INCORPORATING THE LIFE CYCLE CONCEPTS WITHIN THE INTERORGANIZATIONAL RELATIONSHIPS

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RÉSUMÉ

Building on the interorganizational relationships model proposed by Bensaou and Venkatraman (1995), this study seeks to gain a better understanding of this phenomenon by examining various types of relationships established between a German auto parts manufacturer and its business partners. The results suggest that taking into account the product and the business relationships life cycle concepts as well as the types of information (conveyance vs. convergence) exchanged through the various types of business relationships helps in better assessing interorganizational relationships. Indeed, four different relationships at various stages of their life cycles were observed and results indicate that analyzing interorganizational relationships without taking into account the evolving information processing needs and required capabilities associated with the life cycle stages and the information types would lead to a wrong diagnosis of the situation. In other words, disregarding the life cycle concepts implies that the average needs and capabilities of the relationship is correctly aligned when in fact it is not the case. The conclusion is that the phenomenon is bimodal and requires that the different information processing needs and capabilities associated with each stage of both the product and the business relationships life cycles should be considered. Without such caution, a biased conclusion could lead to inappropriate information and communication technology investments and business decisions.

Mots Clés: Interorganizational relationships, Product life cycle, Business relationships life cycle, Information technology alignment, Collaborative development.

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1. INTRODUCTION

Building and managing efficient business relationships is recognized as a key competency in today's network-based business environment (Barringer and Harrison, 2000; Dyer and Singh. 1998; Golicic, Foggin, and Mentzer, 2003). To maintain their competitiveness, many firms choose to concentrate on their main expertise and outsource many peripheral activities to business partners (Hakansson and Snehota, 1995; Jap 2001). By partnering up in value chains with key allies, organizations improve their value while keeping their cost down. To be successful in such a network context, firms need to understand how to grow and maintain efficient relationships (Miles and Snow, 1994). Many authors have shown that building an efficient and collaborative information flow between business partners can provide significant competitive advantages over non-interconnected competitors (Aviv 2001; Lee, So, and Tang, 2000; Simatupang and Sridharan, 2002).

With the market globalization, the fast pace of large-scale changes have an impact on both major and minor players in almost each industry. All the possibilities offered by the use of information technology facilitate the exchange of information. However, each business partner is required to align its needs and its ability to process such information with those of its other business partners. This kind of alignment is not always easy to achieve due to the lack of synchronicity in each partner's organizational maturity.

Despite the literature on strategic alignment concepts, both the concepts of product life cycle and business relationships life cycle have not been successfully incorporated into the literature on interorganizational relationships (Chan, Huff, Barclay, and Copeland, 1997; Henderson and Venkatraman, 1999). Firms that get together to collaborate at the early stages of a product life cycle do not have the same information processing needs and capabilities as firms teaming up in the later stages. In some interorganizational relationships, simple operation data exchanges are required. In other business relationships, collaborative planning may have to share forecasting and replenishment data. In the most complex relationships, firms need to work together on developing new products or services, which necessitates flexible knowledge-oriented information and communication technology (ICT) platforms.

Moreover, each business relationship goes through its own life cycle, which influences the information processing capabilities of the parties involved. These factors may create some discrepancies between business partners because their respective needs and capabilities are not at the same level of sophistication or maturity.

Building on Bensaou and Venkatraman's model (1995), this study seeks to gain a better understanding of interorganizational relationships by taking the life cycle concepts into account. This exploration of the interfirm relationships reviews the theoretical foundations of strategic alignment of information technology, both the product and the business relationships life cycle concepts, and the types of information exchanged. Four types of interorganizational relationships between a major German tier-one manufacturer in the automotive industry and its business partners are studied to illustrate how the alignment between information needs and capabilities is best captured when one considers types of information exchanged, and the product and the business relationships life cycles. The results are then discussed from the perspective of a multi-leveled assessment of interorganizational relationships within a supply chain. The article closes with a discussion on the limitations and further research avenues.

2. THEORETICAL BACKGROUND

Among the theoretical background necessary to better understand interorganizational relationships, it is needed to review what was done so far in the strategic alignment and interorganizational relationships areas, to cover the importance of both the product and the business relationships life cycle concepts, and to discover the possible links between the strategic alignment of IT and the life cycle concepts. This approach should provide insightful ways of identifying the most effective and efficient interorganizational relationships supported by ICT.

2.1. STRATEGIC ALIGNMENT

The notion of strategic alignment or fit has stirred up a lot of interest among academics and practitioners over the last decade (Bergeron, Raymond, and Rivard, 2001; Venkatraman, 1989). As per Venkatraman (1989), the notion of fit can be measured in six different statistical approaches with their own advantages and limitations. The bivariate approaches, be it moderation, mediation and matching, or the system approaches, that is covariation, profile deviation, or gestalts have been empirically compared and results indicate that there are some significant differences between each assessment of alignment (Bergeron, Raymond, and Rivard, 2001).

