Impediments to IT adoption in business relationships: Evidence from Australia and Finland

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Competitive paper

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Abstract

The purpose of the paper is to describe the impediments to information technology (IT) adoption and possible solutions in the context of business relationships by drawing on case studies conducted in both Australia and Finland in the heavy manufacturing sector. Across various industry sectors managers have adopted different types of IT tools to coordinate their relationships with their counterparts. However there has been little academic research in this area until recently, as the research has been focused on large firms in technology rich industry sectors. Through the cases discussed we attempt to identify some of the impediments to IT adoption, strategies for overcoming them and by doing so we are adding to the body of marketing knowledge on business relationships. The in depth case studies were conducted in the steel manufacturing industry in Finland and in the marine defence (shipbuilding) industry in Australia. The findings indicate that doubts about the security of shared information, missing mutual benefits, incompatibility of IT systems, inadequate IT resources, uncertainty about the future directions of the relationship, information rich working routines i.e. face to face communication, IT deployment not being part of the industry standard and investments not justified by the relationship seems to be the most significant impediments to IT adoption in heavy manufacturing in Australia and Finland. For managers this paper provides some insights to manage IT adoption in the heavy manufacturing industry. For academics, we broaden the discussion on IT adoption in the context of business relationships in industry sectors that have not been traditionally targeted. This paper focuses on one industry sector using case studies and as such there are limitations which mean the generalizations are weaker than in a broad scale quantitative research.

Business relationships and information technology

Various aspects of long-term business relationships have been studied since the 1960s across a number of industries (see e.g. steel industry, Johanson, 1966; Snehota, 1982; advertising industry Halinen, 1994). The introduction of information technology (IT) such as mainframe computers in the 1970s changed the face of business within organisations and with the advent of PCs, networking and the internet IT impacted relationships between organisations (Markus and Robey, 1988; Grover, 1993; Stern and Kaufmann, 1985; Chatterjee and Ravichanddran, 2004). According to Ryssel, Ritter and Gemünden (2004) IT in the business context includes computer hardware, software, communication systems and inter-organizational systems. In their extensive literature review on business to business marketing Reid and Plank (2000) addressed the need to study the influence of computers on business marketing. Building on this work a number of studies have appeared after the publication of the article that have investigated in a broad sense the influences of IT on business relationships (see Leek, Naudé and Turnbull, 2003; Ryssel, Ritter and Gemünden, 2004; Ritter and Walter, 2006; Salo, 2006a).

Generally speaking the entry of IT into business relationships has provided instant direct access to information within and between organisations improving communication

and exchange processes (Rao, Perry and Frazer, 2003). Furthermore, when business relationships move beyond trading using the internet based technologies to increased levels of engagement using electronic commerce the boundaries between organisations can become blurred (Ratnasingam, 2004). This is the case for example in contracting software development. The adoption of IT can be a double edged sword, while increasing the exchange of technical or commercial data there is still a large amount of "soft" data such as product usage data, conditions of agreement, knowledge embodied in employees and general organisational information that is still exchanged through personal communications channels (Leek, Naudé and Turnbull, 2003). It seems to be a forgotten aspect in business relationships that they are based on trust and social communication and it is the social interaction that influences and creates the relationship (see Turnbull, 1979; Cunningham and Turnbull, 1982). Moreover, social communication has a central revitalizing role in the business relationships and should not be fully eliminated from the relationships. As emphasized by Leek, Naudé and Turnbull (2003) the social role of interpersonal contacts between organizations is important for the development of long term business relationships. However, the digitization of these interpersonal contacts can lead to a more distant relationship compared to face-to-face contact.

The research carried out in Australia and Finland focused on the adoption of IT in business relationships and the impediments to the adoption of IT in business relationships. In both studies the business relationships were between firms of differing size. Areas discussed include the characteristics of the firms studied, the industries in which they operated and the characteristics of the relationships in relation to the adoption of IT. The next section presents previous literature on IT adoption impediments. After that, methodological choices are detailed. Then, we present case studies. Finally, we provide results and conclusions.

Impediments to IT adoption in business relationships

Drivers and impediments to IT adoption in business relationships can often be the reverse of each other. The drivers for a firm to adopt IT in a business relationship were first conceptualized by Barrett and Konsynski (1982) as cost reductions, productivity improvements and product market strategies. As the level of participation in the use of IT in the business relationship increased so to the level of commitment, resources consumed and the complexity of the operating environment increased (Barrett and Konsynski, 1982).

According to Chatterjee and Ravichanddran (2004) the rationale for adopting IT in business relationships can be placed along a spectrum from a purely economic approach focused on competitive position, efficiency and cost effectiveness to the prevailing inter-organisational relationships where factors such as the size and power of an organisation can determine its likelihood of adopting IT.

