knowledge IOS related resources is determined by the relationship-specificity of knowledge and understanding used in planning for products and programs, the relationship-specificity of knowledge and understanding used in product conceptualization and design and the relationship-specificity of knowledge and understanding used in determining product pricing.

Measurement method:

3410: The extent to which the knowledge and understanding used in planning for new products is relatively similar or is significantly different from what you use with other business partners.

5-point Likert scale: 1 = relatively similar as with other buyers/suppliers; 3 = moderately customized 5 = significantly customized

3420: The extent to which the knowledge and understanding used in product conceptualization and design is relatively similar or is significantly different from what you use with other business partners.

5-point Likert scale: 1 = relatively similar as with other buyers/suppliers; 3 = moderately customized 5 = significantly customized

3430: The extent to which the knowledge and understanding used in determining product pricing is relatively similar or is significantly different from what you use with other business partners.

5-point Likert scale: 1 = relatively similar as with other buyers/suppliers; 3 = moderately customized 5 = significantly customized

Value determination:

The relationship-specificity of domain knowledge IOS related resources is the average of the three indicators 3410, 3420 and 3430.

$$330 = (331 + 332 + 333) / 2$$

Reference:

Subramani, M.R., and Venkatraman, N. (2003). Safeguarding Investments in Asymmetric Interorganizational Relationships: Theory and Evidence. *Academy of Management Journal*, 46 (1)pp 46-62.

4000 IOS capabilities

The variables:

4100 Process-based IOS Capabilities

4200 Knowledge-based IOS Capabilities

Operational description:

The existence of IOS capabilities is determined through the existence of process-based and knowledge-based IOS capabilities.

Value determination:

The existence of IOS capabilities is determined through the average of the variables 4100 and 4200.

Reference:

Subramani, M.R. and Henderson, J.C., A Typology of Hybrid Governance: Proposal and Empirical Validation. in *Academy of Management Conference*, (Chicago, 1999).

4100 Process-based IOS capabilities*Indicators:*

- 4110 IOS support for the order processing, invoicing and settling accounts
- 4120 IOS support for the exchange of shipment and delivery information
- 4130 IOS support for the integration of order planning and forecasts
- 4140 IOS support for coordinating responses in case of unexpected disruptions

Operational description:

The existence of process-based IOS capabilities is determined through the IOS support for the order processing and billing, the exchange of shipment and delivery information, the integration of order planning and forecasts, and coordinating responses in case of unexpected disruptions.

Measurement method:

Please indicate to what extent IT supports the following processes within your relationship with the business partner:

4110: Order processing, invoicing and settling accounts

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

4120: Exchange of shipment and delivery information

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

4130: Integration of order planning and forecasts

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

4140: Coordinating responses in case of unexpected disruptions

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

Value determination

The level of process-based IOS capabilities is determined by the average of the indicators 4110, 4120, 4130 and 4140.

$$4100 = (4110 + 4120 + 4130 + 4140) / 4$$

Reference:

Subramani, M.R. and Henderson, J.C., A Typology of Hybrid Governance: Proposal and Empirical Validation. in *Academy of Management Conference*, (Chicago, 1999).

4200 Knowledge-based IOS capabilities*Indicators:*

- 4210 IOS support for the improvement of the organizational expertise
- 4220 IOS support for the creation of new business opportunities
- 4230 IOS support for improving the understanding of market developments
- 4240 IOS support for the integration of functions with the business partners

Operational description:

The existence of knowledge-based IOS capabilities is determined through the IOS support for the improvement of the organizational expertise, the creation of new business opportunities, improving the understanding of market developments and the integration of functions with the business partners.

Measurement method:

Please indicate to what extent IT supports the following activities within your relationship with the business partner:

- 4210: The improvement of the organizational expertise
5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support
- 4220: The creation of new business opportunities
5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support
- 4230: Improving the understanding of market developments
5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support
- 4240: The integration of functions with the business partner
5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

Value determination

The level of knowledge-based IOS capabilities is determined by the average of the indicators 4210, 4220, 4230 and 4240.

$$4200 = (4210 + 4220 + 4230 + 4240) / 4$$

Reference:

Subramani, M.R. and Henderson, J.C., A Typology of Hybrid Governance: Proposal and Empirical Validation. in *Academy of Management Conference*, (Chicago, 1999).

5000 Strategic benefits

The variables:

5100 Strategic benefits

Operational description:

The construct strategic benefits is determined using one variable, i.e. strategic benefits.

5100 Strategic benefits

Indicators:

- 5110 Achievement of competitive advantage
- 5120 Improvement of the understanding of customer needs
- 5130 Improvement of the relationship with customers
- 5140 Improvement of information exchange
- 5150 Improvement of the products or services

Operational description:

The attainment of strategic benefits is determined through the achievement of competitive advantage, the improvement of the understanding of customer needs, improvement of the relationship with customers, improvement of information exchange and improvement of the products or services.

Measurement method:

Please indicate to what extent the use of the IOS has supported the attainment of the following strategic benefits:

5110: Establishing and/or improving the competitive advantage of your organization

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

5120: Improving your understanding of the customers' needs

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

5130: Improving your relationships with your customers

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

5140: Improving the information exchange with your business partner

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support,
5 = significant IT support

5150: Improving your products or services

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support,

5 = significant IT support

Value determination

The attainment of strategic benefits is determined by the average of the indicators 5110, 5120, 5130, 5140 and 5150.

Reference:

Das, T.K., and Teng, B.-S. "A Resource-Based Theory of Strategic Alliances," *Journal of Management* (26:1) 2000, pp 31-61.

Mukhopadhyay, T., and Kekre, S. "Strategic and Operational Benefits of Electronic Integration in B2B Procurement Processes," *Management Science* (48:10) 2002, pp 1301 - 1313.

6000 Controls

Control variables

6100 Complexity of products/services

6200 Uncertainty of market

6300 Size of the business partner

6400 Frequency of transactions

Operational description

The following control variables are included: the complexity of products/services, the uncertainty of products/services, the size of the business partner and the frequency of transactions. Each control variable is measured using one indicator.

