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Achieving Strategic Benefits from B2B eCommerce: A Multiple Case Study of the Australian Automobile Industry

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Abstract

A request from a powerful customer to use B2B e-commerce is a significant external stimulus for a supplier. Indications from extant research that considers the determinants of EDI adoption are that when customer power is exercised, supplier benefits from B2B e-commerce are typically diminished in the short term. However, with more information becoming available to suppliers using a wider range of electronic modes, suppliers need better advice about how to achieve inter-organizational strategic alignment and gain benefits more quickly. A model of strategic alignment is proposed and tested using multiple case studies in the Australian automotive industry.

1. Introduction

During the 1990s there was considerable research on the adoption, use, and overall benefit of EDI. However, in the late 1990s Internet and Web technologies have created a variety of alternatives to EDI for inter-organization coordination (den Hengst & Sol 2002). B2B e-commerce using these newer technologies has been less widely studied. In particular, there is little research that considers how to achieve alignment of B2B e-commerce strategies with overall business strategies (Gebauer & Shaw 2002).

B2B e-commerce is concerned with “systems and processes that support the flow of information between organizations as it occurs in procurement; manufacturing; research and development; sales; and distribution of goods, information and services” (Gebauer & Shaw 2002). It is well documented that large *hub firms* (Barber 1991) are able to exercise power over their suppliers (*spoke firms*), when they request the use of EDI. This is an important impetus for EDI adoption in 75% or more firms (Premkumar & Ramamurthy

1995; Khananchi & Sutton 2001). In this context, hub firms typically enjoy a disproportionate share of tangible benefits compared with intangible benefits typically reported by spoke firms¹ (Reekers & Smithson 1996; Sriram et. al. 2000).

The aim of this research is (1) to broaden consideration of the types and mode of B2B e-commerce compared with earlier studies that focus on EDI, and (2) to study business and IT strategy with respect to the external influence that is created by B2B e-commerce. The focus of the research is on spoke firms who are subject to customer power. Compared with Chatfield and Yetton (2000), this research proposes a model of inter-organizational strategic alignment (Henderson & Venkatraman 1999) and focuses attention on aspects of IT strategy, infrastructure and processes. This model aims to provide suppliers with more detailed advice about how to gain benefits more rapidly from B2B e-commerce when subject to customer power.

This paper is organized as follows: first description of the propositions and background and rationale for this research; second the multiple-case study procedure used in this investigation; third the results followed by a discussion of possible implications for practice and finally conclusions and limitations.

2. Background Theory and Research Propositions

A variety of different theoretical perspectives has been brought to bear in research on EDI adoption, use, and benefit. These include intra-organization theories of innovation diffusion, inter-organization theories of resource dependence, and transaction costs, together with environmental or network characteristics concerning inter-organizational relationships and trust (Reekers & Smithson 1996; Premkumar & Ramamurthy 1995; Premkumar et. al. 1997; Hart & Saunders 1998). These theoretical perspectives tend to overlap and are used to identify a range of potential influences of EDI adoption. These influences are now briefly discussed.

Prekumar and Ramamurthy (1995) and Prekumar, Ramamurthy and Crum (1997) contrast EDI non-adoption with EDI adoption through the exercise of customer power or by internal proactive actions. Top management support in larger firms emerges as strong determinants of proactive adoption. Competitive pressure and customer power/support distinguishes adopters from non-adopters. In multiple case-study research in the automotive industry, Reekers and Smithson (1996) highlight the opportunities for increased efficiency from using EDI, the types of dependence that exists between customers and suppliers, and the need for adaptation or integration if strategic aims from using EDI are to be achieved.

Hart and Saunders (1998) contrast supplier dependence/customer power with supplier commitment/trust as determinants of EDI usage. About one year after EDI adoption, the dependent suppliers used fewer message types than the committed suppliers, possibly because of fears about disclosing proprietary information. Additionally, Sriram et. al. (2000) examine the benefits from EDI by period of use. Longer experience with EDI is positively associated with perceived benefits over nearly all types of benefit studied.

Bergeron and Raymond (1997) found that organizational support for EDI is positively associated with benefits from EDI. In the absence of organizational support, their longitudinal study demonstrated that imposition of EDI is negatively associated with benefits initially, but as integration of EDI increases over time, the benefits increase.

¹ Hubs are reported to perceive EDI to increase productivity or save on manpower, while spoke firms see benefits in terms of enhanced customer service or remaining competitive.

Iskandar, Kurokawa and LeBlanc (2001) confirm that a proactive management together with larger firm size are associated with EDI integration.