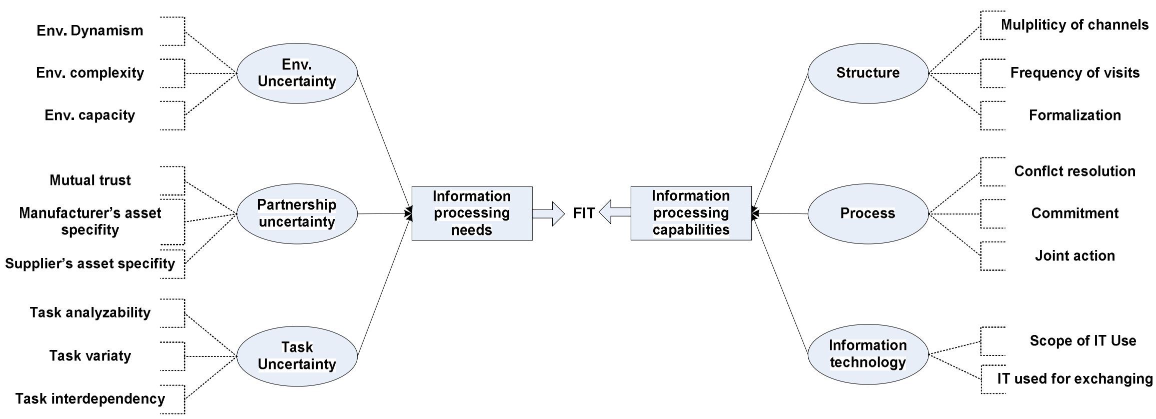
The alignment of IT is a continuous and dynamic process aiming at providing organizations with technological solutions enabling them to achieve their performance goals as dictated by their business strategy. Following the initial model of strategic alignment of IT proposed by Henderson and Venkatraman (1999), various studies have been conducting to empirically validate the impact of such fit on business performance, using internal components of a firm. Studies undertaken on the IT alignment topic looked after certain antecedents (Tornatsky and Fleisher, 1990) such as the organizational context (business strategy, organizational structure), the environmental context (industry, size of the company), and the technological context (technological solutions, management of IT). Research highlighted that a close link between business strategy and IT strategy contributes to the organizational performance (Chan et al. 1997; Sabherwal and Chan, 2001), and that the most powerful companies are those that have a strong adequacy between their business strategy and their strategic management of IT (Bergeron, Raymond, and Rivard, 2001). Some profiles of IT deployment are specific to each type of business strategy (Croteau and Bergeron, 2001). It was also observed that the strategic management of IT, which takes into account the structural sophistication of IT, contributes to the performance (Raymond, Paré, and Bergeron, 1995). Finally, organizations increase their performance when their IT competencies support adequately their organizational competencies (Croteau and Raymond, 2004). On the other hand, the least powerful companies are the ones that indicate a lack of alignment between their business strategy, IT strategy, organizational structure, and IT structure (Bergeron, Raymond, and Rivard, 2004).

All of these researches on the strategic alignment of IT have essentially looked at the fit from an internal perspective rather than an external one. Market globalization and the proliferation of business transactions supported by ICT have created a need to further investigate the characteristics of an "extraorganizational" alignment, that is, the level of fit between different business partners' information needs and capabilities (Bensaou and Venkatraman, 1995). Another limitation related to the measurement of alignment, be it intra- or extra-organizational, is that it does not take into consideration the organizational life cycle (Gupta and Chin, 1994). Even if it is not easy to consider each firm's specific maturity stage when assessing the presence of fit, not taking this into consideration may just impede the real level of alignment between the technological applications and the business needs. Besides the work of Bensaou and Venkatraman (1995), no research has really given a life cycle orientation to the strategic alignment of IT between several organizations.

2.2. INTERORGANIZATIONAL RELATIONSHIPS

Referring to contingency theory (Lawrence and Lorsch, 1967), Bensaou and Venkatraman (1995) argue that interorganizational relationships are driven by an appropriate alignment between information processing needs and capabilities (see Figure 1). Information processing needs are developed from the contextual uncertainty in which a business relationship evolves. Grounding their arguments in organizational and transactions cost theories as well as political economy, Bensaou and Venkatraman (1995) propose that information processing needs arise from three types of uncertainty: environmental uncertainty (complexity and dynamism of the relationship), partnership uncertainty (perceived mutual trust prevailing in the relationship) and task uncertainty (extent to which the relationship is underlined by known business interaction procedures). As for information processing capabilities, this interorganizational relationships model suggests that these aptitudes draw from three interorganizational coordination mechanism: structural mechanisms (multiplicity and formalization of interorganizational information channels as well as the frequency of information exchange), process mechanisms (socio-political processes, such as conflict resolution and joint actions, affecting the freely exchange of information in the relationship) and information technology mechanism (nature and scope of electronic exchange between the business partners).