Measurement method

Please indicate to what extent you agree with each of the following statements:

6100: The products/services involved in the relationship have a high degree of complexity

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

6200: There is a high degree of uncertainty within the market

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

6300: The total number of workers employed by the business partner

5-point Likert scale: 1 = (less than 10), 2 = (11 – 25),

3 = (26 – 100), 4 = (101 – 250),

5 = (more than 250)

6400: We conduct business frequently with the partner organization

5-point Likert scale: 1 = strongly disagree, 5 = strongly agree

Reference:

Subramani, M.R. "How Do Suppliers Benefit From Information Technology Use In Supply Chain Relationships?," *MIS Quarterly* (28:1) 2004, pp 45-73.

Douma, S., and Schreuder, H. *Economic Approaches to Organizations*, (Second edition ed.) Prentice Hall, Hertfordshire, 1998.

6200 Operational benefits

Indicators:

- 6210 Decrease of the transaction costs
- 6220 Improvement of the cash flow
- 6230 Improvement of the efficiency of the stock management
- 6240 Increase of productivity
- 6250 Increase of the processing speed of end customers' orders

Operational description:

The attainment of strategic benefits is determined through the decrease of transaction costs, the improvement of the cash flow, the improvement of the efficiency of the stock management, the increase of productivity and increase of the processing speed of end customer's orders.

Measurement method:

Please indicate to what extent the use of the IOS has supported the attainment of the following operational benefits:

6210 Lowering transaction costs

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

6220: Improving cash flow

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

6230: More efficient stock management

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

6240: Higher productivity

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

6250: Faster processing of orders of your own customers / end customers

5-point Likert scale: 1 = N/A; Minimal IT Support, 3 = Some IT Support, 5 = significant IT support

Value determination

The attainment of operational benefits is determined by the average of the indicators 6210, 6220, 6230, 6240 and 6250.

Reference:

Das, T.K., and Teng, B.-S. "A Resource-Based Theory of Strategic Alliances," *Journal of Management* (26:1) 2000, pp 31-61.

Mukhopadhyay, T., and Kekre, S. "Strategic and Operational Benefits of Electronic Integration in B2B Procurement Processes," *Management Science* (48:10) 2002, pp 1301 - 1313.

I. General Questions

Interview data:

A001 Interviewee name:

A002 Interviewee function:

A003 Date of the interview:

General company information:

A011 Company name:

A012 Visiting address:

A013 Postal address:

A014 Tel. nr.:

A015 Fax nr.:

A016 Primary process:

A017 Branch / sector:

A018 Which of the flowing describes your company:

- ☐ Independent company
- ☐ Holding / parent company
- ☐ Subsidiary of the parent company
- ☐ Other:

A019 At which level does your company mainly operate:

- ☐ Local
- ☐ Regional
- ☐ National
- ☐ International, mainly Europe
- ☐ International, worldwide
- ☐ Other:

A020 How many employees does your company provide work for?

By [- - 20] []

A021 What is the most recent published year revenue realized by your company?

In [20] the revenue was [€]

- | | |
|----------------------------------------------------------|------------------------------------------------------------------|
| <input type="checkbox"/> Less than € 50,000 | <input type="checkbox"/> Between € 1 million and € 10 million |
| <input type="checkbox"/> Between € 50,000 and €100.000 | <input type="checkbox"/> Between € 10 million and € 100 million |
| <input type="checkbox"/> Between € 100,000 and €250.000 | <input type="checkbox"/> Between € 100 million and € 500 million |
| <input type="checkbox"/> Between € 250,000 and €500.000 | <input type="checkbox"/> Between € 500 million and € 1 billion |
| <input type="checkbox"/> Between € 500.000 and 1 million | <input type="checkbox"/> More than 1 billion |

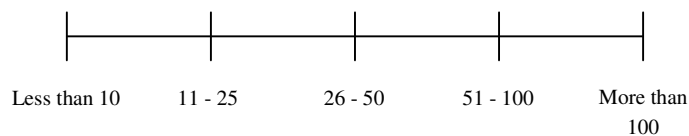
Positioning the interorganizational relationship

A030 Name of the business partner:

A031 Primary process of the business partner:

A032: Branch/sector of the business partner:

6300: How many workers does the business partner employ?



A033: The exchanged products/services:

A034: In the business relationship, the partner is the

- ☐ Supplier
- ☐ Buyer

A035: Since when have you been doing business with this company?

[]

II. The Interorganizational Relationship

Questions for supplier

2113 What is the total number of types of products that your company sells?
[]

2112 How many types of products does this company buy from your company?
[]

2115 What is the percentage of your total sales accomplished through this buyer?
[%]

2121 How frequent does this buyer conduct business with your company?

[] Less than once per month

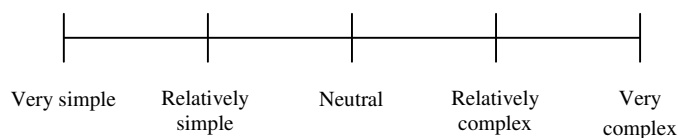
[] Monthly

[] Weekly

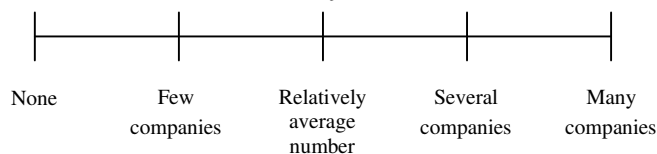
[] 2 – 3 x per week

[] Daily

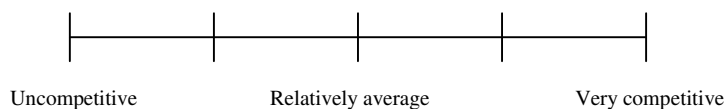
2131 To what extent do you perceive the exchanged products/services to be complex?



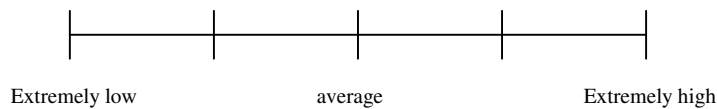
2210 With how many other buyers can your company conduct the same type of business as with this buyer?