Swatman et. al. (1994) proposed a four-stage model of EDI integration, from a manual “rip-and-read” (Lauer 2000) style of EDI terminal through to seamless integration with internal information systems, including a hypothesized series of stages to full integration. Tuunainen (1998) also discusses evolution paths in similar terms. Khananchi and Sutton (2001, Table 14) report that only 3.9% of (mostly) SME spoke firms have achieved seamless integration of externally sourced electronic information with internal information systems by early 1998.

There are strong indications from the research summarized above that largely tactical benefits (operational efficiency gains) from EDI, especially for spoke firms, are achieved more rapidly by adopting a proactive approach and by integration with internal systems. However, other research studies (e.g., Mukhopadhyay, Kekre & Kalathur 1995; Riggins & Mukhopadhyay 1994; Reekers & Smithson 1996) propose that EDI can provide strategic benefits to the organisation such as time-based competitive advantage in the form of just-in-time (JIT) and total quality management (TQM) systems. Stalk, Evans and Shulman (1992) argue that the automobile manufacturing industry is dependent on time-based competition, which focuses on reducing cycle time or response time through the use of EDI in the entire value chain.

Chatfield and Yetton (2000), who focus on strategic benefits, introduce a concept of EDI embeddedness² as a basis for examining levels of inter-organisational cooperation. The theory of embeddedness suggests that embedded inter-firm relationships rely on exchange of sensitive information, joint problem solving and trust. This is defined in terms of the MIT 90s model (Scott Morton 1991) which is underpinned by a theory of fit between five domains including IT, strategy and individual roles and skills. Low-level embeddedness is defined in terms of limited inter-firm alignment in the IT domain; moderate-level embeddedness adds alignment in the strategic domain; while high-level alignment relies on social ties between individuals in the firms. Strategic payoff for hub firms is highly correlated with EDI embeddedness for the six case studies considered (Chatfield & Yetton 2000). For example, Honda in Japan exhibits high-level EDI embeddedness for high strategic payoff, while Ford in the USA exhibits low-level EDI embeddedness with its suppliers and has achieved low strategic payoff.

Numerous other researchers (see for example Chandler 1962; Brynjolfsson, Renshaw & van Alstyne 1997) describe the importance of achieving fit among a firm’s strategy, its structure, and its managerial processes, and in particular the issue of aligning business strategy with IT strategy. Chatfield and Yetton (2000) have contributed insights into how the notion of fit can extend to inter-organization systems. However, there is little evidence about how inter-organization fit can be achieved in practice.

Henderson and Venkatraman (1999) provide a strategic alignment model that focuses on business strategy and IT strategy together with respective infrastructure and processes (see Figure 1). This model addresses all the domains of fit, but provides a further level of refinement compared with the MIT 90s model. Each of the four dimensions of the strategic alignment model contains additional advice about three components that need to be addressed and themselves aligned. In this research, we use this method as a basis for distinguishing different levels of alignment in an inter-organizational perspective, while also providing advice about how to enhance alignment for B2B e-commerce.

² EDI system integration at both initiator and adopting firms.

