

How Does Information Technology Impact on Business Relationships? The Need for Personal Meetings

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Abstract

The paper raises the question of if and how information technology impacts on social exchange relationships. The aim of the study is to investigate changes of social interaction patterns due to information technology in business relationships, by analyzing one specific aspect of interaction in business relationships, namely the effect of information technology on the need for personal meetings. The theoretical view is constructed on interaction, focusing on the need for personal meetings and information technology. The method employed is statistical and a total of 354 business relationships on the Swedish business to business market are collected and analyzed. Information technology in business relationships is examined by the level of use of information technology and the influence its use has on the need for personal meetings of the business relationship. The result shows that business relationships in which information technology increases or decreases the need for personal meetings to higher extent also have a relatively higher level of use of information technology in the exchanges. However, the relation between the level of use of information technology and its effect on the need for personal meetings is not linear, which means that although the need for personal meetings changes with higher levels of information technology use in exchanges, it is unknown when or why the need for meetings increases or decreases.

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Introduction

New technological development puts new demands on companies, or provides new possibilities for developing or improving market activities as well as products. One example of such technological development is the employment of information technology among industrial companies doing business (Deeter-Schmelz, 2002, Pires and Aisbett, 2003). There are many different information technologies, hence also various possibilities for companies to use them as they conduct their exchanges. (Archer and Yuan, 2000, Borders *et al.*, 2001, Egan *et al.*, 2003, Mukhopadhyay and Kekre, 2002, Ovalle and Marquez, 2003, Prasad *et al.*, 2001) Some solutions make it possible for users that are geographically dispersed to share data bases and messages to be copied and delivered instantly to a vast number of receivers (Claycomb *et al.*, 2004, Deeter-Schmelz, 2002, Reunis *et al.*, 2005, Öhrwall Rönnbäck, 2002). Using for example Electronic Data Interchange (EDI) is a way of letting some information flows go entirely via information technology, such as the ordering of products and information on delivery, or for payment (Angeles and Nath, 2000). Having integrated EDI increases efficiency and permits business relationships to save time and reduce costs. (Hill and Scudder, 2002, Laage-Hellman, 1989)

The development of information technology in business has occupied the attention of researchers in recent years (Chatfield and Yetton, 2000, Leek *et al.*, 2003, Vlosky and Smith, 1993, Wilson and Vlosky, 1998). One established view on business in academic research is to study business between companies is to study it as taking place in business relationships of long term orientation. Such business relationships contain elements of business, information and social elements and there are a number of studies imposing the impact of information technology on those different elements (cf. Leek *et al.*, 2003, Pires and Aisbett, 2003, Reunis *et al.*, 2005, Wu *et al.*, 2003).

While some proclaim that information technology increases relationship efficiency other researchers state the negative impact of information technology. The impact of information technology on, for example, content of industrial exchange is discussed by a number of researchers. (cf. Burgelman and Doz, 2001, Mukhopadhyay and Kekre, 2002, Osmonbekow *et al.*, 2002, Sharma *et al.*, 2001). Research within this field on how information technology impacts on different relationship dimensions is extensive, but the specific area on how information technology impacts on social interaction of business relationships has received little attention. Following the demands of contemporary research for new studies, this paper studies the use of information technology in the setting of industrial business relationships and its impact on the social dimension.

As business is conducted between two companies, people from them meet in order to exchange information on everything involving the product and the business. Over time the two parties get to know each other and thus a social dimension develops in the business relationship, through the interaction. It is suggested in this paper that when information technology is employed in a business relationship, it may change or replace former ways of exchanging information and one aspect of such change could be an effect on the social interaction. Social interaction involves the meeting between people from the two companies doing business and so meetings are of interest for the study of social interaction.

The social dimension of business relationships is in itself a vast area for research and so this paper narrows down by studying one specific aspect. The topic is the need for personal meetings in business relationships and how the need changes when the level of use of information technology varies in business relationships. As meetings are part of the information exchange it is plausible the need for them would decrease or increase as information technology is used.