The perceptions of the benefits of IT in business relationships can vary between organisations within the same business relationships. There can be a "relationship satisfaction gap" between the two organisations caused by differing levels of expectation, trust, dependence, commitment and power between the organisations. To one organisation the adoption of IT can be seen as advantageous and to another a necessary evil (Vlosky, Wilson and Vlosky, 1997). Factors such as the historical length of the relationship, the economic importance to the organisation and degree of inter

organisational social and structural bonds tend to reduce the "gap" (Vlosky, Wilson and Vlosky, 1997).

Ratnasingam (2004) suggests the following when setting up a collaborative relationship around web enabled systems, the agreement on a common goal among the collaborative firms, finding or creating value and ongoing return for all partners in the project, integration of the organisation's internal systems and implementing security systems to protect information exchanged between the organisations.

Ryssel, Ritter and Gemünden (2004) found that the introduction of IT into a relationship alone does not create value however trust and commitment did have a significant impact on value creation and the authors concluded that value creation was a function of the relationships in the collaboration and not of the IT deployed. Trust and commitment were often cited as precursor to the adoption of IT. It must also be taken into consideration that use of IT can also impersonalise business relationships which can have a negative impact on the level of trust (Ryssel, Ritter and Gemünden, 2004).

Security is a major issue with any inter-organisational system and without sufficient security there will not be the exchange of detailed information which assists in the development of trust between organisations (Ratnasingam, 2004; Salo, 2006a). Previously, trust has been described in the context of business relationships however Ratnasingam (2004) identifies trust specifically in relation to the use of technology between firms. Ratnasingam, (2004, p. 383) defines technology trust as "the subjective probability by which organizations believe that the underlying technology infrastructure is capable of facilitating transactions according to their confident expectations". The author identifies 11 facilitating conditions for technology trust, ability, integrity, availability, accessibility, efficiency, flexibility, standardization, compatibility, performance, reliability and security.

Perry, Cavaye and Coote (2002) in their study of trust and the adoption of IT in business relationships identified social bonds for trust as equity, trustworthiness, conflict, benevolence and commitment, but also technical bonds for trust being competence and investment. Competence is the expected level of performance of business transactions and this level of competency is the determinant of the amount of investment in IT by the collaborating firm.

The introduction of inter-organisational IT systems such as electronic data interchanges (EDI) has caused a shift in business transactions from labor focused to a capital focus. The adoption of such systems is not triggered by a desire to upgrade but is often the result of external pressure by a larger partner. The adoption of an EDI is often a means for further strengthening the bonds between firms (Morris, Tasliyan and Wood, 2003).

The use of inter–organisational systems brings with them a flow of knowledge between organisations and issues of management and security. Thuraisingham et al. (2002) suggest that knowledge management is key to successful use of inter-organisational IT systems as through these systems there can be a blurring organisational boundaries. So while there is a need to share information there is also a need to protect sensitive information within their organisations.

Thuraisingham et al. (2002) states that knowledge is like a resource which is shared across organisations in a collaborative situation however it is also a source of individual or organisational advantage and power which creates resistance to collaboration. For smaller firms knowledge is a significant asset both to be traded and to be gained from

others (Echeverri-Carroll, Hunnicutt and Hansen, 1998). They found that smaller firms benefited from relationships with larger firms by gaining access to a larger pool of information, in turn the larger organisation depends on the specialist knowledge of the smaller firms. Echeverri-Carroll, Hunnicutt and Hansen (1998) found little evidence of control by the larger firms over smaller firms' decision to adopt IT adoption.

Smaller firms can also be knowledge generators and players in innovation both within the firm and in collaboration with others, yet due to their lack of formalised systems and focus on day to day survival often fail to make the most of the knowledge created (Kitching and Blackburn, 1999; Levy, Loebbecke and Powell, 2003). According to Kitching and Blackburn (1999) SMEs realised the significance of new knowledge and intellectual property to their business survival yet this did not directly affect their management practices.

The effective management of knowledge generated within a specific relationship is important for sustained competitive advantage and as such SMEs can end up as losers (Levy, Loebbecke and Powell, 2003). IT is used to store and exchange explicit knowledge, however SMEs tend to be poor adaptors of IT which hampers their knowledge management (Levy, Loebbecke and Powell, 2003).

From the discussion of drivers and issues around the adoption of IT in business relationships the following table was synthesized. The factors identified could be classified as economic or technical which are easier to measure and those that are based around social or relational factors tend to be more intangible and difficult to value.