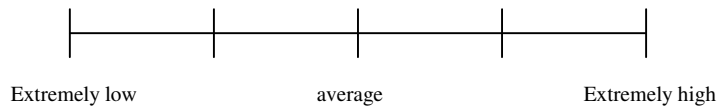
2220 How competitive do you consider the suppliers within the market you are operating in?



2310 How high do you consider the business partner's search costs before conducting the transaction?



2320 How high do you consider the business partner's monitoring costs after conducting the transaction?

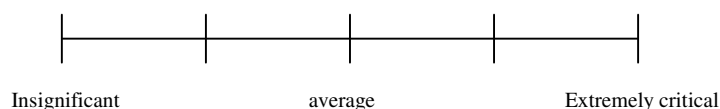


Questions for buyer

2411 Which, if any, of the following strategies does your business partner use to distinguish himself from other suppliers:

- ☐ No strategy
- ☐ Creating information asymmetry between supplier and buyer
- ☐ Innovation
- ☐ Collusion between suppliers (e.g. cartel)
- ☐ Having natural monopoly

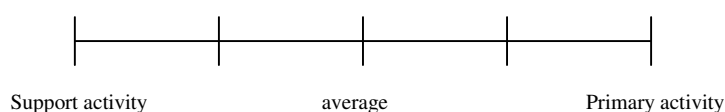
2511 How critical is the product offered by the business partner for your company?



2512 What percentage out of your total purchasing costs goes to this business partner?

[%]

2521 To what extent does the exchanged product/service from the business partner contribute to your organization's primary business activities (where the most revenue come from)?



Trust, Dependence and Interorganizational Systems

Trust Issues

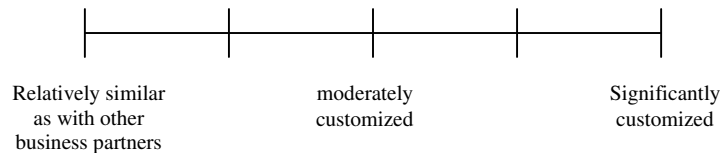
Please indicate to what extent you agree with each of the following statements:

	Strongly agree			Strongly disagree	
	1	2	3	4	5
1110 The business partner is competent in accurately and efficiently processing transaction information					
1120 The business partner is honest and accurate when setting deadlines					
1210 The business partner is willing to share information					
122 The business partner is honest in business dealings					
1310 The business partner follows through in delivering on promises made by him					
1410 The information provided by the business partner is reliable					
1420 The business partner adheres to agreements					
1430 The business partner is consistent in business dealings					
6100 The products/services involved in the relationship have a high degree of complexity					
6200 There is a high degree of uncertainty within the market					

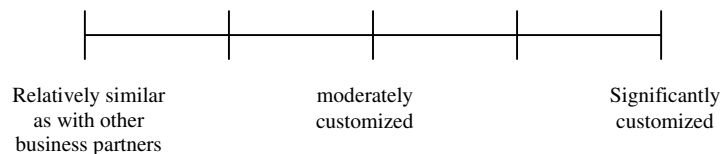
III. The Information Technology aspect of the relationship

The Information Technology related resources used within the relationship

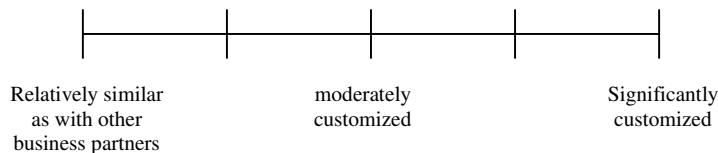
3110 We have conducted IT investments to facilitate communications with the business partner (new computers, bar code printers, etc.)



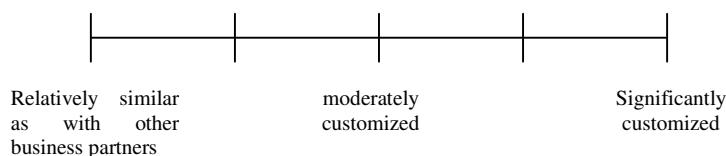
3120 Our communication devices can be used to facilitate communications with other business partners as well.



3210 Our workers require specific IT knowledge to be able to communicate with the business partner.

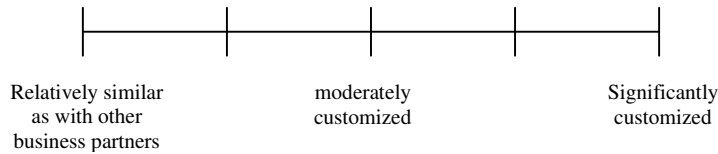


3220 Our workers require specific business knowledge to be able to communicate with the business partner.

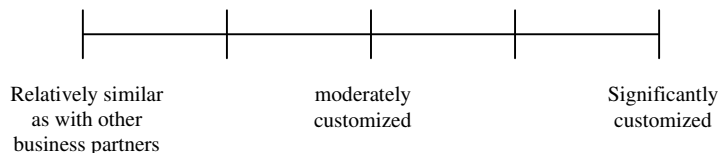


Trust, Dependence and Interorganizational Systems

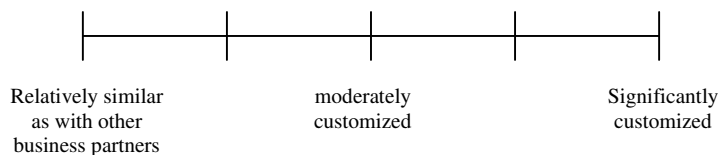
3310 The extent to which the *software and applications* used (e.g. billing, inventory management, EDI, etc.) in exchanging products/services with the business partner are relatively similar or are significantly different from what you use with other business partners.



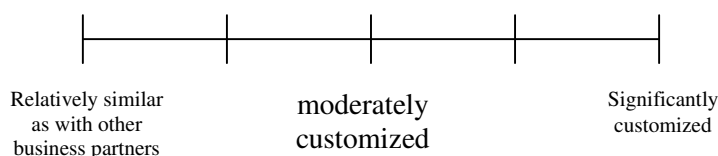
3320 The extent to which the *administrative procedures* used (e.g. vendor selection, cost accounting procedures, etc.) in exchanging products/services with the business-partner are relatively similar or are significantly different from what you use with other business partners.