Research Question and Aim of Study

The recent efforts of researchers in information technology integration into business relationship (Lindh, 2006, Ryssel *et al.*, 2004) and information technology impact on business networks (Baraldi, 2003, Dahlin, 2007, Ritter 1999) have added new knowledge on business relationships and networks. In line with the first field of research, this study focuses on business relationships and specifically concerns the social dimension of

business relationships and focuses on personal meetings. The following research question is to be answered in the paper:

How does the use of information technology in business relationships affect the need for personal meetings?

The aim is to analyze to what extent the use of information technology in business relationships influences on the need for personal meetings in long term oriented business relationships. The paper starts by discussing the analytical framework, which is based on theories on business relationships which are of long term orientation and based on exchanges. The discussion is followed by analysis of 354 industrial business relationships on the Swedish business-to-business market and conclusions on the effect of information technology use on the need for personal meetings.

Theoretical Background

Approaching business as being constructed of ongoing business relationships between two specific parties means accepting that a mutual history and future for the relationship has been jointly developed by the two parties involved. The history is fundamentally based on the parties' experiences of prior business exchanges of products and/or services for financial reimbursement. The future of the business relationship is mirrored by the parties' expectations on the continuance of their business, providing a long-term orientation for the actions in the relationship (cf. Anderson *et al.*, 1994; Blankenburg *et al.*, 1997, Hallén *et al.*, 1993; Iacobucci and Hopkins, 1992; Johanson, 1989).

The business relationship approach analyses the joint business between companies rather than the business operations of one company. It means investigating the activities between two companies and studying business activities as bi-directional; *i.e.* business taking place in a dyad of exchange (Bagozzi, 1974). Exchange concerns more than buying and selling, as the law of exchange by Alderson and Martin (1965) defines: Exchange is when both parties give something in order to obtain something they need, but not possessed before, and thus exchange increases the value of each party. The nature of exchange is that both parties increase their value (Alderson and Martin, 1965; Bagozzi, 1974). When the exchanges between two companies are long-term orientated a business relationship is developed and, hence, the timely orientation is important for the study of business relationships (Iacobucci and Hibbard, 1999; Johanson 1989, Kock, 1991, Low, 1997, Walter and Ritter, 2003). The companies involved in an ongoing business relationship also get to know each other over time and learn a behaviour preserving stability, thereby keeping congruity in the business relationship (Hausman, 2001, Johanson, 1989).

Exchanges have become established as the core of business relationships. They have been studied as exchanges with varying aspects; product exchange, information exchange, social exchange, technological exchange and financial exchange (Cook and Emerson, 1978; Håkansson, 1982). Exchange of information is part of the exchanges of a business relationship, important both for executing the product exchange and money transfer (Hallén *et al.*, 1991; Håkansson, 1982; Johanson, 1989). Different exchanges involve different activities, or interactions. To use the term interaction is also a way of illustrating that business is carried out as a two-way communication between companies, *i.e.* the companies influence on each other (Håkansson, 1982; Johanson, 1989; Turnbull *et al.*, 1996).

Social Interaction and Information Technology

The exchanges of the business relationship inevitably involve interaction and social activity. The parties get to know each other as they interact (Ford *et al.*, 1986; Turnbull *et al.*, 1996). Social interaction takes place when people from the two parties talk or meet in order to get to know each other and exchange information. Social interaction varies in intensity depending on how many people are involved, how often they meet and the character of the information they exchange (Cook and Emerson, 1978; 1984; Håkansson and Östberg, 1975). The information that is transferred via social interaction is more than the tangible pieces of information on the product. It is also of a less tangible nature as it carries information on both products and other related aspects.

The social interaction reduces uncertainty, and lets the parties find out that they can rely on each other (Granovetter, 1985).