Table I Issues influencing IT adoption in the business relationships

Economic and technical enablers	Authors	Impediments
Cost reductions Productivity improvements Product market strategies Competitive position Efficiency and cost effectiveness Access to information	Barrett and Konsynski, (1982); Chatterjee and Ravichanddran, (2004); Echeverri-Carroll, Hunnicutt and Hansen, (1998)	No real or perceived competitive advantage from shared IT
Routine and simple exchange process	Bensaou and Venkatraman, (1996); Salo, (2006a)	Information rich and complex exchange process
IT resources and skills Technical trust and bonds Level of integration of the organisation's existing internal systems i.e. level of IT investments Level of implementing security systems to protect information exchanged between the organizations	Salo, (2006a); Perry, Cavaye and Coote, (2002); Ratnasingam, (2004); Salo, (2007a), (2007b)	Poor IT resources and skills Absence of the technical bonds Incompatibility and rigidity of IT systems (need specific IS adapters) Insufficient security protocols Fear of losing mission critical information after relationship dissolution
Finding or creating value and ongoing return for all partners in the project	Ratnasingam, (2004); Salo, (2006a)	Inability to create on going value from the relationship
Social and relational enablers	Authors	Impediments
Common history between the organizations	Clemons, Reddi and Row, (1993); Vlosky, Wilson and Vlosky, (1997); Naudé,	Lack of trust and commitment

	Holland and Sudbury, (2000)	
Power balance between organisations	Chatterjee and Ravichanddran, (2004); Vlosky, Wilson and Vlosky, (1997); Morris, Tasliyan and Wood, (2003)	Power asymmetry imbalance
Trust and commitment Social bonds	Vlosky, Wilson and Vlosky, (1997); Perry, Cavaye and Coote, (2002); Salo, (2006a)	Lack of trust and commitment Absence of social bonds
High level of integrity, availability and accessibility, efficiency, flexibility, standardization, compatibility, performance, reliability and security of IT	Salo, (2006a); Perry, Cavaye and Coote, (2002); Ratnasingam, (2004); Salo, (2007a), (2007b)	Low level of integrity, availability and accessibility, efficiency, flexibility, standardization, compatibility, performance, reliability and security of IT
Dependence	Vlosky, Wilson and Vlosky, (1997)	Low dependence
The agreement on a common goal and value created	Ratnasingam, (2004); Salo, (2006a)	Lack of common goals and disagreement on value creation

Methodology

The research sought to expand existing knowledge around business relationships and the use of IT in the context of heavy manufacturing. Due to the novel nature of this phenomenon and the complexity of business networks in particular both researchers used a case study methodology. The choice of case study allowed the investigation of a "contemporary phenomenon within its real-life context" in circumstances were the "the boundaries between phenomenon and context [were] not clearly evident" (Yin 2003, p.13). Since we are dealing with a relatively new area of study in which the researcher has only little or no control over the events that are occurring in a real-life context, a case study is a very appropriate method (Stake, 1995, p. 435-454). The use of a case study approach allowed the investigation of the interrelationship of the various parties and also the identification of specific relationships between organisations from both sides of the relationship.

Case selection is a crucial phase in case research, and advice on case selection is therefore extensively provided in literature (Eisenhardt, 1989; Pettigrew, 1989; Perry, 1998). The case companies were selected based on theoretical sampling, in which the cases are selected so that they represent the problem of the study. Nevertheless, the decision as to how many and which particular cases are selected is left to the researcher (Romano, 1989). We selected a total of six companies that formed three business relationships. Two relationships were based on Australian data and one on Finnish data in order to capture some aspects of impediments of IT adoption in heavy manufacturing industry business relationships. The main data source through which IT impediments were conceptualized consists of 14 semi-structured interviews (Kumar, Stern and Anderson, 1993; Arksey and Knight, 1999). Prior to the research being conducted the researches agreed on key themes of investigation and the interviewees were accordingly asked to specify aspects of business relationships, internal as well as connecting IT

systems and impediments to IT adoption. The choice of informants was premised on the principle that information is best elicited from people who have knowledge of the phenomenon and who have been involved with studied business relationships and IT adoption. After interviewing relevant informants, we were able to perceive some saturation in both Australian and Finnish data, and further cases or informants were thus not needed.

Table II Interview data

Australian interviews		
Company/informant	Position	Date, and duration of interview
Alliance Shipbuilding and Upgrade (N1)	Supervising Project Manager	April 2005, 1.5 hours
Alliance Ship Repair Maintenance (N2)	Contractor to Defence	May 2005, 2 hours
Naval Combat Systems (P6)	Through Life Support Manager	May 1, 2005, 2.5 hours
Naval Communications Systems (P7)	President	April 2005, 1.50 hours
Finnish interviews		
Alpha		
	Purchasing Manager	November, 2003, 1 h 40 min
	Business IT Manager	March, 2004, 1 h 30 min
	IT Manager	March, 2004, 1 h 45 min
	Technology Advisor	March, 2004, 1 h 45 min
	Production Planner	March, 2004, 2 h
	Product Manager	March, 2004, 2 h
Beta		
	CEO	November, 2003, 2 h 10 min
	CIO	November, 2003, 1 h 45 min
	CFO	November, 2003, 1 h 55 min
	Production Manager	November, 2003, 1 h 30 min