Figure 1. Model of interorganizational relationships (Bensaou and Venkatraman, 1995)



2.3. LIFE CYCLE CONCEPTS: THE MISSING PIECE

One limitation of the interorganizational relationships model proposed by Bensaou and Venkatraman (1995) as well as for strategic alignment model of Henderson and Venkatraman (1999) is that they do not take into account the product life cycle supported by the business relationships. Business partners can be involved in one or many stages of a product's life cycle. Some business partners collaborate in the development of the products while others are involved in the production stages and roll-out activities. As for the business relationships life cycle, the maturity of the relationship may influence the partners' ability to efficiently exchange information with one another.

Bensaou and Venkatraman's model (1995) is meant to be static, providing a snapshot of a relationship at a certain point in time. The model provides very little indication of how a relationship could mature and reach a higher-level configuration. The strategic alignment is therefore measured at a specific moment. Unfortunately, no consideration is given whatsoever to the trajectory that business partners intended to follow or to the information exchanged at the different stage of the product life cycle, when in fact, this information differs greatly. Indeed, the characteristics of the information needed to collaborate at the product development stage are definitely different than the information exchanged by the partners at the production stage. Information processing capabilities are also very different between these two stages. In the development stage, collaboration tools are mostly used to exchange geometrical and functional information while transactional data are usually exchanged in production execution phase. Disregarding the evolution of needs and capabilities along the product life cycle could lead into a false alignment diagnostic. Should a misfit diagnostic be drawn for a specific relationship, there is no indication if the partners were actually investing to improve the information exchanges, or going downhill from a situation where they used to be in aligned stage. Taking into account the life cycle of the relationship might therefore help in better assessing the level of interorganizational alignment.

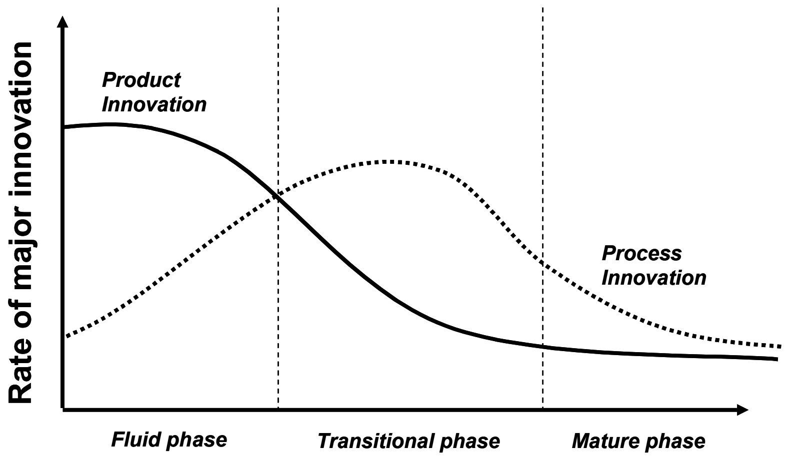
Life cycle concepts have been researched in both the management (Gupta and Chin, 1994; Miles and Snow, 1994) and the IT literature (Ross, 2003), but little attention has been paid to linking strategic alignment and life cycles especially in an interorganizational context. Hence, this paper argues that two life cycle concepts (product and business relationships) are relevant to the measurement of interorganizational alignment. This paper argues that the life cycle concepts should be incorporated into the measurement of interorganizational alignment. The following sections describe both the concept of product and business relationships life cycles and insist on the evolution of the needs and capabilities along these life cycles.

2.3.1. Product life cycle

A firm's ability to adapt its strategy to the product life cycle has been identified as a key success factor (Agarwal and Gort, 2002). According to Birou, Fawcett, and Magnan (1998), the product life cycle can serve as a "common strategic denominator through which the competitive efforts of different areas of the firm can be effectively aligned" (p. 38). Product life cycle has been used as a critical factor in several manufacturing models (Hayes and Wheelwright, 1979). Business strategy has been translated into functional decision-making by using the product life cycle in logistics (Kaminski and Rink, 1984). In engineering and information technologies, the product life cycle concept has attracted a lot of attention recently, as new tools have been introduced to better manage information along the entire life cycle of a product (Sudarsan, Fenves, Sriram, and Wang, 2005).

Different life cycle models have been proposed, but Levitt's model (1965) is one that is widely recognized. His model proposes that product life cycles follow a linear stage path: design, introduction, growth, maturity, and decline. Other authors, such as Fox (1973), Wasson (1974), Anderson and Zeithaml (1984), and Hill and Jones (1998) have proposed different variants of this model. In the innovation management literature, Utterback and Abernathy (1975) proposed a model of industrial innovation synchronized with the product life cycle. In this model, the authors distinguish innovation that affects the product itself from innovation of the process for manufacturing this product. The model claims that product and process innovations are interdependent and follow a pattern over time. In the initial stage of the product life cycle, the rate of product innovation is expected to be very rapid, while the production process is still rudimentary and often unreliable in terms of quality. In the transitional stage, market acceptance brings a change of focus from product to process innovation in order to benefit from mass manufacturing. In the mature stage, product innovations are generally incremental while process innovations concentrate on productivity and quality.