To interact in order to exchange information is an important aspect of business relationships, since information is needed in order to carry out ordering, communicate on specific requirements of the products, as well as to deliver and agree on payment. Interaction that involves exchange of information often provides the parties with additional information, such as that of the market. The latter involves everything from issues regarding customers or suppliers in the immediate surroundings, to expected changes in the conditions of the market in general (Johanson, 1989; Seyed-Mohammad, 1990). The technical information on products and production processes is also decisive as to the extent and character of the information exchange (Cook and Emerson, 1978; Hallén *et al.*, 1991; Hallén *et al.*, 1993). To summarise, the extent of information exchanges encompasses different areas, topics and amounts. Furthermore, information exchanges are necessary for maintaining the product exchanges and the business relationship as a whole. Evidently, there are many activities in business relationships for which information technology can be purposefully used. Examples are exchange of information on products, order, delivery or economic transactions.

Meetings and Information Technology

The social interaction of a business relationship can be discussed in terms of how often people from the companies meet, or how well the parties know each other. It is argued that depending on the extent of the use of information technology for different exchanges, the impact on the social interaction patterns that are carried out without information technology may be influenced. One argument that could be raised in the theorizing on the effect of use of information technology in business relationships is that the number of meetings, or need for meetings will decrease, as the use of the technology handles a great deal of information exchanges, i.e. replaces some of the personal exchange of information.

The question is if the need for personal meetings decreases when the levels of information technology use increase. That would suggest increased efficiency of meetings, as the use of information technology then replaces other means of interaction for some types of exchanges. On the other hand, the use of information technology may require additional meetings, if the technology is difficult use or the purpose of its employment is another than making the information exchange more efficient by decreasing the need for meetings. The reasons why the use of information technology in business relationships would decrease or increase the need for personal meetings can only be speculated on. This paper analyses the extent to which the need for personal meetings has decreased or increased in the investigated business relationships as a result of the use of information technology, as well as to the extent which such a change is related to levels of lower and higher of information technology. If the use of information technology affects the need for personal meetings, and that effect is related to when the use is lower or higher, it is interesting to analyze why and how the need for personal meetings is affected by the use of information technology.

Methodology

The analysis is based on data from an empirical standardized study, which comprises a large amount of questions on business relationships and networks. For the purpose of the analysis of information technology and social interaction a number of questions on meetings and the perception of the social dimension of the business relationship were asked in the survey. As this paper is concentrated on the aspect of personal meetings and information technology, only a few questions from the survey are analysed. Firstly the analysis concerns how the use of information technology influences on the need for personal meetings. The use of information technology for different purposes is also part of the analysis, and hence are questions on its use also included in the analysis.

Sample

The respondents are 354 suppliers on the Swedish business-to-business market who have filled out a standardised questionnaire about an important customer and information technology in the relationship with

that customer. The products of the participating companies range from raw materials, equipment and other goods to services companies buy or sell from each other. The information from the questionnaire shows that the mean for number of customers and employees are 945 and 32, respectively. The variation in numbers is considerable; the median of number of customers 100, which differs from the average. The minimum number of customers is 1 and the maximum is 100 000. The variety should explain the difference between mean and median and also suggests that the median says more about the general look of the sample regarding the common number of customer.

On average the customer stands for 20 % of the company turnover for the supplier. The companies' turnovers have a mean of 48000000 SKr. The questions analysed were measured by asking to what extent there is information technology for different exchanges and its impact on the behaviour of the business relationships. A scale of seven steps was used so the information could be used for bi- or multivariate analysis.

Analysis

Before the analysis of the chosen questions from the survey is initiated, there is a statement on how it is to be carried out. The first section describes the scales of the questions and how they are used in the analysis, as well as tests on validity and reliability of constructs. The parts that follow are analyses on the changes of information technology and need for personal meetings in business relationships, focused on answering the research question more directly.