All the interviews were taped with the interviewee's permission and then transcribed and analyzed accordingly and in Australia data Nvivo 7 software was used. We employed qualitative data analysis in order to thematize the material (see Miles and Huberman, 1984). We also used documents, minutes of meetings, industry reports and company visits to triangulate the respondents' answers, as suggested in literature (Patton, 1987; Yin, 1994). Data triangulation was used between the information sources mentioned above. In practice, data triangulation was first used to compare the different perspectives presented by each of the interviewees and, subsequently, to compare the interviews with other sources, such as industry reports, in order to validate our observations and interpretations. The results are presented in the next section. The identities of the companies or the respondents are not revealed for reasons of confidentiality.

Case studies

One of the main focus of both studies was to investigate the use of shared technology within business relationships, however level of shared technology used was well below expectations, considering the number of large national and multi national companies that were involved in the studies.

Development of the business relationships

In the Australian study two specific business relationships were investigated between N1 and P6 and between N2 and P7. The firms studied were part of a multi-industry cluster incorporating marine, defence and resources industries located in Western Australia. N1 was an alliance organisations established to service the Australian Navy and had been in existence for over two years. Prior to this the two main subcontractors such as P6 involved with the building of the ANZAC class of frigates dealt directly with the Navy. The establishment of N1 was designed to provide a coordinated approach between the Navy and the subcontractors for shipbuilding and upgrade. At the time of the interviews N2 a contractor to the Navy was in the process of setting up a similar alliance organisation for the maintenance and repair of the frigates. N2 was a private contractor brought in to try and provide some form of interface between the Navy and the contractors one of which was P7. Hence the relationship between N2 and P7 was not as formalized as the one between N1 and P6 at the time of the research.

For N1 the development of the alliance and the participation of the subcontractors within that alliance had meant significant gains for the Navy in the speed and quality of the building and upgrading of vessels. P6 saw the alliance as advantageous by "halving the time it takes to turn around upgrades and providing open communication, responsiveness, flexibility and reduced risk".

An ad hoc relationship between N2 and P7 has existed for the past four years however the planned move to an alliance with a new structure "may be a little more challenging" according to N2. The shift to an alliance according to N2 would "reduce duplication of effort and simplify structures and business processes". It was pointed out that defence personnel are transient as they are often being posted elsewhere at short notice. The formation of an alliance would allow for knowledge to be retained within the corporate personnel giving greater stability. N2 considers that an alliance would provide an "efficiency of resourcing and access to manpower as combat system expertise is in short supply in W.A., it also will reduce double handling of financial tasks".

In the Finnish context one business relationship was investigated between Alpha and Beta. The firms studied are independent companies but could be seen as part of a multi-industry cluster incorporating various metal industry related companies operating in Finland and Europe. In the Alpha-Beta business relationship parties have been committed to a business relationship for over 40 years. The empirical context of the case is the steel processing industry. The buyer, Alpha, is a medium sized steel maker in Europe while the seller Beta, is a large machine workshop located in Finland. Beta was established in 1960s about the same time as the Alpha. Business with Alpha started with heating, plumbing, and air conditioning (HPAC). In late 1960s and in the beginning of the 1970s the main area of business in the relationships shifted to different types of steel objects and especially heavy steel products which were needed by the Alphas end customers. As the number of business activities grew between them and Alpha demanded more services from Beta's workshops Beta enlarged considerably their workshops and became a major player in specialized steel engineering operations in Finland. In the 1980s the HPAC business was no longer the main business focus. Diana describes: "HPAC was totally dissolved in the mid-1980s". The main focus of the business shifted to steel engineering. Clearly, Beta was focusing their operations and specializing in areas according to Alpha's

demand however, it was not only Alpha who needed specialized steel engineering services but also companies in the paper industry and those needing heavy steel object engineering also were customers of Beta. CEO of Beta stated that "We have organized our activities so that we can make offshore solutions directly to end-customers. We have needed quality systems and different certificates in place". Furthermore, at the beginning of the 1990s Beta commenced exporting its products and their share of export revenues started to grow steadily.

Basically, the Alpha-Beta relationship has grown from simple HPAC transaction to involve complex offshore solutions. This has been possible as both Beta and Alpha have developer their internal resource based and skills in relation to changes in their end customer demand. As their end customer wanted more complex offerings those were jointly developed. Currently, Beta is one of the biggest steel engineering workshops in Finland and Alpha is one of the leading steel mills in Europe.