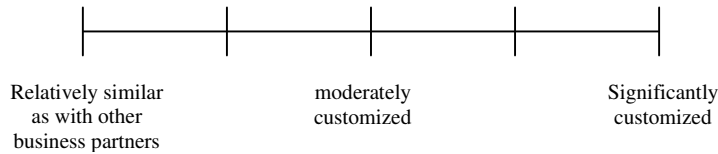
3330 The extent to which the *operating procedures* used (e.g. manufacturing, bar-coding, packaging, shipping procedures, etc.) in exchanging products/services with the business-partner are relatively similar or are significantly different from what you use with other business partners.



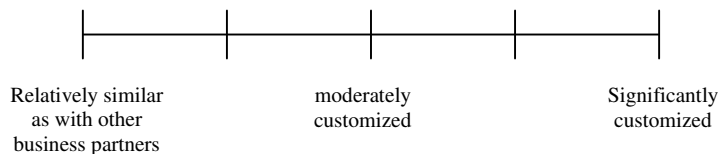
3410 The extent to which the knowledge and understanding used in planning for new products is relatively similar or is significantly different from what you use with other business partners.



3420 The extent to which the knowledge and understanding used in product conceptualization and design is relatively similar or is significantly different from what you use with other business partners.



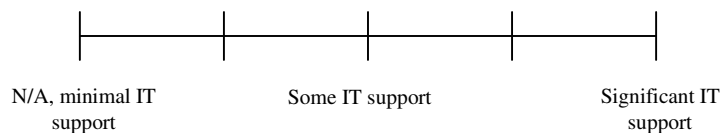
3430 The extent to which the knowledge and understanding used in product conceptualization and design is relatively similar or is significantly different from what you use with other business partners.



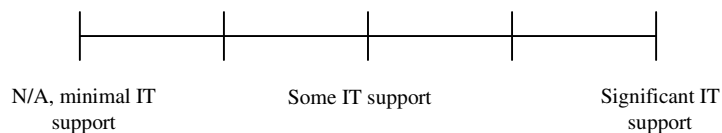
The Information Technology related capabilities

Please indicate to what extent IT supports the following processes within your relationship with the business partner:

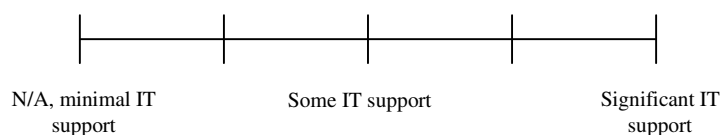
4110 Order processing, invoicing and settling accounts



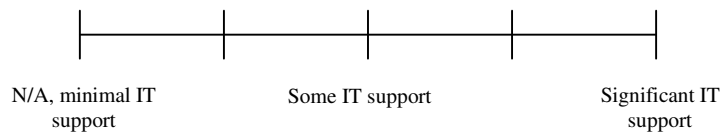
4120 Exchange of shipment and delivery information



4130 Integration of production planning and forecasting

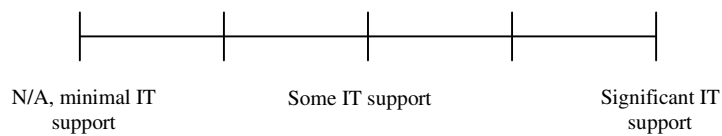


4140 Coordinating responses in case of unexpected disruptions

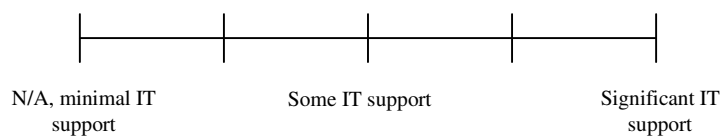


Please indicate to what extent IT supports the following activities within your relationship with the business partner:

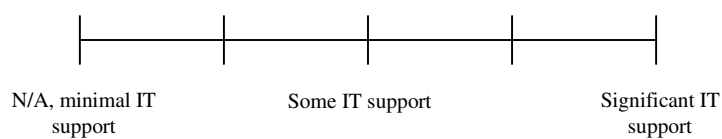
4210: The improvement of the organizational expertise



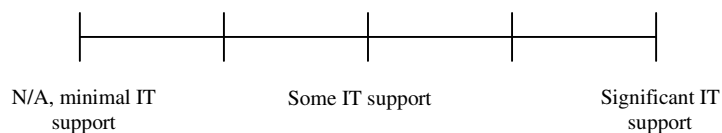
4220: The creation of new business opportunities



4230 Improving the understanding of new market developments



4240 The integration of functions (eg. Designs and manufacturing) with the business partner



The benefits

Please indicate to what extent the use of the IOS has supported the attainment of the following operational benefits:

	Minimal IT support			Significant IT support	
	1	2	3	4	5
6210 Lowering transaction costs					
6220 Improving cash flow					
6230 More efficient stock management					
6240 Higher productivity					
6250 Faster processing of orders of your own customers					

Please indicate to what extent the use of the IOS has supported the attainment of the following strategic benefits:

	Minimal IT support			Significant IT support	
	1	2	3	4	5
5110 Establishing and/or improving the competitive advantage of your organization					
5120 Improving your understanding of the customers' needs					
5130 Improving your relationships with your customers					
5140 Improving the information exchange with your business partner					
5150 Improving your products or services					

Kritieke kwesties rondom zakelijke relaties van Internetwinkels en informatietechnologie

Een goede relatie met een transportbedrijf is van essentieel belang voor het succes van een webwinkel.

De vragen in deze enquête hebben betrekking op de relatie tussen uw bedrijf en het transportbedrijf die uw producten bij uw klanten aflevert. Indien uw bedrijf relaties heeft met meerdere transportbedrijven wordt u verzocht om het bedrijf te kiezen waarmee u de meeste zaken doet.

Sommige vragen hebben betrekking op IT-investeringen en –gebruik. Voor beantwoording van deze vragen is geen technische deskundigheid nodig.