Procedure of Analysis

The first aspect to be analysed is the extent to which the need for meetings is affected by the use of information technology in the business relationships. The question is measured as a direct question in the survey, thus reflecting the respondents' opinion. It is measured on a scale of 9 degrees, on which 5 is neutral (=no change) and lower values (1-4) represent a decrease in the need for meetings and the higher values (=6-9) represent an increase in the need for personal meetings. The answers are grouped into "decrease of need for meetings" (values 1-4), "no change in need for meetings" (value 5) and "increase in need for meetings" (values 6-9) in the analysis.

The use of information technology is measured by asking the respondent to what extent it is used in the exchanges with a specific customer. The varying exchanges asked about are; (1) business contact, (2) social contact, (3) technical information, (4) information on products, (5) sales, (6) order or deliver, (7) production planning, (8) payment, (9) negotiation on terms, (10) marketing and (11) production collaboration. The scale is a seven degree scale on which 1 represents "not at all" and 7 "very much". Then the 11 variables on use are analysed and a single variable on the use of information technology in the business relationships is created, by being compounded to an index. The construct is then compared to the variable on how the use of information technology has increased or decreased the need for personal meetings and the significance of the variation is tested before any conclusions are drawn.

A test of validity (to show the all measure a similar phenomenon) is performed by an item-to-total correlation analysis (two-tailed, Spearman's rho). Churchill (1979) established that indicators with correlation below 0.35 ought to be excluded from the construct. This has been used as the guideline for the construct of information technology use.

Reliability is tested with Cronbach's alpha (Cronbach and Meel, 1955). This test for reliability involves the alpha coefficient for each construct which is evaluated for internal consistency of the indicators. Nunnally (1978) has indicated an alpha of 0.7 or higher to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature. The recommendation by Nunnally (1978) is adopted in the assessment of reliability in this paper.

The next step of analysis is to test the variable on use of information technology against each of the three groups. Mean values are analysed and a non parametric test is used to assess the significance of the test. The type of significance test is chosen based on what is considered best suited for the scale of the item. A non-

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parametric test is used when the scale is ordinal. The most common test is the Wilcoxon rank test, which is similar to the Mann-Whitney test also used in many studies. The Wilcoxon rank test is, though, best suited for related samples and has thus been chosen for the analyses of this paper. The result of the Wilcoxon rank test judges the difference between the means relative to the spread or variability of their scores, and shows at what level the values are statistically significant (Siegel, 1956). The test provides a Z value, which should be > 2 or < -2 . It is associated with a p value which assess the significance of the difference. The p value should be 0.05 or less for a test at the 95 % significance level (Siegel, 1956) and is thus interpreted in a similar way as a t-test.

Need for Meetings and Information Technology

Table 1 below shows the result of an analysis on how the observations are dispersed between the three categories of decrease, no change and increase of need for personal meetings. Below the table is the question as it was asked in the survey.

Table 1 Frequency and division of answers on IT and change in need for meetings

Value	Frequency	Valid %	Share	Group
1	0	0		
2	10	3		
3	30	8,9		
4	31	9,2	21.00%	decreased
5	225	66,6	66.60%	neutral
6	20	5,9	12.40%	increased
7	15	4,4		
8	5	1,5		
9	2	0,6		
Missing	16			
Total	354	100		

To what extent has the use of information technology in the relationship with the customer increased or decreased the need for personal meetings?

There are 338 valid responses to the question on the change of need for personal meetings due to the use of information technology. The right column suggests three groups; (1) decreased: where the need for personal meetings has decreased from the use of it, (2) neutral: where the need for personal meetings has not been influenced from the use of it, and (3) increased: where the need for personal meetings has increased from the use of information technology. The first category, which think that the use of information technology has decreased the need for personal meetings (values 1-4) accounts for 21% of the answers. A share of 66.60% on the other hand does not think there is change in the need for personal meetings (value 5). Interestingly, 12.40% claim that the use of information technology increases the need for personal meetings. It means that the use of information technology sometimes increases the need for meetings, and sometimes decreases it.