State of IT usage in the business relationships – Australian and Finnish Cases

Across the two studies there were consistently low levels of the use of IT within the business relationships. In the Australian research the use of IT in business relationships was lower level than that used within the individual organisations. The alliance which N1 and P6 were part of had its own network which the partners accessed. In contrast there was no shared IT between N2 and P7 with electronic interactions through email. P7 has restricted access to the Navy network to view the status of vessels. The level of access of the Navy network has increased recently due to the rise in the use of private contractors, rather than Navy personnel, that maintain Navy vessels. Despite the low level of the use of IT within the relationships studied benefits to adoption identified included: the consistency of documentation and processes across organisations; common or shared expectations and knowledge provided and access to information which allowed for the scheduling of work and project management. P6 comment that the firm "needed to be in the relationship for the long term to make the IT investment worthwhile".

In the Finnish case from the 1960s to 1980s there was no IT used in the business relationship between the parties. However, some internal applications like office computers and software were acquired during that time. Basically, the telephone and the fax were most important means to communicate and exchange information if personal communication was out of question. It is pointed out that almost all of the interaction between the parties at the dawn of the relationship was based on social interaction which also created a trustful relationship. Unfortunately, organizational changes have undermined the created trust and the relationship over time. As the volume of exchange increased more people were hired and all these factors increased internal complexity of communication. Internal systems were underdeveloped and communication was based on manual exchange of papers and social communication. Many meetings were needed to get things done in the relationship and there were neither identifiable routine communication patterns nor same products exchanged between parties, or if there are, they were a small volume of the total amount of exchanges in the relationship. Thus, information and transaction flows between companies were not easily identified, codified and predicted as in the relationship between retailers and wholesalers involved in the cereal business. Moreover, from the beginning the continuity of the relationship was

constantly being questioned by both parties. Communication and exchange patterns were rather simple and the relationship was asymmetric, since Alpha was in a commanding position due to its role as a large buyer of subcontracting services. Beta managed to serve Alpha and others with a relative small number of employees involved in administration. This kept internal communication simple at first. Similarly, the business relationships in the Australian cases highlighted the divergent cultures of the firms involved and required significant cultural change and adjustment by each party in order to work together.

The introduction of IT into existing business relationships in both studies has been slow and face a number of impediments. In the Australian study there was no common IT system between N2 and P7 only limited access to the Navy's systems. For N2 multiple systems and the lack of continuity in formatting of information across the Navy's and subcontractors IT systems made locating information extremely time consuming. Both N2 and P7 found restriction due to security, intellectual property issues and the red tape involved in getting clearance for employees to access Navy systems. P6 considered the introduction of a shared system created conflict between the firms when settling on a single system rather than maintaining their different IT systems. In the Finnish case Alpha invested heavily in various IT applications and solutions including electronic marketplaces, point-to-point connections with customers and suppliers and different software applications during the 1990s and 2000s however there were no attempts to integrate with Beta. For Beta scarce resources and a reluctance to adopt IT has mean their investment in only some applications and though those investments were carefully planned currently the solutions cannot be easily integrated. It was in the mid 1990s when e-mail was first utilized between the Alpha and the Beta to inform about plant visits. Besides e-mail exchanges sometimes welding software might be send from the Alpha over the Internet to the Beta.

In contrast the larger organisation in the business relationship in the Australian case, the Navy rather than being the leader in IT was seen by some interviewees as having old and inflexible IT systems and that this would crate difficulties in using shared IT. The perspectives on the adoption of new IT systems were quite divergent while N1 saw the alliance as a "platform of procedures and process which are reviewed and updated collaboratively between the three partners" P6 saw it as a "Navy driven project that was pushed from top down with quite a bit of disagreement and sabotage at the lower levels of the respective organisations". For N2 and P7 the only new IT systems came from the Navy and were filtered down to the commercial subcontractors with restricted access. In the Finnish case it seems that organizational changes in Alpha have altered relationship with Beta and that has also caused the feeling of missing common goals in the relationship. Moreover, Alpha does not use long-term contracts with Beta and that manifests itself as the lack of common goals. In addition, Beta has limited IT resources, skills and the overall interest to adopt IT is limited. Basically, the relationship is complex in the communication and exchange pattern and which decreases the opportunities to automate activities (see Bensaou and Venkatraman, 1996). To sum up in the Finnish case, the lack of common goals and benefits and increased organizational changes have severely inhibited the level of shared IT adoption in the relationship.

Results

Both cases highlighted context and case specific impediments to shared IT adoption in the business relationships studied. It is noted that results presented are only illustrative in nature as case studies attempt only to provide local explanations. It is suggested that the results presented are relevant for the heavy manufacturing, steel manufacturing and engineering industries. Other industrial areas may benefit indirectly from the results. The findings indicate that doubts about the security of shared information, missing mutual benefits, incompatibility of IT systems, inadequate IT resources, uncertainty about the future directions of the relationship, information rich working routines i.e. face to face communication, IT deployment not being part of the industry standard and investments not being justified by the relationship seems to be the most significant impediments to IT adoption in both Australia and Finland. There are some notable differences that are discussed. Table 3 presents in detail the impediments to shared IT adoption in the studied relationships.