Figure 2. Pattern of product and process innovations



2.3.2. Product life cycle and types of information exchanged

The product life cycle stages with which a business relationship is associated drive the type of information exchanged between partners. For example, the characteristics of the information needed to develop a virtual mock-up of a new product are very different from the type exchanged during production orders. Such a distinction between the types of information exchanged is proposed by Dennis and Valacich (1999), that is the information conveyance versus the information convergence.

Conveyance is the exchange of structured and detailed operational information, and involves a low level of uncertainty regarding the understanding of the information by other parties. Conveyance is repetitive in nature, with an already tested, successful set of procedures available to arrive at a solution. Conveyance includes typical supply chain execution, which requires an extensive volume of structured information. This operational information is defined as "short-term quantitative information about daily logistics/sales activities or status information on orders and inventory levels" (Moberg, Cutler, Gross, and Speh, 2002). It concerns the actual material flow between the supply chain partners and covers functionalities that support the operational aspects of the supply chain, such as inventory management, warehousing, etc. (Muzumdar and Narayan, 2001). The adequate conveyance of information between business partners is key to triggering process innovation at the later stages of Utterback and Abernathy's product life cycle model (Utterback and Abernathy, 1975).

Convergence, on the other hand, is defined by Dennis and Valacich (1999) as the development of a shared meaning of information. In a convergence context, there is a high degree of uncertainty concerning the various parties' needs for information and the way this information is to be exchanged. The information exchanged in a convergence context is not always detailed enough for an unequivocal understanding of its meaning. Because of this possible ambiguity, partners involved in convergence processes need to engage in iterative exchanges to come to a clearer consensus. Information convergence is used in both the early and later stages of Utterback and Abernathy's model (1975). For instance, at the new product development stage of the product life cycle, business partners often need to exchange geometrical and functional data to generate product innovation. The supplier of an engineering component, for example, needs detailed information (pertaining to the complete system) from a manufacturer to ensure the geometrical fit of this part with the other modules of the product. The manufacturer has to comment on the part's potential functional interaction with the rest of the system. Much iteration is needed before the partners arrive at a final design. Convergence is also important later on in the product life cycle when manufacturing partners collaborate on production planning, thus triggering process innovation. Supply chain collaboration often revolves around the joint planning and forecasting of end-customer demand with the objective of better aligning production capabilities and resource scheduling along the supply chain (Buxmann, Diaz, and von Ahsen, 2003; Muzumdar and Narayan, 2001). Many important benefits are associated with better collaborative planning (Lee, So, and Tang, 1997). To collaborate at this level, supply chain partners need to share prospective data on industry trends before taking strategic business decisions.

2.3.3. Business relationships life cycle

Business relationships are not static. They develop and grow over time, and come to an end when the parties choose to discontinue their partnerships. This notion of evolution has been proposed by many authors who studied the life cycle of business relationships. Two groups of authors have developed similar frameworks that clearly distinguish different stages of interorganizational relationships between supply chain partners. One group proposed that the major steps in the business relationships life cycle are the relationships development, settling, routinization, and dissolution (Dwyer, Shurr, and Oh, 1987; Ford, Dadde, Hakansson and Snehota, 1998; Powell, Koput, and Smith-Doerr, 1996). Another group identified four different stages of supply chain relationships with their respective critical aspects: open market negotiation, cooperation, coordination, and collaboration (Spekman, Kamauff, and Myhr, 1998).

2.3.4. Business relationships life cycle and types of information exchanged

Obviously, the type of information that needs to be exchanged will differ greatly at the different stages of interorganizational relationships. Low levels of collaboration may rely mostly on conveyance exchanges, such as structured transaction data. Higher levels of collaboration may need both conveyance and convergence, as their collaboration may span multiple aspects of the product value chain. Each capability has to be aligned with each collaboration stage.

Not all business relationships have the technological and human maturity to reach the highest collaboration level. Relationships developed in the later stages may have the required norms and structure to reach higher collaborative contexts. Moreover, within the portfolio of relationships that a firm develops and maintains, not all interorganizational linkages will be at the same level of maturity. A firm may therefore need to support, in parallel, various levels of collaborative stages, and consequently a broader range of IT capabilities.

In recent years, ICT have contributed to rapidly enhance information processing capabilities in interorganizational relationships. The critical role played by ICT in the creation and management of a supply chain is undeniable. Many organizations are finding the concepts of e-commerce and supply chain management increasingly appealing. Reductions in inventory, product development time, time to market, procurement workforce, and the like have encouraged large companies to adopt advanced technologies in order to achieve the potential supply chain savings (Sucky, 2004). With new communication channels between buyers and suppliers, relationships are being transformed from adversarial, arm's-length transactions to collaborative processes (Humphrey, Shiu, and Chan, 2001). The main reason for this shift is that buyers now need suppliers in order to a gain competitive advantage in major markets. According to Laseter (1998), it is important at this point to have equilibrium between cooperation and competition in the supply chain. Some complex interorganizational processes require the combination of several technologies that must evolve progressively in an integrated environment.