The result inevitably leads to the questions of why and how the use of information technology impacts on the need for personal meetings. Had the results shown that the need for meetings always decreases when information technology is used, that would have been a clear indication of increased efficiency in the information exchange: when information technology is employed for exchanges information the need to meet decreases. But the analysis has shown that in many cases, the use of information technology increases the need for meetings, which at first glance would indicate decreased efficiency. This means that although efficiency in information exchange may be affected, far from the whole explanation of the relation between use of information technology and meetings can be explained by it. The issue calls for further and more extensive analysis. The continuation in this paper is about analysing if the increasing or decreasing need for meetings due to information technology really relates to higher use of information technology, or if the level of use has no connection to the increase or decrease.

A number of questions on the level of use of information technology (for different purposes) are analysed to establish whether there is a relation between the change in need for meetings and the varying level of use of information technology. The following analysis shows a number of questions on the use of information technology in business relationships and tests how they can be used in the continued analysis.

Use of Information Technology

Concerning the use of information technology, questions measuring the use of information technology in the specific business relationship are analysed. The 11 questions are accounted for in table 2 below, as well as the tests of item-to-total correlations and alpha.

Table 2 Use of IT in the business relationships item-to-total and alpha

	Item-to-total correlation	Questions
	Correlation	To what extent is information technology used in the relationship with the customer regarding*:
1	0,72 **	business contact
2	0,61 **	social contact
3	0,71 **	exchange of technical information
4	0,77 **	information on products
5	0,80 **	sales of products
6	0,81 **	order of products or delivery
7	0,80 **	production planning
8	0,60 **	economic transactions
9	0,66 **	negotiation on deals
10	0,70 **	marketing
11	0,73 **	coordination of production
Reliability analysis: alpha = 0.905, n = 319		
**Correlation is significant at the .01 level (2-tailed).		
Spearman's rho		
* scale 1 (not at all) - 7 (very much)		

Table 2 shows that the observations on the questions on the use of information technology in the business relationships are highly inter-related. All the correlations are well over 0.35 and the α is 0,905. The construct can be considered highly consistent and is used to analyse the use of information technology in the specific business relationship is therefore used as a single variable in the continued analysis.

The Level of Use of IT and Need for Meetings

The following analysis compares the variables of use of information technology with the one on the effect on need for personal meetings. The purpose is to find out if there is a relation between the two, i.e. to answer whether the increase in need for meetings due to the use of information technology really relates to the level of the use.

Table 3 shows the three groups of decreased, neutral and increased need for personal meetings and the use information technology.

Table 3 Mean values of use of IT for the three groups

Use of IT	Mean values				Wilcoxon (Z/ p-value)		
	Decrease	Neutral	Increase		1 vs 2	2 vs 3	1 vs 3
Mean	45.1	34.2	44.3	Z-value	-5.0	-3.7	-0.4
Frequency	64	210	38	p-value	0.00	0.00	0.67
Percentage	20.5%	67.3%	12.2%				

Looking at the first analysis of Table 3, it is clear that the mean values for the two groups which think information technology changes the need for meetings is higher (1: 45.1 and 3: 44.3) than of those which do not think the need for meetings are affected (2: 34.2). Furthermore the Z-values and p-values show that the difference between the groups which think information technology affects the need for meetings are significant, whereas the last test, on the difference between the two groups which think information technology has made a difference, is not significant. The pattern demonstrates a distinction between the observations reporting an impact from information technology on the need for personal meetings and those reporting no difference.

The analysis provides three groups of interest. The first group is business relationships with relatively higher use of information technology in which the need for meetings has decreased as an effect of the use of information technology. This group accounts for 20.5% of the observations. The second group is business relationships with relatively lower use of information technology in which the need for meetings is unaffected by the use of information technology. This group accounts for 67.3% of the observations. The third group is business relationships with relatively higher use of information technology in which the need for meetings has increased as an effect of the use of information technology. This group accounts for 12.2% of the observations.

Apparently, the need for personal meetings is related to the use of information technology in business relationships. The relation exists for higher levels of use of information technology, regardless if it is an increase or a decrease in the need for meetings that is analysed. Both the groups of decreased or increased need for personal meetings have higher levels of use of information technology than the neutral one. This strongly supports that an increasing level of use of information technology relates to an increasing impact by information technology on the need for personal meetings.