Table III Impediments of shared IT adoption and some coping strategies

Impediments in Australian cases	Reasons	Overcoming / coping strategies
Lack of a formalized agreement	The highly confidential nature of the industry meant that share IT in this context could not be implemented between N2 and P7 without a formalized agreement	This issue had already been identified and an alliance was in the process of being established
Security Fears	The confidential nature of the work being carried out and the high level of competition meant that there was significant emphasis on information security Shared IT was viewed suspiciously	Create levels of access around knowledge and provide a third party platform to carry centralized low security information.
Protection of Intellectual Property	The industry in Australia is very small with many multinationals competing with local firms for scare billon dollar contracts. Partners change for each contract, so allies can become competitors	Provision of a third party "space" or IT platform for information exchange that protects each partner's systems.
Conflict over the selection of shared IT	Each organisation in the relationship wanted to use the systems they were familiar with	Adopt a new system however no one is familiar with it which can cause more problems
Divergent organizational cultures	Navy tended to be hierarchical and inflexible. Even the contractors had divergent cultures and although they collaborated on one project they may be competitors on another causing conflict	The use of a formal agreement between N1 and P6 seemed to create a common platform/language for the relationship. The relationship between enlisted Navy personal and contractors will always be difficult
Lack of support from lower levels of the organization	The adoption of the shared IT was a top down decision	Better implementation and changed management strategies. Engage those who have to work with the system
Resistance to change	Even if the status quo was inefficient it was familiar. The interviewees were predominately ex-Navy personnel and over 45 years old	The Alliance with N1 and P6 proved a successful example of the an alliance hence the Navy's decision to create a second alliance around maintenance of

		vessels Encouragement of culture change from within the Navy
Organizational rigidity	This was particularly evident with the Navy which had layers of bureaucracy, slowing change	Recruitment of the personnel from non-military backgrounds within the private contractors to encourage cultural change
Impediments in Finnish case	**Reasons**	**Overcoming / coping strategies**
Organisational changes	At one point in time Alpha had high internal employee turnover	Creating more flexible interaction and attempt to lower employee turnover if necessary
Information rich and complex exchange process	In the relationship different types of heavy steel objects are exchanged. Most importantly, objects are always specifically created for Alpha	Attempts should be at least to create some type of drafts of possible products that could be ordered and handled in R&D digitally. This would decrease the order to finished product costs considerably
Lack of common goals and disagreement on value creation	Due to the short term contracts common goals are not created and this has hindered long term orientated common value creation	Draft long term contracts with details about the volume and prices. Plan and prepare a future orientated common business strategy and value creation map
Poor IT resources and skills	Beta has limited IT skills and willingness to adopt IT in the relationship	Long term contracts with some detailed suggestions from Alpha would accelerate Betas investing in IT and IT specific learning.
Incompatibility and rigidity of IT systems	Alpha has relatively old systems from the 1970s and new systems working together. Beta has some older systems and specifically created systems that suited their needs	Integration is complicated. However, detailed analysis of what Alphas IT needs to be integrated with Betas would help. This is in place when integration is planned. Integration might be possible with the help of specific adapters between systems or by using third parties that have specific software solutions who could act as middlemen.

From the Table 3 it can be seen that, there exists similarities in the cases but interestingly there are some differences. In Australian cases organizational culture and industry specific impediments are central while in the Finnish case relationship specific work routines and organizational changes have hindered IT adoption. In both cases organizational rigidity is seen as impediment to IT adoption and as contracts are short-term this reduces future orientation in the relationship.

Conclusion

Understanding of the nature of IT impediments is crucial for deploying IT effectively in business relationships. The purpose of the paper was to describe the impediments to IT adoption and possible solutions in the context of business relationships. We described the impediments with the help of case studies conducted in both Australia and Finland in the

heavy manufacturing sector. For the Australian and Finnish research the impediments identified fall into two broad categories, technical and organisational. For the relationship between N2 and P7 the lack of a formalized agreement stating the parameters of the relationship meant that proceeding with any form of shared IT was out of the question. In the Finnish case exchange process was complex and could not be formalized. The issues with security and protection of intellectual property are not exclusive to the defence industry but perhaps more pronounced. Security issues were not major concerns in the Finnish case study although secure information exchange is the antecedent for IT adoption. Security concerns need to be addressed on a procedural and technical level. Even when a form of shared IT was introduced a number of issues centering on the organisations rather than technology arose. Shared IT is used to a limited extent (e.g. e-mail) in the Alpha-Beta business relationship. Furthermore, the Finnish company Beta has limited IT skills and relies on procurement of IT resources from third parties. The jostling between those in the Australian alliance over whose system should be used is another indicator of the intense competition in the industry which makes working on a common goal difficult. It was commented by P6 that the process for the implementation of the alliance between N1 and P6 had been enforced from the top of the organisation. This had lead to dissension among the employees whose job it was to use the new system and there were indications of some employees undermining the new system.