With the rise of e-business in the last decade, the range of conveyance and convergence tools is now larger—e-mail, chat rooms, message boards, online product data managers, and product life cycle applications (Marquez, Bianchi, and Gupta, 2004) — and the variation in the types of information exchanged electronically has grown greater. The same is true of supply chain collaboration, which is now supported through tools that offer functionalities such as demand management, production planning and scheduling, and distribution requirement planning (Cassivi, Lefebvre, Lefebvre, and Léger, 2004).

3. METHODOLOGY

Building on the above literature review, this paper further investigates the alignment between the information processing needs and capabilities during interorganizational relationships through the lenses of both the product and the business relationships life cycle concepts, and the types of information exchanged.

This article argues that taking the product life cycle into account in the measurement of strategic alignment is very important if one is to produce an adequate diagnosis. Convergence and conveyance information require different types of tools to ensure that the exchange of information between partners is efficient. A firm could achieve a proper alignment on one dimension, but be in a complete misalignment on the other. In this particular case, disregarding the product life cycle could lead to an overall diagnosis of mild misfit, whereas in fact the alignment problem is only related to a specific information processing needs.

The business relationships life cycle is also critical to effectively measuring the alignment of a business partnership. A good alignment diagnosis should be able to differentiate a relationship in its early stages, in which the parties involved are investing time and money to learn how to collaborate, from its more mature and legally regulated stages, in which no effort is made to increase the efficiency of the information communication process.

This paper follows up on a previous empirical study conducted in the automotive sector, investigating the electronic collaboration within the supply chain of a large European Automotive Supplier (EAS) (Lefebvre, Lefebvre, Le Hen and Mendgen, 2006). This previous research focused on the determinants and impacts of e-collaboration tools in geographically distributed product development teams. Results suggested that the determinants of the level of use of e-collaboration tools seem strongly biased towards human-related factors and that the overall impact of these tools is positive but not significantly related to cost reductions. Out of the 61 respondents from this previous study, four illustrative cases are selected to further investigate their information alignment.

Each case discussed here involves one specific relationship between EAS and its business partners based on the supply chain collaboration classification provided by the German Association of the Automotive Industry (VDA). This classification comprises six categories: 1) parts suppliers and developers, 2) components suppliers and developers, 3) module suppliers and developers, 4) system suppliers and developers, 5) service providers, and 6) contract manufacturers (i.e. turnkey manufacturing partner). Each category differs in terms of the level and type of information processing required by the various parties in the relationship. Based on this classification, the cases were selected because of the high variance between them (Holland and Plischke, 2001). Each case was validated by key EAS informants involved in the different relationships. Since EAS does not maintain relationships in the third (module suppliers) and sixth categories (contract manufacturing), no relationships were provided for these two categories.

The following table briefly describes the selected relationships for each of the remaining categories (see Table 1). It should be noted that business relationships in the automotive sector are always described with regard to their position in the supply chain of car manufacturers. Therefore, one of the selected relationships (case C) is a first-tier relationship, which means that it is a relationship between a car manufacturer and its first-tier supplier (EAS). The three other cases are second-tier relationships between EAS and its own suppliers. Case A corresponds to a relationship between EAS and one of its suppliers of standard parts, which are used in the manufacturing of automobile components (e.g. generator, gear box, or cockpit) and sold to car manufacturers. Case B involves a firm specialized in plastic subsystems that fit into a larger system that EAS sells to car manufacturers. Finally, case D presents the relationship between EAS and a firm specialized in control and automation that designs and manufactures a customized assembly line for a specialized car component.

Table 1. Description of the cases

Case	VDA Category	Relationship	Seller	Buyer
A	1 - Part	2nd-tier	Standard parts manufacturer	EAS
B	2 - Component	2nd-tier	Components manufacturer	EAS
C	4 - System	1st-tier	EAS	Car manufacturer
D	5 - Service	2nd-tier	Machinery manufacturer	EAS

Open-ended questions based on Bensaou and Venkatraman's survey tool (1995) were provided to EAS informants involved in the business relationships with these three vendors. Based on the data collected, each of the four cases was summarized by the researchers and validated by EAS's main respondent.

4. RESULTS

This section presents the results extracted from the four cases. In each case, data gathered from the EAS's main respondent and the previous study is used to specify the product and the business relationships life cycles, as well as the information processing needs and capabilities.

4.1. CASE A: STANDARD PARTS MANUFACTURER

This supplier provides EAS with a mature, standardized technology. While many other suppliers of this part are available on the market, this long-time supplier was chosen as a provider due to its renowned quality standards, its delivery capability, and its competitive price. The manufacturing technologies that integrate this part into EAS's products are also mature and standard. Since the product is in its maturity, there is no need for incremental collaborative product innovation. In addition, given that demand has been very stable in recent years, collaboration planning does not appear to be a value-added activity from EAS's point of view. In sum, very little sensitive information needs to be exchanged, through convergence, between EAS and this supplier. Yet, EAS reports that time is spent on monitoring the supplier's performance through a tight electronic integration of EAS's production department and the supplier's sales function. There is a need for information conveyance to provide adequate information flow between partners.