Hartelijk dank voor uw tijd en ondersteuning. U kunt de enquête starten door op de onderstaande knop **Volgende** te drukken

Verstandhouding binnen de relatie

Kunt u aangeven in hoeverre u het met iedere stelling eens bent:

	Volledig mee oneens	Deels mee oneens	Neutraal	Deels mee eens	Volledig mee eens
Het transportbedrijf kan de orderinformatie deskundig verwerken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het transportbedrijf komt zijn beloftes na	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het transportbedrijf is eerlijk in zakelijke handelingen (bijv. procedures bij het kwijtraken van pakketten)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het transportbedrijf is bereid tot het delen van aanvullende informatie (bijv. hoe orders worden uitgevoerd)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het transportbedrijf houdt zich aan de afspraken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het transportbedrijf is consistent in de uitvoering van orders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het transportbedrijf is open met betrekking tot informatieverstrekking indien noodzakelijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het transportbedrijf is coöperatief (bijv. als onze bedrijf bijzondere wensen heeft)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Het gebruik van ICT middelen

Van welke informatie- en communicatietechnologieen maakt u gebruik om met het transport bedrijf te communiceren

- ☐ Telefoon
- ☐ Fax
- ☐ E-mail
- ☐ EDI
- ☐ Internet – EDI
- ☐ Anders, nl.

Kunt u aangeven in hoeverre u het met iedere stelling eens bent:

	Volledig mee oneens	Deels mee oneens	Neutraal	Deels mee eens	Volledig mee eens
Wij hebben IT investeringen gedaan om met het transportbedrijf te communiceren (bijv. nieuwe computers, barcode printers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Onze communicatieapparatuur kunnen we tevens gebruiken voor communicatie met andere transportbedrijven	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De locatie van ons bedrijf speelt een belangrijke rol in de relatie met het transportbedrijf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het transportbedrijf is innoverend (bijv. biedt nieuwe services aan)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het transportbedrijf werkt nauw samen met andere transportbedrijven	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het transportbedrijf heeft investeringen gedaan in de relatie met ons bedrijf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Er is geen ander geschikt transport bedrijf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We sturen vaak producten naar onze klanten m.b.v. dit transportbedrijf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ons bedrijf heeft kennis van de transportsector (wij kennen de geschikte transportbedrijven, prijzen, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

IT gerelateerde investeringen

Indien uw bedrijf de volgende investeringen heeft gedaan, in hoeverre kunnen de middelen of procedures tevens met andere transportbedrijven gebruikt worden.

	N.V.T.	Geschikt voor gebruik met andere transportbedrijven		Matige aanpassingen	Speciaal aangepast voor transportbedrijf	
Software en applicaties	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Administratieve procedures (bijv. facturering)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operationele procedures (bijv. verpakken van producten)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In hoeverre zijn de volgende kennistypen aanwezig binnen uw bedrijf en in hoeverre zijn ze aangepast op het transportbedrijf.

	N.V.T.	Geschikt voor gebruik met andere transportbedrijven		Matige aanpassingen	Speciaal aangepast voor transportbedrijf	
Kennis rondom planning van nieuwe producten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kennis rondom productlevering (bijv. installatie van producten)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kennis rondom prijscalculatie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Kunt u aangeven in hoeverre u het met de volgende stellingen eens bent:

	Volledig mee oneens	Deels mee oneens	Neutraal	Deels mee eens	Volledig mee eens
Het transportbedrijf heeft speciale fysieke middelen (vrachtwagens, transportapparatuur) aangeschaft voor de zakelijke relatie met ons bedrijf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het transportbedrijf heeft speciale fysieke IT-middelen (vrachtwagens, transportapparatuur) aangeschaft voor de zakelijke relatie met ons bedrijf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De werknemers van het transportbedrijf hebben specifiek kennis of hebben specifieke training gevolgd voor de zakelijke relatie met ons bedrijf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De interne processen van het transportbedrijf zijn aangepast voor de zakelijke relatie met ons bedrijf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Volledig mee oneens	Deels mee oneens	Neutraal	Deels mee eens	Volledig mee eens
De expertise van het transportbedrijf is aangepast voor de zakelijke relatie met ons bedrijf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De diensten van het transportbedrijf zijn belangrijk voor ons bedrijf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transportdiensten hebben in het algemeen een hoge mate van onzekerheid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transportdiensten zijn in het algemeen complexe diensten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Kunt u aangeven in welke mate IT-ondersteuning wordt gerealiseerd voor de volgende activiteiten:

	Minimale IT-ondersteuning		Enige IT-ondersteuning		Omvangrijke IT-ondersteuning
Orderverwerking en facturering	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Uitwisselen van vracht- en leverinformatie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integratie van orderplanning en voorspellingen met het transportbedrijf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gecoördineerde communicatie met transportbedrijf in geval van onverwachte storingen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het creëren van nieuwe zakelijke kansen (bijv. extra diensten bij leveringen)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het begrijpen van marktontwikkelingen rondom pakketverzendingen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het integreren van functies met het transportbedrijf (bijv. laden en lossen van producten)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het verbeteren van uw bedrijfsexpertise rondom verzendingen. (bijv. klantvoorkeuren omtrent productleveringen)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Trust, Dependence and Interorganizational Systems

Kunt u aangeven in welke mate IT een bijdrage heeft geleverd om de volgende **operationele voordelen** te behalen:

	Minimale IT bijdrage		Enige IT bijdrage		Omvangrijke IT bijdrage
Verlagen van transactiekosten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Verbeteren van cashflow	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Efficiënter voorraadmanagement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hogere productiviteit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Snellere verwerking van orders van uw eigen klanten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Kunt u aangeven in welke mate IT een bijdrage heeft geleverd om de volgende **strategische voordelen** te behalen:

	Minimale IT bijdrage		Enige IT bijdrage		Omvangrijke IT bijdrage
Creëren en/of verbeteren van het concurrentievoordeel voor uw bedrijf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De behoeften van uw klanten beter begrijpen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Verbeteren van de relaties met uw klanten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Informatieoverdracht verbeteren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Uitvoering van transportdiensten verbeteren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Kunt u aangeven in hoeverre u het met de volgende stellingen eens bent:

	Volledig mee oneens	Deels mee oneens	Neutraal	Deels mee eens	Volledig mee eens
Voor de relatie met het transportbedrijf hebben we bepaalde investering in non-IT-middelen gedaan (bijv. aanpassingen van verpakkingen)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Onze werknemers hebben specifieke kennis m.b.t. het transportbedrijf (bijv. verpakkingseisen, levercondities)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Onze werknemers hebben specifieke IT-kennis nodig om informatie m.b.t orders correct aan het transportbedrijf te communiceren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ons bedrijf heeft werknemers aangesteld om met het transportbedrijf te communiceren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Tot slot willen we graag meer weten over uw bedrijf. De informatie die u hier geeft, zal alleen voor classificatie en statistische analyse gebruikt worden.