The divergent cultures between the Navy which is in the business of defence and the private contractors who were profit driven meant on going conflict. The problem has intensified in recent times as the Royal Australian Navy has a shortage of enlisted personnel and often has to send shore based personnel, involved with the maintenance and upgrade of the vessels, to sea. This leads to discontinuity in working relationships between the Navy and the private contractors. To try and bridge the gap between the Navy and the private contractors these firms have employed predominately ex navy personnel, however this may have perpetuated some of the issues around a resistance to change and organisational rigidity. Though only a limited study the results illustrate that while the literature has tended to focus on technical issues around shared IT. Additional factors concerning the relationship and organisational culture also play a role in the use of shared IT. This was especially visible in the Finnish case.

For managers, we introduced IT adoption impediments relevant in the heavy manufacturing industry and provided some preliminary ideas on how to cope with the impediments found. Further studies are needed from this perspective to validate the findings.

For academics, the paper has provided some ideas on what type of impediments there are to adopt IT in the heavy manufacturing industry business relationships. Future research is needed both qualitative in other industrial context and quantitative to provide more generalizable results. To discuss, the limitations of the paper it must be stated that neither the industries nor the amount of interviews were identical in the studied cases but they present relevant IT adoption impediments from the perspective of the heavy manufacturing industry.

References

Arksey, H. and Knight, P. (1999), **Interviewing for Social Scientists**, Sage publications, London.

Barrett, S. and Konsynski, B, (1982) "Inter-Organisational Information Sharing Systems" **MIS Quarterly**, Vol 5, No Dec, special issue, pp. 92-105.

Bensaou, M. and Venkatraman, N. (1996) "Inter-organizational relationships and information technology: a conceptual synthesis and a research framework", **European Journal of Information Systems**, Vol 5 No 2, pp. 84-91.

Chatterjee, D. and Ravichanddran, T. (2004) "Inter-Organisational Information Systems research: A Critical View and Integrative Framework", **Proceedings of the 37th Hawaii International Conference on Systems Science**, Hawaii, USA.

Clemons, E.K., Reddi, S. and Row, M.C. (1993) "The Impact of IT on the Organization of Economic Activity: The 'Move to the Middle' Hypothesis", **Journal of Management Information Systems**, Vol 10 No 2, pp. 9-35.

Cunningham, M.T. and Turnbull, P.W. (1982) "Inter-organizational personal contact patterns", in: Håkansson, H. (Ed.), **International Marketing and Purchasing of Industrial Goods. An Interaction Approach**, John Wiley & Sons, Chichester, pp. 304-316.

Echeverri-Carroll, E., Hunnicutt, L. and Hansen, N. (1988) "Do asymmetric networks help or hinder small firms' ability to export?", **Regional Studies**, Vol 32, No 8, pp. 721-733.

Eisenhardt, K.M. (1989) "Building theories from case study research", **Academy of Management Review**, Vol 14 No 4, pp. 532-550.

Grover, V. (1993) "An Empirically Derived Model for the Adoption of Customer Based Interorganisational Systems", **Decision Science**, Vol 24 No 3, pp. 603-640.

Halinen, A. (1994), **Exchange relationships in professional services – A study of relationship development in advertising sector**, Publications of the Turku School of Economics and Business Administration, A-6, Doctoral dissertation, Turku, Finland.

Johanson, J. (1966), **Svenskt specialstål på utländska marknader** (Swedish Special Steel on Foreign Markets), University of Uppsala. Department of Business Administration. Doctoral dissertation, Uppsala, Sweden.

Kitching, J. and Blackburn, R. (1999) "Intellectual property management in the small and medium enterprise (SME)", **Journal of Small Business and Enterprise Development**, Vol 5 No 4, pp. 327-335.

Kumar, N., Stern, L.W. and Anderson, J.C. (1993) "Conducting Interorganizational Research Using Key Informants", **Academy of Management Journal**, Vol 36 No 6, pp. 1633-1651.

Leek, S., Naudé, P. and Turnbull, P.W. (2003) "How is IT affecting business relationships?", **Industrial Marketing Management**, Vol 32 No 2, pp. 119-126.

Levy, M. Loebbecke, C. and Powell, P. (2003) "SMEs, co-opetition and knowledge sharing: the role of information systems", **European Journal of Information Systems**, Vol 12, No 2, pp. 3–17.

Markus, L. and Robey, D. (1988) "Information Technology and Organisational Change: Causal Structure in Theory and Research", **Management Science**, Vol. 34, No. 5, pp. 583-598.