This relationship is based on an established, repetitive business process. There is little variety in the tasks executed in this relationship and the parties' interdependence is low. EAS rarely needs to visit the supplier's site to monitor this relationship because of the conveyance capabilities supporting the information exchange between the two parties. Information technology is extensively used to convey reorder and delivery information, as the two organizations have interconnected their ERP systems. It should be noted that this conveyance capability was already in place before the relationship existed, so no specific ICT investments have been made to support this relationship.

4.2. Case B: Complex components manufacturer

EAS and this supplier have jointly developed a plastic component. This product, which demands a significant amount of engineering content, is considered an innovative and highly complex product from both the development and manufacturing points of view. The complexity mainly results from the fact that this component needs to fit with other subsystems when they are integrated during the final assembly. There is a fairly high demand for such customized components in the automotive sector nowadays because of the pressing imperative to reduce car weight. The development of such components requires close electronic collaboration across many functions in both companies: product development engineers, industrial engineers, quality experts, etc. Furthermore, the variety of collaborative task is very wide and the partners are highly interdependent. At the development stage, the partners need to exchange both geometrical and functional specifications on the product so that they convergently develop a common understanding of the component's properties. This type of convergence is usually achieved through a large number of iterative feedback cycles. After carrying out product development, EAS and its supplier need to collaborate to ramp up the assembly line for the new product. Cooperation is often critical at this point to optimize the product line before it goes into full-scale production.

Over the years, EAS and its supplier have developed a close, collaborative relationship. Building on both companies' existing design methodologies, development teams have successfully implemented different adaptive learning mechanisms to foster innovation and effectiveness. Both parties have invested a lot of specific relationship assets to support this interorganizational collaboration and many joint actions have been put in place to further improve collaborative exchanges. Yet, some trust issues remain. EAS fears that its supplier might share know-how with other firms it is working with. At the product development stage, a wide variety of electronic collaborative tools (e.g. 3D CAD modeling software, software simulation application, and product data manager to store product information) are necessary to successfully collaborate in the speedy development of such a complex product and to rapidly mock up both the product and the manufacturing process (high collaborative information needs). Nevertheless, numerous visits are still required, and specific training is offered on these advanced cooperation tools to increase acceptance among resisting teams. Moving to the production stage, the information processing needs are changing over to conveyance in the form of electronic information integration between EAS's ERP and the supplier's MRP to ensure efficiency. Both firms are now working on improving the conveyance of transactional data.

4.3. Case C: System manufacturer

The third case is the relationship between EAS and a large automotive manufacturer. EAS sells various mature systems, such as alternators, to this manufacturer. Many of these systems are somewhat generic and are sold to other car manufacturers as well. While these products are mature, functional improvements are still needed to provide smaller, quieter and more efficient car systems and, because the system has to fit in the car after these modifications, this needs to be done in conjunction with the providers of the other car systems. Yet, the car manufacturer tries to carry over as many systems as possible from one model to another; many adjustments are essentially needed to ensure compatibility with other systems and subsystems. The need to exchange and to converge information on geometric and functional specifications is therefore very important. Both firms' product engineering departments need to share information in an iterative process to ensure coherent product development. Yet information conveyance is also very critical to support the supply chain.

This relationship is supported by operational and repetitive tasks. Using established business practices to convey operational information, EAS's sales and the OEM's purchasing functions are reported to be well integrated. While effective, collaboration in this relationship is often confrontational because of the rigidity of the interorganizational business processes and collaboration tools imposed by the car manufacturer. For instance, the car manufacturer insists on using the same collaboration tools and techniques throughout the development cycle. Therefore, the product engineering departments must send large and very detailed CAD files back and forth. Obviously, the technical specifications contained in CAD files are particularly necessary to ensure the appropriate system integration. But exchanging CAD files is a long and costly process. Data needs to be extracted, often converted, and integrated back into the supplier systems. When modified data is sent back to the car manufacturer, the same process needs to be repeated. On the other hand, at the early stage of development, engineers need to exchange drafts to initiate the collaborative process and much less detailed information is required. New, simpler tools that enable 3D visualization are now available and would best fit the companies' needs in the early development stage. Using such technology could greatly improve the interaction cycle. But for legal reasons, the car manufacturer does not allow such low-level information to be used by development teams. In other words, the information processing capability is much greater than the information processing needs at the early stage of the product development cycle. Yet, both business partners are currently in discussion to bridge this gap.

4.4. Case D: Service provider

The fourth case concerns a relationship between EAS and a provider of product assembly lines. EAS classifies this supplier in the service provider category as its product is used to support the main manufacturing operations. In addition, because assembly lines need to be specifically designed to meet EAS's requirements and existing machinery capabilities, this supplier delivers a customized assembly line. Even though assembly lines are based on a mature technology, their high level of engineering content and the necessary customization of the machinery make it complex to customize. Their implementation therefore requires close collaboration between the supplier's design engineers and EAS's industrial engineers to optimize the performance of the automated line. From a product life cycle perspective, a customized assembly line contributes to the process innovation phase of products manufactured by EAS.