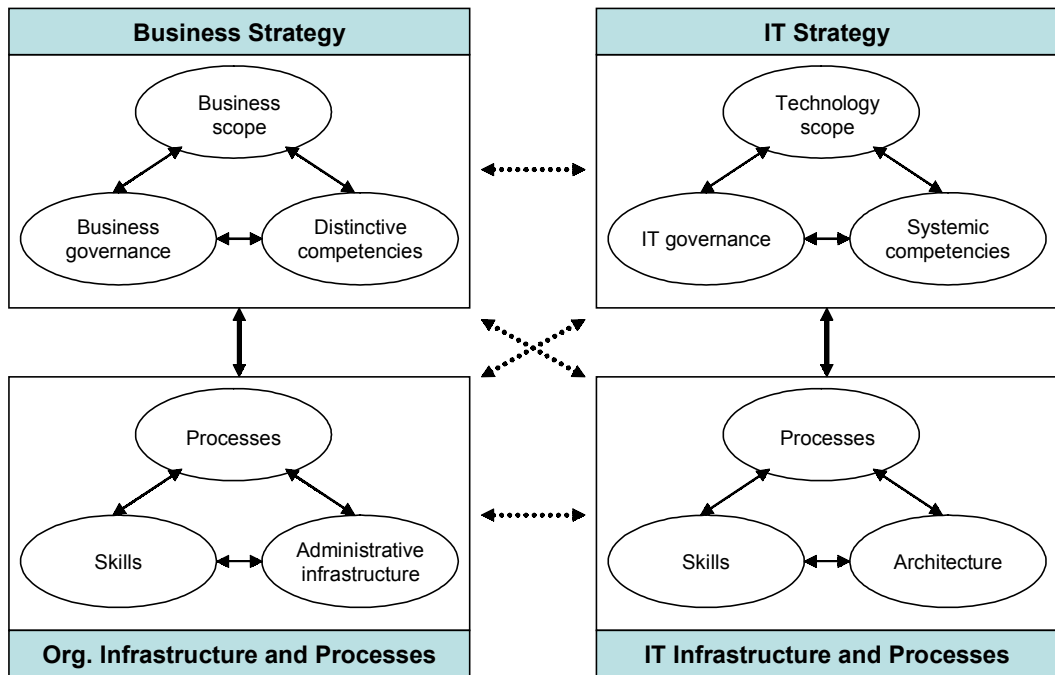


Figure 1: A strategic alignment model (based on Henderson and Venkatraman 1999)

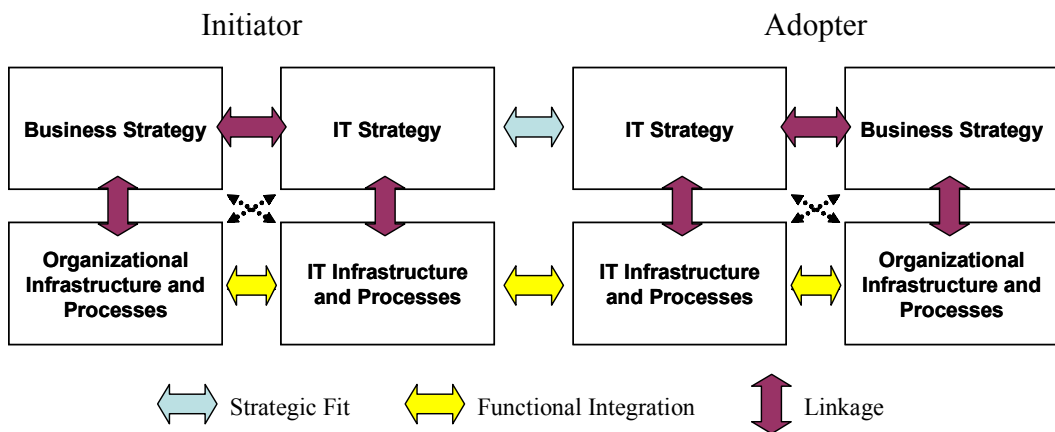


Figure 2: High-Level Inter-Organizational Strategic Alignment

High-level inter-organizational strategic alignment is defined in terms of strategic fit that spans the IT and business strategy of both hub (initiator) and spoke (adopter) firms. Additionally, their IT and business infrastructure and processes are all integrated together in a way that is linked to their respective strategies (Figure 2). Within the adopter’s IT strategy, there is alignment between the technology scope, IT governance and systemic competencies; while within IT infrastructure and processes, the operational architecture, processes and skills are aligned (Figure 3). (Definitions for the components of IT strategy and IT infrastructure and processes are provided in Table 1).

Table 1: Definitions for the Components of IT Strategy and IT Infrastructure and Processes (based on Henderson and Venkatraman 1999)

Component	Definition
Technology scope	Refers to information technologies that support both business strategies and/or new business initiatives such as EDI, Web-based applications, AANX, and Covisint (pg. 474).
IT governance	Mechanisms that assist in selecting and obtaining the required IT competencies through the formation of numerous relationships such as strategic alliances, joint ventures, and relational marketing exchanges (pg. 474).
Systemic competencies	Refers to comparative advantage attributes of IT strategy that contribute positively to either the creation of new or to the support of existing business strategies. Such IT strategy attributes could be system reliability, cost-performance levels, and interconnectivity flexibility (pg. 474).
Processes	The work processes that are central to the operations of the information systems infrastructure (pg. 475).
Skills	The skills required to effectively manage and operate the information systems infrastructure within the organization (pg. 475).
Architecture	The technical infrastructure of the organization is collectively the result of choices made with respect to the portfolio of applications, the configuration of hardware, software, communication, and data (pg. 474-475).