Miles, M.B. and Huberman, A.M. (1984), **Qualitative data analysis: A source book of new methods. Sage publication**, Newbury Park, CA, USA.

Morris, D. Tasliyan, M. and Wood, G. (2003) "The Social and Organizational Consequences of the Implementation of Electronic Data Interchange Systems: Reinforcing Existing Power Relations or a Contested Domain?" **Organization Studies**, Vol. 24 No 4, pp.557–574.

Naudé, P, Holland, C. and Sudbury, M. (2000) "The Benefits of IT-Based Supply Chains-Strategic or Operational?", **Journal of Business-to-Business Marketing**, Vol. 7 No 1, pp. 45-67.

Patton, M.Q. (1987), **Qualitative evaluation and research methods**, Sage publications, CA, USA.

Perry, C. (1998) "Process of case study methodology for postgraduate research in marketing", **European Journal of Marketing**, Vol 32 No 9/10, pp. 785-802.

Perry, C., Cavaye, A., and Coote, L. (2002) "Technical and social bonds within business-to-business relationships", **Journal of Business & Industrial Marketing**, Vol 17 No 1, pp. 75-88.

Pettigrew, A.M. (1989) "Context and Action in the Transformation of the Firm", **Journal of Management Studies**, Vol 24 No 6, pp. 649-670.

Rao, S., Perry, C. and Frazer, L. (2003) "The Impact of Internet Use on Inter-firm Relationships in Australian Service Industries", **Australasian Marketing Journal**, Vol 11 No 2, pp. 10-22.

Ratnasingam. P. (2004) "The Impact of Collaborative Commerce and Trust in Web Services." **Journal of Enterprise Information Management: An International Journal**, Vol 17 No 5, pp 382-387.

Reid, D.A. and Plank, R.E. (2000) "Business Marketing Comes of Age: A Comprehensive review of the Literature", **Journal of Business-to-Business Marketing**, Vol 7 No 2/3, pp. 9-178.

Ritter, T. and Walter, A. (2006) "Matching high-tech and high-touch in supplier-customer relationships. **European Journal of Marketing**, Vol 40 No 3/4, pp. 292-310.

Romano, C. (1989) "Research strategies for small business: a case study", **International Small Business Journal**, Vol 7 No 4, pp. 35-43.

Ryssel, R., Ritter, T. and Gemünden, H.G. (2004) "The impact of information technology deployment on trust, commitment and value creation in business relationships", **Journal of Business & Industrial Marketing**, Vol 19 No 3, pp. 197–207.

Salo, J. (2006a), **Business relationship digitalization: A case study from the steel processing industry**, Oulu University Press, Doctoral dissertation, Oulu, Finland.

Salo, J. (2006b) "Business relationship digitization: what we need to know before embarking on such activities?", **Journal of Electronic Commerce in Organizations**, Vol 4 No 4, pp. 75-93.

Salo, J. (2007a) "Business relationships redesign with electronic commerce tools: An empirical investigation", **Business Process Management Journal**, (In press).

Salo, J. (2007b) "Mobile technology usage in business relationships", in Khosrow-Pour, M. (Ed.), **Encyclopedia of Information Science and Technology**, 2nd ed, Idea Group Publishing, PA, USA, pp.1-7. (In press).

Snehota, I. (1982), "Siderex S.p.A", in Håkansson, H. (Ed.), **International Marketing and Purchasing of Industrial Products,** Jonh Wiley & Sons Chichester, UK, pp. 62-73.

Stake, R.E. (1995), **The art of case study research**, Sage publications, Thousand Oaks, CA, USA.

Stern, L. and Kaufmann, P. (1985), "Electronic data interchange in selected consumer goods industries: An interorganizational perspective", in Buzzell, R.D. (Ed.), **Marketing in an electronic age,** Harvard Business School Press, Boston, pp. 52–73.

Thuraisingham, B., Gupta A., Bertino, E. and Ferrari, E. (2002), "Collaborative Commerce and Knowledge Management", **Knowledge and Process Management**, Vol 9 No 1, pp. 43-53.

Turnbull, P.W. (1979) "Roles of Personal Contacts in Industrial Export Marketing", **Scandinavian Journal of Management**, Vol 16 No 5, pp. 325-337.

Vlosky, R.P., Wilson, D.T. and Vlosky, R.B. (1997), "Closing the interorganizational information systems relationship satisfaction gap", **Journal of Marketing Practice**, Vol 3 No 2, pp. 75-86.

Yin, R.K. (1994), **Case Study Research: Designs and Methods**, 2nd edition, Sage publications, Thousand Oaks CA, USA.

Yin, R. K. (2003), **Case Study Research Design and Methods**. (4nd ed.). California: Sage.