EAS and this service provider have successfully established a relationship that supports cooperative design activities. Yet trust is still an important issue, as the need to electronically exchange product documentation has put both firms in a delicate context whereby one counterpart learns about the other's products and processes, and may eventually use that information with other parties. From the information convergence point of view, both firms have made moderate specific investments to support the relationship. The two firms use simultaneous 3D CAD to develop and simulate the assembly line before starting the actual manufacturing and implementation of the product. However, many visits between the parties are still required. As for information conveyance capabilities, due to their previous nonspecific investment in electronic commerce functionalities, both firms are indeed capable of handling close electronic integration. But it must be acknowledged that this case displays no need for such operational effectiveness.

5. ANALYSIS AND DISCUSSION

In order to evaluate the role of the life cycle concepts in the assessment of interorganizational alignment, the four cases are positioned according to the three dimensions illustrated in figure 3. In the upper portion of Figure 3, business relationships are classified according to the interorganizational relationship life cycle stages proposed by Spekman, Kamauff, and Myhr, (1998). In the lower part of Figure 3, the product underlying each case is analyzed and positioned along Utterback and Abernathy's pattern of innovation curve (Utterback and Abernathy, 1975). In the middle part of Figure 3, the level of information needs and capabilities is assessed using Dennis and Valacich's information processing typology (Dennis and Valacich, 1999). The level of information processing needs and capabilities (high, medium, or low) is qualified according to the quantity and importance of the conveyance and convergence information exchanges between EAS and its partners.

Analysis of the cases provides some meaningful indications of the importance of taking the product life cycle into account when assessing interorganizational alignment. Results indicate that the product life cycle stages influence the information processing needs. Cases in the early stages of the product life cycle (cases B and D) had a high need for information convergence between EAS and its business partners, since close collaboration was required to jointly work on product development and customization. As for the cases in the later product life cycle stages (cases A and C), the focus switched to operational efficiency and attention was drawn toward the conveyance information flow.

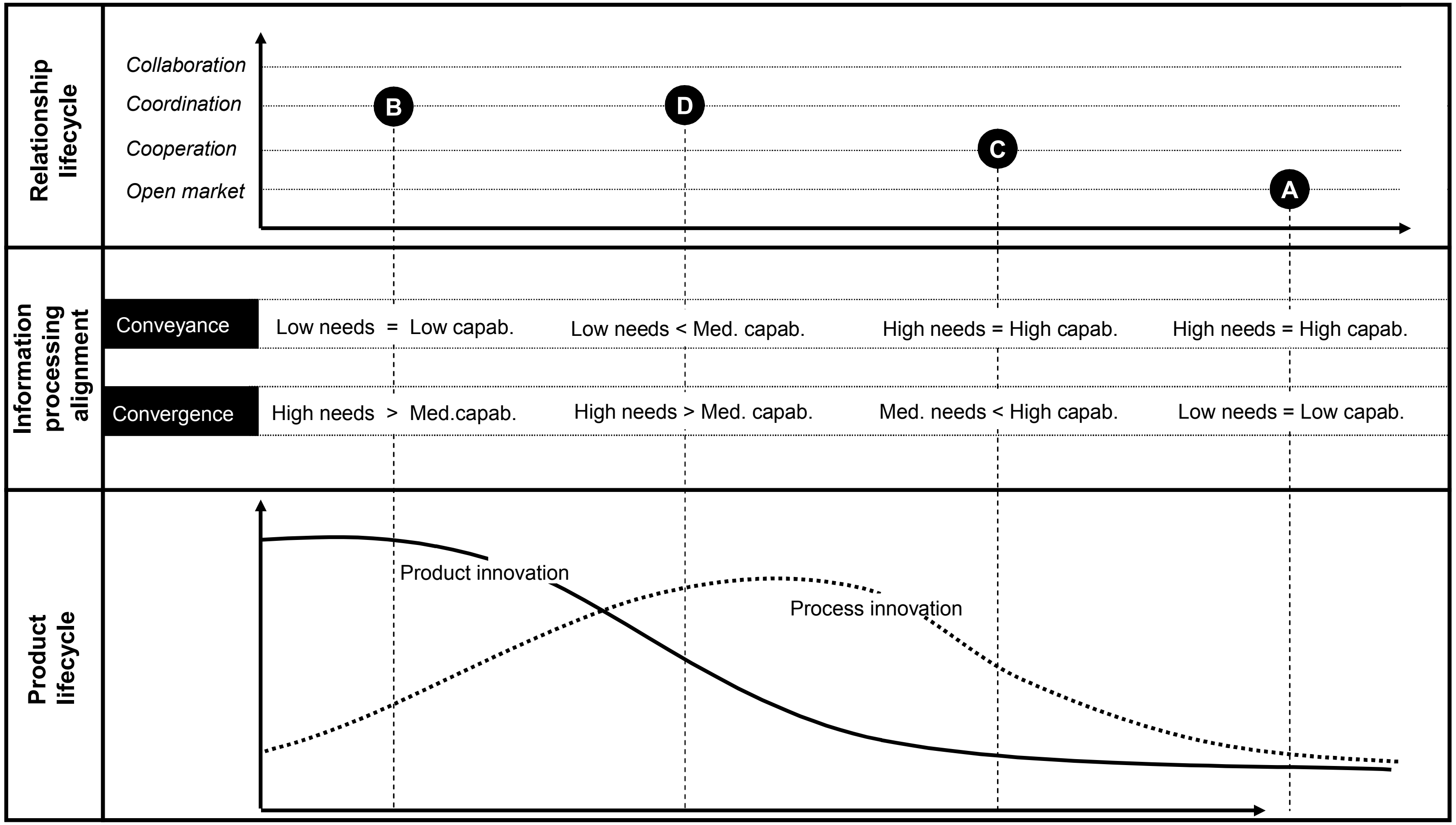
The cases also illustrate the role that the business relationships life cycle plays in the development of information processing capabilities. For instance, cases B and D revealed that trust issues inhibited the parties from moving to the highest level of collaboration. In both cases, the partners feared opportunistic behavior from their counterparts because they could easily share electronically acquired information with third parties. In both case, this lack of maturity limited the information processing capabilities. Physical visits are therefore needed to compensate for the lack of ICT infrastructure to support collaboration. With more maturity in their relationship life cycle, the parties could reach a higher level of capability needed to use the information convergence tools efficiently.