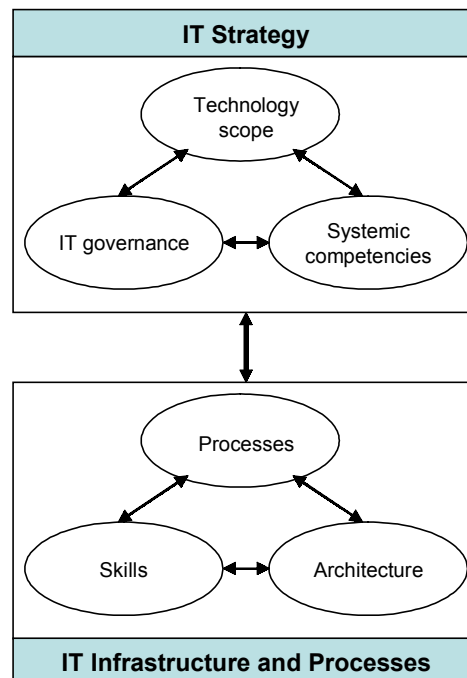


Figure 3: High-Level Inter-Organizational Strategic Alignment (adopter IT domains)

Medium-level inter-organizational strategic alignment differs from Figure 2 by the lack of explicit linkages between the adopter’s business strategy and its IT strategy, and a

weakening of the linkage to business infrastructure and processes. There is still an effort to functionally integrate the IT with business infrastructure and processes. Within the IT dimensions, systemic competencies and IT architecture are undeveloped or missing (Figure 4).

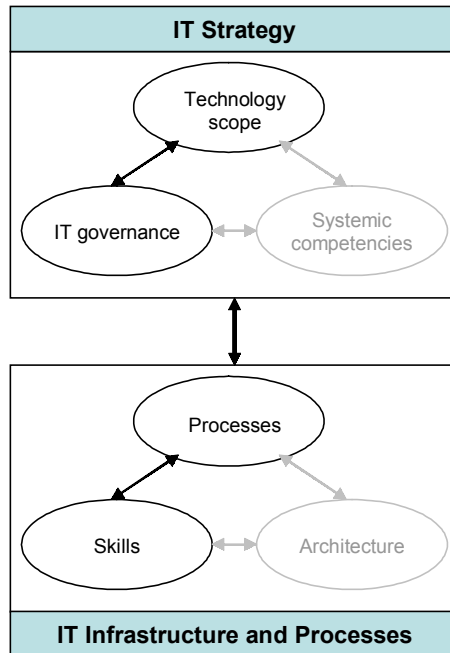


Figure 4: Medium-Level Inter-Organizational Strategic Alignment (adopter IT domains)

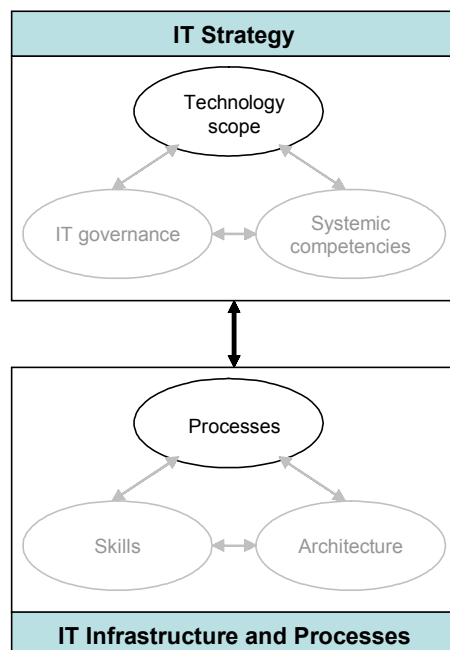


Figure 5: Low-Level Inter-Organizational Strategic Alignment (adopter IT domains)

Low-level inter-organizational strategic alignment differs from medium level alignment by the lack of functional integration between the IT with business infrastructure and

processes. Within the IT domains, only technology scope and processes are well developed (Figure 5).

Given this prior research, we set forth the following research propositions:

Research Propositions 1a and 1b:

Spoke firms that adopt B2B e-commerce as a result of the exercise of customer power exhibit lower-levels of inter-organizational strategic alignment.

Spoke firms that adopt B2B e-commerce as a result of an internal proactive decision exhibit higher-levels of inter-organizational strategic alignment.

Research Proposition 2:

Spoke firms that have achieved inter-organizational strategic alignment are better placed to gain long-term benefits.

If the models of inter-organizational strategic alignment are validated, they provide advice about proactive adoption of B2B e-commerce, which provides for higher levels of benefits. This enhances earlier advice that was provided in the context of EDI, for example Swatman et. al. (1994).

In a broader context, this research also contributes to a growing body of literature that considers the relationship between IT strategy, infrastructure, and processes which can affect firm performance and value (Henderson & Venkatraman 1999).