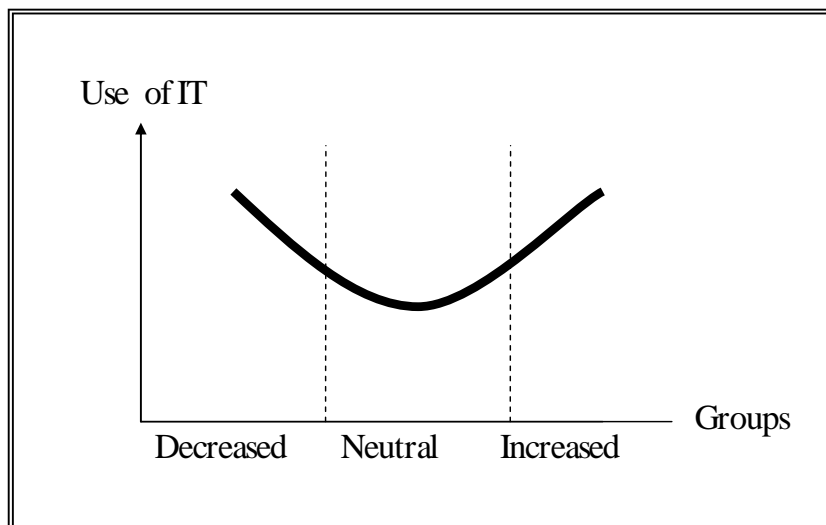
Conclusions and Further Research

This paper studies the effect of information technology as a condition companies increasingly adapt to. The focus of attention in this paper is the possible changes of the social interaction patterns in industrial business relationships when information technology is used in the exchanges for different purposes. The analysis, which focused on the aspect of personal meetings and use of information technology, comprised information from 354 companies gathered in a standardized survey carried out on the Swedish business-to-business market.

The analysis showed that the use of information technology is related to change of the need for personal meetings when the use is relatively higher. Companies reporting a decreased need for personal meetings, as well as companies reporting an increased need for personal meetings are all using information technology to a greater extent than those reporting no change in the need for personal meetings. In general, higher levels of use of information technology for different purposes of exchange relate to higher levels of change of the need for personal meetings due to use of information technology. Interestingly, the change in need for meetings can be either an increase or a decrease. Which of the two that occurs requires the inclusion of additional variables in the analysis.

The conclusion is that when there is use of information technology in business relationships, it affects the social interaction patterns by influencing on the need for personal meetings. The pattern of the three groups regarding their level of use of information technology is shown in Figure 1:

Figure 1 Use of IT related to the change of need for personal meetings



The obvious questions awoken by this paper are *why* and *how* the use of information technology changes the need for personal meetings. Had there been a straight line shown in figure 1, a linear relation between the use of information technology and its effect on need for personal meetings could have been supported. The case is however different and can be regarded as somewhat paradoxical, as it would be plausible that the use of information technology either increases or decreases the need for personal meetings. The reasons lie within the varying purposes of the employment of information technology as well as other characteristics of the business relationship and calls for deeper analysis.

Further research should be conducted to find differences between the three groups regarding the character of the business relationships in various aspects, in order to explain when the use of information technology increases or decreases the need for personal meeting. To analyze the social interaction patterns deeper would be a starting point, but other elements such as different aspects of exchanges must also be included in such analysis, such as delivery patterns, types of products, production technologies and so on. A question which has not been discussed at all in this paper are elements of behavior, such as trust, commitment, adaptation,

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interdependence or cooperation of business relationships, which otherwise are thoroughly investigated in contemporary research.

This paper, however, shows that information technology, when employed in business relationships, affects the need for personal meetings. The conclusion is that this is a complex issue, as there is no simple answer to how the need for meetings is affected by this new technology. The topic deserves and requires extensive further research.

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