Through this work, it was discovered that the types of information processing (conveyance or convergence) contribute to discriminating between two types of interorganizational alignment that appear to coexist for each relationship. This finding is a novel aspect of the strategic alignment concept that was neither studied nor even mentioned in previous related research (Chan et al., 1997; Henderson and Venkatraman, 1999; Croteau and Bergeron, 2001; Bergeron, Raymond, and Rivard, 2001; Bergeron, Raymond, and Rivard, 2004; Croteau and Raymond, 2004).

This bimodal aspect of the fit is revealed through Case A, where the relationship has high needs and capabilities for the conveyance dimension while having low needs and capabilities for the convergence dimension. Taking this approach contributes to a better assessment of the status of a relationship by splitting the traditional measures of fit into two new measures. This avoids a potential misalignment diagnosis, when in fact the interorganizational partnership is very well tuned. The risk of misdiagnosis is particularly great for relationships in which there is a serious discrepancy between the two types of information flow. Not distinguishing between these concepts could lead to a false diagnosis of case D as well. On average, for case D, the needs seem to be aligned with the capabilities, while in fact, conveyance needs are low and convergence needs are high, which contributes to a non-alignment along both dimensions. In such a case, averaging the needs and capabilities of both information flows leads to a diagnosis that would not recognize the bimodality of the phenomena.

Some thoughts on the consequence of misalignment also emerge when analyzing cases C and D. In these cases, both EAS and its business partners have better capabilities than the relationship context calls for (more convergence capability for case C and more conveyance capability for case D). This over-commitment of resources surely affects the profitability of interorganizational ICT investments. But the impact of this over-capability is probably completely different from the consequences of a case where needs are not supported by adequate capabilities. This dual case of misalignment needs to be further investigated to understand the methodological and managerial implications of the phenomenon.

Figure 3. Summary of the results



6. CONCLUSION

This paper investigated the importance of life cycle concepts in the assessment of interorganizational relationships. The results show that analyzing interorganizational relationships without taking into account the evolving needs and required capabilities associated with the two different types of information would lead to a wrong diagnosis of the situation. In other words, disregarding the life cycle implies that average needs and capabilities might lead to the conclusion that the relationship is correctly aligned when in fact that is not the case. Our analysis indicates that the interorganizational alignment is bimodal and requires that the different information processing needs and capabilities associated with each stage of a both the product and the business relationships life cycles be considered. Without such caution, a biased conclusion could lead to inappropriate ICT investments and business decisions.

Obviously the small number of illustrative cases and the specificity of the chosen sector limit the generalizability of the results. However, the richness of the cases helps to identify the key aspects of interorganizational relationships. This study introduces new research avenues. Uncovering two levels of interorganizational alignment due to the information type and adopting the life cycle concepts call for comprehensive statistical approaches using a multilevel alignment perspective (Bergeron, Raymond, and Rivard, 2001). Further research related to the misalignment is also needed to better discriminate its impact on performance. In other words, does being in an “over” or “under” capability context in terms of supporting information needs impede the relationship performance? Are there any differences between the two different contexts?

This paper contributes to a better understanding of interorganizational relationships by adding a new dimension based on both the product and the business relationships life cycle concepts, which provides some valuable insights into the challenges of information needs and processing capabilities integration within a supply chain.

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