3. Research Method

To examine the propositions in this research, we investigated five tier 1 suppliers to the automotive industry in Australia. The automotive industry is a major manufacturing industry worldwide, with the largest six manufacturers responsible for 86% of global production. This provides a basis for the original equipment manufacturers (hereafter referred to as OEMs) to exercise power over many of their suppliers, especially in regional locations.

A long-term trend in the industry is for the OEMs to outsource component production. Tier 1 suppliers, in turn, have shifted their focus towards system integration of modules rather than production of individual components. As evidenced by the 3DayCar programme³, there has been a trend towards shorter lead times during the 1990s, with a vision for a 3-day cycle from order placement to delivery. A briefing paper from the 3DayCar programme⁴ highlights trends towards EDI and web-based information exchange amongst vehicle makers and suppliers, but also notes numerous barriers that arise from current IT systems and confusion about future trends.

Australia's automotive industry is relatively small in a global context. Its size is broadly comparable with many manufacturing bases outside the USA, Western Europe and Japan. Tier 1 suppliers in Australia typically supply to three or four different OEMs, whereas in the larger markets this can be just one. However, the Australian government has provided leadership to the automotive industry in an effort to sustain its competitive position on a global scale. This research is directly relevant to one aspect of the recent Government

³ <http://www.3daycar.com/>, accessed on 14 January 2003.

⁴ "Current IT Systems: The Barriers to 3DayCar", <http://www.3daycar.com/> accessed on 15 January 2003.

Productivity Commission inquiry: the assessment of “the interdependence between vehicle assemblers and component producers”⁵.

A multiple-case study approach was selected in this research to support the primary objective of probing issues related to what changes, if any, spoke firms make to their IT infrastructure, processes and strategy, and the extent of inter-organizational strategic alignment. Since the research is largely exploratory and explanatory in nature, designed to extend earlier conceptual work (e.g., Reekers & Smithson, 1996; Tuunainen, 1998; Chatfield & Yetton, 2000), the theory and explanation-building approach from case study research depicted by Yin (1994) and Eisenhardt (1989) was followed. The data gathering and analysis procedure was divided into the following steps. First, the research propositions were specified as precisely as possible. Second, the prior specification of the population and sample are important. In this study, industry effects are held constant by the selection of the automotive industry and by a focus on tier 1 suppliers. The sampling logic followed literal replication (cases selected so that they predict similar results) and theoretical replication (cases predicting contrary results to some extent but for predictable reasons) (Yin 1994).

A consultant with extensive experience in the automotive industry provided advice about firms to include in this study given these guidelines, with replication being driven by different sizes and ownership structures of supplier firms. A cross-sectional qualitative analysis was conducted on six companies involved in the automotive industry: five tier 1 suppliers and one OEM (see Table 2). For confidentiality reasons, firms in this research are referred to by number rather than by name. Altogether, three interviewers conducted 12 interviews with executives from the six case companies using a script of structured open-ended questions. We aimed to interview the managing director or CEO and the senior operations and IT executives because these were viewed as “key informants” in our investigation (Yin 1994). In practice this was not always possible. Data collection was carried out between July and December 2002.

The consultant provided extensive comments during the development of the interview guide, which was based on conceptualisations provided by the prior literature and the primary objectives of the investigation. The interview script was in six parts and the following information was collected: (1) Profile of the firm; (2) professional role of interviewee; (3) business strategy of the firm; (4) IT infrastructure and processes of the firm; (5) IT strategy of the firm; and (6) summary and conclusion of the interview.

The interviews were of forty-five to ninety minutes in duration and followed the same predetermined structure. Broad items were used to minimize leading questions and to capture variation in the interviewees’ answers. The interviews were performed in an atmosphere of trust where certain confidential issues were discussed and in some cases confidential documents were received. All interviews were tape recorded and transcribed. The manuscript for each interview was checked for errors and then coded. “Open coding” (Miles & Huberman, 1994), an iterative process that allows for comparisons among case studies, was used to summarize segments of the data. For example, one comparison that was essential for this investigation was to examine inter-organizational alignment and to compare similarities and differences among the case studies. Coding was conducted over several weeks and each manuscript’s coding scheme was checked independently by at least two members of the research team. The NVivo⁶ computer package assisted in the analysis of the interviews.

⁵ <http://www.pc.gov.au/inquiry/auto/index.html>, accessed on 14 May 2002.