Voor welk organisatieniveau geeft u antwoorden?

- ☐ Eenmanszaak
- ☐ Divisie / business unit
- ☐ Dochten van moedermaatschappij
- ☐ Moedermaatschappij / holding / B.V.
- ☐ Anders, nl.

Hoeveel werknemers heeft uw bedrijf in dienst?

- ☐ Minder dan 10
- ☐ 10 – 25
- ☐ 26 – 50
- ☐ 51 – 100
- ☐ Meer dan 100

Wat is de (meest recent gepubliceerde) jaaromzet van uw bedrijf?

- ☐ Minder dan € 100.000
- ☐ € 100.000 - € 1 miljoen
- ☐ € 1 miljoen - € 10 miljoen
- ☐ Meer dan € 10 miljoen

Welke type(n) producten verkoopt uw bedrijf?

- ☐ PCs / Laptops
- ☐ PC onderdelen
- ☐ Software
- ☐ HIFI & Video apparatuur
- ☐ PDA's & Handhelds
- ☐ Telecomproducten
- ☐ VOIP-telefonie
- ☐ Anders, nl.

In hoeverre vindt u de markt waarin uw bedrijf opereert concurrerend?

- ☐ Geen concurrentie
- ☐ Zwakke concurrentie
- ☐ Gemiddeld
- ☐ Sterke concurrentie
- ☐ Extreme concurrentie

Welke transportbedrijf levert uw producten bij uw klanten?

- ☐ TPG
- ☐ DHL / Van Gend & Loss
- ☐ Fedex
- ☐ Holland Parcel Express
- ☐ Motorkorier
- ☐ TNT
- ☐ Transmoto
- ☐ UPS
- ☐ Anders, nl.

Hoe lang is uw bedrijf al klant van het transportbedrijf?

Maanden

Jaaren

Welke type diensten verleent het transportbedrijf aan uw bedrijf?

- ☐ Wegtransport
- ☐ Zeetransport
- ☐ Spoortranspot
- ☐ Luchttransport

Verzorgt het transportbedrijf tevens andere diensten aan uw bedrijf?

- ☐ Opslag van producten
- ☐ Communicatie met de klant
- ☐ Aanvullende diensten aan de hand van klantvoorkeuren (bijv. installatie van producten)
- ☐ Anders, nl.

Hartelijk dank voor uw medewerking

Trust, Dependence and Interorganizational Systems

Indien u wenst, kunt u tevens een overzicht krijgen met de resultaten van het onderzoek. Daarvoor kunt u hieronder uw gegevens invullen.

Naam:

Bedrijf:

Telefoon:

Adres:

E-mail:

Hoelang bent u werkzaam bij uw huidige bedrijf?

Maanden

Jaren

Hoe lang bent u persoonlijk betrokken bij de relatie met het transportbedrijf?

Maanden

Jaren

Hebt u interesse in het bijwonen van E-business seminars aan de universiteit van Tilburg?

☐ Ja

☐ Nee

Heeft u aanvullende opmerkingen? Dan mag u die hieronder vermelden.



Indien u vragen hebt, kunt u ons bereiken op telefoonnummer 013-466 8080
of via M.K.M.Ibrahim@uvt.nl

Appendix D IOS Capabilities and Operational Benefits

This appendix discusses the influences of IOS capabilities on the attainment of operational benefits. The analysis uses the survey data, which is collected from the respondents representing Internet shops.

Independent variables

The independent variables in this analysis are the process-based and knowledge-based IOS capabilities. Section 9.3.2 discusses the indicators, which are used to measure these variables. These variables are discussed in that section as dependent variables.

Dependent variable

The dependent variable is the operational benefits attained from the relationship. The extent of operational benefits is established based on five indicators: (1) Lowering transaction costs, (2) Improving cash flow, (3) More efficient stock management, (4) Higher productivity and (5) Faster processing of orders of your own customers / end customers.

Control variables

The following variables are incorporated as control variables: The uncertainty of the market, the complexity of the services, the frequency of conducting transactions and the period of the relationship are argued to influence the benefits attained from the relationship (Douma et al., 1998).

Table D.1 Pearson correlation matrix

Variable	Mean	S.D.	1	2	3
1. Existence of process-based IOS capabilities	1.85	1.00	1		
2. Existence of knowledge-based IOS capabilities	1.88	1.03	0.50	1	
3. Operational benefits	2.85	1.19	0.38	0.32	1

Table D.1 provides the descriptive statistics and correlation values. The hypotheses are tested using the multiple regression method. The findings of the regression analysis are provided in table D.2. The existence of both process-based and knowledge-based IOS capabilities has significant influence on the attainment of operational benefits. The findings support earlier studies indicating that tight cross-organizational interlinkage and knowledge sharing positively influence the obtainment of operational benefits (Gosain et al., 2004; Malhotra et al., 2005).