⁶ <http://www.qsr.com.au/products/nvivo.html>

Table 2: Data collection Sources

Firm	Type [†]	Informants	
		No.	Positions (Australian unless noted otherwise)
Supplier S1	M, P	3	CEO, Director of Operations, IS Manager
Supplier S2	M, P	3	Deputy CEO and Director of Operations, GM Logistics, IS Manager
Supplier S3	M, P	3	Asia Pacific CEO, IS Manager, Global IS Manager
Supplier S4	A, P	1	Managing Director
Supplier S5	A, L	1	IT Manager
OEM	M, L	2	Manager IS (ERP), Manager IS (Web and e-commerce)

[†] M=multinational, A=Australian, P=privately owned, L=listed

4. Results

Research Propositions 1a and 1b:

Of the five tier 1 supplier firms interviewed, four stated that they adopted B2B e-commerce as a direct result of the exercise of customer power. For example, the CEO of a tier 1 supplier illustrated this point in the following manner: “We are driven by the IT requirements of these very large customers ... [we’re] advised that you’ll have those facilities operational yesterday or you don’t get any forward orders. You will not participate in the next model. You put the facilities in or you die” (S1), while the Deputy CEO and Director of Operations of another multinational supplier outlined the influence of customer power in a similar manner: “Very much so. An example would be on the spare parts side of the business where both [large OEMS] have announced that they’ll be using ... an internet-based system for ordering of spare parts in the future. So they’re dictating the pace in terms of the use of technology in that process” (S2).

However, one supplier discussed a two-way process where not only customers influence suppliers, but suppliers can influence the OEMs and their own suppliers. The Asia Pacific CEO of this supplier elaborates: “Yes absolutely. I think to some degree customers have said we want real time information on our supply time ... [but] on the other hand, I think there’s people like ourselves who will influence the customers. For instance I mean we were one of the first people who go into real just in time with [large OEM] because we had some supply problems ... [and] we demand it from our suppliers ... So yes, we influence the suppliers [and customers] in that sense” (S3).

All suppliers exchange information electronically with vehicle manufacturers using EDI and to a lesser or greater degree integrate this with their own enterprise systems to enhance the speed of information flow and decision-making. But this integration does not necessarily reflect inter-organizational strategic alignment. For example, as one General Manager of Logistics explains: “I think the business strategy was formulated almost mutually exclusive to the IT strategy. Totally separate from what I can gather. Yeah. There wasn’t really an integrated approach” (S2). Even though most suppliers stated that their IT strategy was aligned with the firm’s business strategy, this perception does not necessarily indicate strategic alignment. As the CEO of a supplier illustrates: “IT’s contribution is pivotal ... and one of the reasons it’s pivotal is that it’s powerful if you use

it correctly, very powerful. It can save money on the one hand and it can extend customer servicing on the other. And we see it as a key strategic aspect of the business. But again as a tool rather than as an end in itself” (S1).

In the context of the strategic alignment model in Figure 1, tier 1 suppliers view IT as a function that mainly provides support to the business and does not generate strategic direction for the business. The external influence of the OEMs and some internal initiatives impinge directly on IT infrastructure and processes. However, most of these firms have IT staff and processes that aim to integrate information to further exploit its utility. Meanwhile, S3 provides evidence that proactive firms do not wait for influence from external stakeholders, but rather seek to mutually influence the external stakeholders themselves: “I think that [IT] is an enabling tool to facilitate business” (S3). As such there is a low-level of IT strategy in most of the supplier firms, with the exception of S3 that operates under the provisions of a global IT policy. This conclusion is supported by the typical organisational structure of suppliers where the IT manager reports to a finance executive, and IT does not have a separate position in the firm’s executive group. One consequence of this is that: “...a [network-related] decision that I can’t really share with anybody because management don’t know what I’m talking about” (IT manager at S5).

While insights about the value of integration were evident (for example: “...the only problem I would see is that we’re not integrated enough electronically ...” (S2)), this integration was not necessarily translated into strategic advantage. However, S3 was an exception and took integration one step further in several comments about progressing IT initiatives: “...the demand comes internally. So from the business managers, they suggest areas with suppliers or customers that could be improved, but they’re the ones that actually drive the change”. An informant from S3 also suggested that the OEMs are lagging behind and they would prefer to work proactively with them to improve IT processes and infrastructures. S3 was the only supplier in the sample that mentioned a global intra-organizational IT policy that covers certain hardware and software standards or products, together with a compliance process.