Table D.2 The standardized coefficients of the regression

Variables	Attainment of Strategic benefits
Existence of process-based IOS capabilities	0.264*
Existence of knowledge-based IOS capabilities	0.170**
Uncertainty	.118
Complexity	-.066
Frequency	.177
Period of relationship	-.031
Significance of the entire model	.001

* $p < .05$; ** $p < .1$

Dutch summary

Organisaties gaan zakelijke relaties aan en maken gebruik van informatie technologie om prestaties te verbeteren. Dit proefschrift bespreekt de invloeden van afhankelijkheid en verschillende typen van vertrouwen op het gebruik van interorganisationale informatiesystemen (IOS) binnen dyadische relaties. In het onderzoek wordt onderscheid gemaakt tussen vertrouwen dat gebaseerd is op competenties, betrouwbaarheid, openheid en zorgzaamheid. Een ander kernbegrip binnen het onderzoek is relatie-specificiteit. Relatie-specificiteit ontstaat wanneer middelen een lagere waarde krijgen indien de organisatie die middelen gebruikt in andere zakelijke relaties. Het onderzoek spitst zich toe op middelen die gebruikt kunnen worden om de informatie-uitwisseling te realiseren, namelijk IOS gerelateerde middelen. Daarbij is er onderscheid gemaakt tussen verschillende typen IOS gerelateerde middelen. Het eerste type bevat fysieke middelen zoals hardware en software. Het tweede type bevat menselijke middelen zoals technische en management vaardigheden. Het derde type bevat immateriële middelen, die gerealiseerd kunnen worden met behulp van de IOS. Twee subtypen immateriële middelen zijn onderscheiden: bedrijfsprocessen en domein-kennis. De theorieën ontleend aan de “resource-based view” (RBV) argumenteren dat de succesvolle combinaties van middelen kunnen leiden tot capabiliteiten. Dit onderzoek onderscheidt twee typen IOS capabiliteiten, namelijk procesgebaseerde en kennisgebaseerde IOS capabiliteiten.

De bevindingen van het onderzoek laten zien dat afhankelijkheid een positieve invloed kan hebben op de relatie-specificiteit van menselijke middelen, interne processen en domein-kennis. De verschillende vertrouwenstypen hebben verscheidene invloeden. Indien het vertrouwen is gebaseerd op competenties of betrouwbaarheid, dan zullen voornamelijk de menselijke activiteiten en bedrijfsprocessen een hogere mate van relatie-specificiteit vertonen. Indien vertrouwen is gebaseerd op openheid, dan zullen voornamelijk de menselijke activiteiten en aanwezige domein-kennis een hogere mate van specificiteit vertonen.

De bevindingen laten tevens zien dat de combinatie van relatiespecifieke IOS gerelateerde middelen kan leiden tot de realisatie van IOS capabiliteiten. Bepaalde combinaties van relatiespecifieke IOS gerelateerde middelen kunnen

leiden tot bepaalde IOS capabiliteiten. Het *specificeren* van bedrijfsprocessen (customization) aan de behoeften van de zakelijke partner en de goede ondersteuning door menselijke activiteiten, leidt tot succesvolle aansluiting van de bedrijfsprocessen. Het specificeren van kennis (customization) aan de behoeften van de zakelijke partner en de goede ondersteuning door menselijke activiteiten, leidt tot succesvolle kennisoverdracht. De realisatie van de IOS capabiliteiten leidt tot strategische voordelen voor de zakelijke partners.

Conference presentations and publications by the author

Ibrahim, M. K. M. 2006. *Trust, Dependence and Interorganizational Systems*. Paper presented at the Academy of Management annual meeting, Atlanta, US.

Ibrahim, M. K. M., & Ribbers, P. M. A. 2006. *Trust, Dependence And Global Interorganizational Systems*. Paper presented at the 39th Annual Hawaii International Conference on System Sciences [CD Proceedings], Hawaii, US.

Ibrahim, M.K.M. 2005 *Analyzing The Impact of Trust and Dependence on Interorganizational Systems Using The Resource-Based Perspective*. Paper presented at the Second workshop on trust within and between organizations [CD Proceedings], European Institute for Advanced Studies in Management, Amsterdam, The Netherlands.

Ibrahim, M. K. M. 2005. *Interorganizational Trust and Interorganizational Systems' Information Quality*. Paper presented at the 10th International Conference on Information Quality, MIT, Cambridge, US.

Ibrahim, M. K. M. 2005. *Trust and Power Within Network Organizations*. Paper presented at the Workshop on Organizational Design [CD Proceedings], European Institute for Advanced Studies in Management, Brussels, Belgium.

Ibrahim, M. K. M. 2004. *Studying The Performance Of Interorganizational Teams Using Multiple Perspectives*. Paper presented at the International Workshop on Teamworking, Trier, Germany.

Ibrahim, M. K. M. 2004. *Studying Interorganizational Systems Using Multiple Perspectives*. Paper presented at the International Conference for Electronic Commerce [CD Proceedings], Delft, The Netherlands.

Ibrahim, M. K. M. 2003. *Interorganizational Systems from Different Perspectives*. Paper presented at the Proceedings of Conferentie Informatiewetenschap, Eindhoven, The Netherlands.

Ibrahim, M. K. M. 2003. *The Impact of Trust on Interorganizational Systems: A Resource-Based Perspective*. Paper presented at the Second workshop on trust within and between organizations [CD Proceedings], European Institute for Advanced Studies in Management, Amsterdam, The Netherlands.

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Index

- absorptive capacity, 99
- accessibility, 2, 3
- acquisition, 12, 97, 99, 115
- adoption, 5, 69, 83, 137
- attitude, 1, 17, 24, 39, 54, 62, 75, 135, 142
- automation, 62, 101, 118, 121, 127
- automotive supplier, 5
- awareness, 56
- boundaries, 2, 8, 15, 25, 54, 78, 98, 118, 136, 143
- business dynamics, 3
- caring, 18, 24, 28, 29, 39, 55, 58, 61, 62, 63, 68, 74, 75, 77, 136
- causal relationship, 8, 39, 44, 54, 55, 141
- chi-square, 50, 51, 52, 53
- competitive advantage, 4, 5, 9, 12, 13, 17, 32, 83, 97, 99, 125, 127, 128, 131, 134, 140,
- conceptual model, 7 - 9, 11, 14, 19, 21 - 33, 35, 39, 41, 45, 47 - 54, 55, 62, 134, 135, 146
- confirmatory factor analysis (CFA), 50, 51
- connectivity, 2, 3, 68, 76, 84, 94, 123
- construct, 7, 8, 21 - 35, 36, 37, 39, 41, 42, 44, 45, 47 - 54, 55, 134, 149
- cross-dock, 65, 66, 102
- customer needs, 128, 130
- data analyst, 72, 105, 106, 124
- descriptive statistics, 51, 52, 92, 112, 128
- disruptive shifts, 3
- dissolution, 56
- economic exchange, 4
- EDIFACT, 68, 69
- effectiveness, 74, 81, 89, 122, 138, 140
- electronic data interchange, 14, 64, 68, 76, 118, 146
- electronic hierarchies, 15, 16
- electronic markets, 4, 15, 16
- ethical appeal, 1
- expansion, 56, 58
- explanatory studies, 8
- exploration, 56, 146
- extranet, 86
- flexibility, 3, 32, 125, 140, 144
- goodness-of-fit, 50, 54
- goodwill, 1, 18, 58
- governance structure, 15, 16
- heterogeneity, 11
- indicator, 41, 42, 45, 47 - 50, 51, 52, 53, 111, 128
- information
 - value of information, 3
- information transfer, 128, 144, 146
- information-based process, 12
- intelligence, 1
- interactivity, 3
- internet-EDI, 76
- interpretivist, 35
- interview, 39, 41, 43, 62, 87, 101, 149
 - semi structured, 41, 43, 85, 120
- justice, 1