An issue that is evident amongst tier 1 suppliers is the publishing of information by the OEMs on web portals or extranets. The tier 1 suppliers are expected to log into the extranet and access information that is relevant about meetings and some aspects of their trading relationship. Such an arrangement clearly weakens B2B e-commerce because an extranet does not provide for immediate electronic integration of information, and is another exercise of customer power. This may be one of the clearest symptoms of the evident low-level inter-organizational alignment in Australia and is evidenced by the following description of the problem: “With the Internet each [OEM has] got their own environment that they want you to go into and do whatever they want you to do, [so we’ve got] different systems in place for every customer that we have. So it becomes a bit of a challenge trying to create them. And some of them can’t be integrated at this point. For instance, the [OEM] supplier-network has all their stats on [the Internet], their fliers, all their reject status and other documentation schedules. You can’t get the information off the air to make use of it, which is a real problem. With EDI it just feeds straight in, straight through. It’s on a standard format” (IS Manager, S1). A similar account of the problem is provided by the general manager of logistics, S2: “EDI is becoming almost old hat. Now that everything is internet based. So we’re still trying to get the EDI up and running. The day we finish and have completely EDI 100% integration and raise our hands in the air, they’ll [OEMs] say well you’re outdated now. It’s on the Internet ... Now a lot of our customers will just do what we used to do with our after market customers and that is manually just key in our data. What we want to do is electronically download our data and supply it electronically”.

Another problem that was widely raised by suppliers is the different software packages and file exchange formats used by the different vehicle makers for engineering design

information. This appears to be an instance where the OEMs are adopting global firm-wide policies. In a small market like Australia where suppliers typically trade with three or four OEMs, this adds considerable costs to the suppliers. However, some of the multinational suppliers discussed the potential for round-the-clock design work as design effort followed the sun around the world, facilitated by electronic exchange of design information. But no detailed plans were revealed by our interviews for implementation in the short term.

An upcoming development, mentioned by the OEM, may be the provision of electronic information for suppliers using web services, rather than using HTML on an extranet. This would have the potential to provide for broader and richer types of information exchange using XML as the base standard. None of the suppliers mentioned this possibility when asked about their plans for extending the scope of electronic information exchange.

In general, research propositions 1a and 1b are supported. Based on an analysis of the transcripts of discussions with the five tier 1 suppliers, most supplier firms emerge as exhibiting lower-levels of inter-organizational strategic alignment whereas S3 emerges as distinctive. The CEO leads by example: "I want to be able to walk up to any computer of any [company in the group] in the world, dial in and then just be able to get all of my information, my mail...", "...speed of information and the accuracy of that information is a huge competitive advantage." (S3). A more speculative attitude to IT investment is evident, in drawing and analogy with R&D expenditure: "you know you've got to take a risk sometimes ... and you win one big one." (S3). However, at the regional level: "in our strategic planning we don't mention IT in the sense of it is a particular strategy but comes back to my initial statement, what is IT, its an enabling tool and its just part of it" (S3).

Research Proposition 2:

Prior research suggests that inter-organisational strategic alignment provides numerous strategic benefits to the firm. These strategic benefits are confirmed by our research, albeit by one firm, as illustrated by the CEO of S3: "In today's marketplace particularly, the speed of information and the accuracy of that information is a huge competitive advantage. And I think in our organization we've done a reasonably good job of integrating all of that. Everything from business systems, to marketing systems, to supply systems, and having that available in real time. I don't know how much value you can put on it but I think it's [an] absolute necessity today and without it, I don't know how we [would] survive. I really don't. It's ... an imperative ... to have high speed, high volume, accurate, integrated, standardised information available to me ... I can't think how you'd managed your business today without it."

Moreover time-based competitive advantage is an important strategy used in the automobile industry and our research reveals that only S3 was able to utilise this approach effectively, as reflected by the following comment from the IT Manager: "Speed's [imperative] ... if we were talking five years ago, we'd [have] said it was standardisation, but that doesn't ... count ... it's the speed of reacting to things. If you're not fast you're dead basically. If you can't get things moving in a reasonable amount of time, you struggle to get anything in place in time. Our project times are getting shorter. It used to be five years for a project for a new car. It's now down, I think the latest one [for large OEM] was 18 months, so it's really shrinking. So you have to have that speed of turnover of getting things out ... so speeds the biggest advantage."

However, while the other four suppliers generally believed that there were strategic advantages to inter-organisational alignment, they were unable to demonstrate whether their organisations had achieved inter-organisational alignment and what the benefits of this alignment are. For example, most suppliers focused on benefits that led to operational advantages, but failed to highlight long-term competitive advantages. As

such, the General Manager of Logistics at S2 reflects this sentiment in the following manner: "IT can play an important role in being part of the competitive edge. Because ... [IT] allows us to become efficient in production, we can do it at a much lower cost [and] if we can identify where our problems in inefficiencies are ... that is the role of IT in the organisation."