Index

- just-in-time (JIT), 28, 31, 60
- knowledge, 1, 7, 13, 15, 18, 25, 28
 - 32, 39, 60 - 78, 82 - 95, 98 - 115, 118 - 131, 136, 137 - 147
- knowledge transfer, 99, 105, 108, 109, 139, 143
- kurtosis, 51
- latent construct, 48, 49, 50
- limitation, 7, 9, 75, 76, 78, 133, 140, 145, 146
- literal replication, 39
- mixed method, 37, 38
- monomethod, 37
- multitrait-multimethod matrix, 37
- network, 26, 58, 83, 86, 142, 214
- norm, 56, 58
- normality, 51
- openness, 18, 24, 28 - 39, 58 - 78, 135, 136, 142, 143, 147
- operational cost, 4
- operationalization, 41, 42, 45
- opportunism, 1, 17
- order decoupling point, 99
- path dependence, 12
- performance, 3, 5, 13, 17, 18, 26, 32, 63, 68, 70, 71, 75, 77, 86, 98, 103, 104, 117, 118, 120, 121, 125, 136, 140
- philosophy, 1, 135
- positivist, 35, 36, 134
- power, 17, 56, 62, 81, 82, 83, 88, 146
 - bargaining power, 118
- problem statement, 3, 6, 11
- process, 3 - 7, 12, 15, 25, 28 - 32, 37, 39, 44, 49, 56 - 78, 83, 85 - 95, 98 - 115, 118 - 131, 135 - 147
- profitability, 4
- qualitative, 36, 37, 38, 54, 135
- quantitative, 8, 36 - 39, 43, 45, 47, 54, 91, 111, 128, 135
- quatitative, 36, 38, 91
- questionnaire, 41, 42, 44, 45, 185, 197
- R&D, 31
- reason, 1, 5, 39, 56, 59, 62, 64, 69, 75, 83, 85, 88, 94, 97, 99, 102, 111, 144, 146
- regression, 47, 50, 92, 93, 112, 113, 128, 129, 130
- relational contract theory, 58
- reliability, 5, 18, 24, 28, 29, 39, 44, 52, 58, 60 - 64, 68, 70 - 75, 77, 78, 121, 122, 135, 136, 142, 147
- replication, 39
- research approach, 3, 7, 8, 9, 33, 35, 36, 37, 133, 134
- research design, 7, 8, 35, 39, 43, 45, 134
- research method, 9, 35, 45
- research objective, 3, 6, 7
- research philosophy, 35, 36
- research questions, 3, 6, 7, 8, 9, 133, 134, 135, 138
- resource-dependence theory, 11, 14
- response rate, 44, 49
- reverse auction, 86
- risk, 16, 28, 56, 59, 73, 140, 146
- root mean square residual (RMR), 51, 53
- routine, 25, 83
- SAP, 74
- Sarbanes-Oxley, 64, 65, 67
- sentiment, 5
- skewness, 51

- social exchange theory, 44
- social skills, 114, 115
- strategic alliance, 4, 97, 133, 141
- structural equations modeling (SEM), 8, 47, 49, 51, 135
- summary, 3, 9, 18, 21, 33, 43, 45, 47, 54, 62, 78, 95, 115, 131, 133, 134
- supply chain, 82, 83, 94
- survey
 - web survey, 44, 45, 49
- sustainable competitive advantage, 12, 13, 32
- technological progress, 3
- temperance, 1
- theoretical replication, 39, 62, 85
- transaction completion, 127
- transaction cost economics (TCE), 11, 14, 15, 16, 58, 59
- transportation industry, 44, 45
- triangulation, 37, 41, 135
- trust
 - attitudinal trust, 18, 62
 - behavioral trust, 18
 - benevolence, 18, 57
 - commitment, 13, 18, 56, 58, 100
 - competence, 18, 24, 28, 29, 39, 58, 60, 61, 63, 66, 68, 70 - 78, 82, 88, 135, 142, 147, 149
 - confidence, 5, 18, 28, 56, 60, 66
 - integrity, 5, 57, 100, 146
 - uncertainty, 17, 37, 58, 78, 92, 104, 112, 119, 128, 143, 149
 - unidimensionality, 49
 - unit of analysis, 16, 38, 117
 - validity, 8, 45, 47, 50, 51, 52, 91, 135
 - value, 1, 2, 3, 12, 13, 15, 16, 19, 25, 36, 41, 42, 48, 50, 51 - 53, 63, 66 - 69, 72, 76, 77, 82, 83, 87, 90, 92, 98, 99, 100, 103, 104, 106 - 110, 112, 117, 119, 120 - 128, 136, 142
 - variable, 8, 17, 21, 26, 27, 35, 36, 39, 41, 42, 44, 45, 48, 50, 55, 66, 69, 72, 77, 87, 90 - 92, 111, 112, 118, 128, 130, 134, 149
 - virtue, 1
 - web interface, 87
 - web module, 86, 87
 - weberian, 39, 62
 - XML, 76