Thus based on our analysis of the transcripts of discussions with the five tier 1 suppliers, only one supplier firm was able to outline the strategic benefits of inter-organisational alignment, that is, "It helps [in] the globalisation of the business ... assists in the management of all [facets] of the business ... and assists in real time information, which is of strategic importance to us" (CEO, S3). As such, research proposition 2 is supported by our research.

5. Some Possible Implications for Practice

The impetus for IT adoption in the automotive industry should not be left solely to the discretion of the OEMs. The five suppliers interviewed in this research perceive that the OEMs influence the choices over methods for information exchange, but most feel there is latitude for negotiation over details and timing. S3 in particular perceived that the vehicle makers are receptive to suggestions, that they synthesize the best suggestions and exploit them in the industry. The OEM itself expressed a clear policy not to endorse any particular software vendor, and expressed reluctance to be seen to mandate any particular technology or standard, in case its lifetime provided short and the mandate became unsustainable.

The automotive exchanges such as AANX⁷, and Covisint⁸ globally, that arise from automotive federations or joint ventures, are a further potential influence on suppliers. In Australia, Covisint has not been strongly backed after an initial push towards adoption. It is seen as a largely web-based resource and only one supplier included in this research is a member. (The level of adoption is similar to that reported in Europe by Arbin & Essler (2002)). Meanwhile there is a perception amongst suppliers that the vehicle makers support adoption of AANX, and its perceived benefits are to provide relatively cheaper EDI connectivity and sufficient bandwidth for exchanging engineering information. There is also a continuing debate and tension between the vehicle makers' proprietary networks and information resources, versus those that have broader industry representation.

The specialist logistics firms are also emerging as important stakeholders in the automotive industry. These firms have sophisticated software to integrate global supply chain execution and management by linking the physical shipping of inventory with electronic information about that inventory, thus providing track and trace of inventory in real time. They also value add to the information by analysis that can provide tailored management reports, for example concerning supplier performance. Some logistics providers are also engaged in final sub-assembly of components from suppliers prior to delivery to OEMs, which can further strengthen their importance to the industry.

In summary, for the Australian automobile industry at least, it appears very clear that a more mature approach to IT governance (from the IT strategy dimension) is required. Time-based competitive advantage is systemic (Chatfield & Yetton 2000), and relies on systemic competencies in IT strategy. This is not being achieved currently in the

⁷ <http://www.motor.net.au/aanx/>, accessed on 14 January 2003.

⁸ <http://www.covisint.com>, accessed on 14 January 2003.

Australian automotive industry. This suggests that customer power alone is not appropriate and that OEMs need to facilitate more, and suppliers need to be more proactive.

In the future, Web services, including UDDI⁹ and ebXML (Kotok & Webber 2002), are likely to be used at relatively low cost over the Internet once critical mass and a suitable security regime is established. Such Web services may diminish the business case from specialized network exchanges like AANX. Furthermore, logistics is rapidly becoming an information-intensive activity, especially in the context of time-based competitive advantage. The network exchanges, which provide for information exchange separate from the physical goods, may simply duplicate much of the information that is also required for logistics to operate effectively.

6. Conclusions and Limitations

The results of the research in this study have indicated that tier 1 suppliers in the automotive industry in Australia have, at least to some degree, attempted to make changes to their IT infrastructure and processes to accommodate the requirements of electronic information interchange with major customers. On the other hand, it was clear that the role of IT was only to support business and not to drive business strategy. In general, the supplier firms generally have a low-level IT strategy and limited methods available to develop an IT strategy.

There are several limitations of this study. First, a case study research method was used, and consequently, the limitations associated with the case study approach are applicable (Yin, 1994). Second, a convenience sampling procedure was used, but on sound advice from a knowledgeable consultant to the industry. Third, the number of firms was limited.

Several avenues for future research result from this study. While the research findings provide evidence on the changes made to IT infrastructure by a limited number spoke firms in response to requirements from hub firms in the automotive industry in Australia, a survey that covers the majority of spoke firms would be valuable to gain a better understanding as to whether the results hold across the whole industry. Second, future research on other industries where similar requirements of hub firms of spoke firms would provide evidence across industry settings. Third, the emergence of web services, the availability of a wider range of electronic modes and the software provided by logistics firms will no doubt require future study into changes to inter-organizational strategic alignment for B2B e-commerce.

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⁹ www.uddi.org, accessed 23 January 2003

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