Available online at www.sciencedirect.com
ScienceDirect
Journal of Operations Management 25 (2007) 1234–1254
JOURNAL OF OPERATIONS MANAGEMENT
www.elsevier.com/locate/jom

Barriers to supply chain information integration: SMEs adrift of eLands

C.M. Harland *, N.D. Caldwell, P. Powell, J. Zheng

School of Management, University of Bath, Bath BA2 7AY, UK

Available online 17 January 2007

Abstract

The literature extols the potential benefits of supply chain integration and the crucial role of integrated eBusiness to deliver those benefits. However, adoption of eBusiness in supply chains has been slower than expected, particularly in small to medium sized enterprises (SMEs). This paper reports findings of a longitudinal study of four supply chains in different sectors over a 4-year period. Specifically it examines the barriers to adoption of eBusiness technologies and therefore to achievement of integrated information in supply chains. Differences between firms in supply chains and between supply chains are examined. The study reveals disparity between existing and planned use of eBusiness by larger downstream firms compared to upstream SMEs. The SMEs are cautious, only planning to invest in eBusiness if dominant downstream customers force them; however, they do not appreciate the full benefits to be gained from eBusiness adoption. The downstream larger businesses are forging ahead with eBusiness in 'eIsolation' and are not providing supply chain leadership. They are creating eLands with SMEs adrift of them.

Keywords: Case studies; eBusiness; Supply chain management; Supply chain leadership

1. Introduction

The last decade has seen an increasing body of knowledge purporting that competitive advantage is now derived from supply chains competing with other supply chains, not just firms with other firms (e.g., Dyer, 1996; Harland, 1996; Dyer and Singh, 1998; Lorenzoni and Lipparini, 1999). The growth of interest in supply chain management is evident; many researchers' assert that integration is essential to supply chain management (Currie, 2000; Frohlich and Westbrook, 2001; Sanders and Premus, 2002; Lewis and Talalayevsky, 1997; Patterson et al., 2003; Bowersox et al., 2000). Information integration in supply chains is beneficial to performance (Sahin and Robinson, 2002; Mabert et al., 2003; Child and Faulkener, 1998; Currie, 2000; Frohlich and Westbrook, 2001; Christiaanse and Kumar, 2000; Chandreshekar and Schary, 1999; Lancioni et al., 2003; Cagliano et al., 2003; McIvor and Humphrey, 2004; Gunasekaran and Ngai, 2004; Bovel and Martha, 2000; Cross, 2000; Seggie et al., 2006). Increasingly information integration in supply chains is viewed as crucial to delivering benefits of integration (Sahin and Robinson, 2002; Lancioni et al., 2003; Gunasekaran and Ngai, 2004; Venkatraman, 1991). However, information integration in supply chains is not well advanced (Fawcett and Magnan, 2002; Sanders and Premus, 2002; Van Hoek, 2001) despite the development of eBusiness technologies and the take-up of enterprise resource planning (ERP) systems (Mabert et al., 2003; Olhager and Selldin, 2003).

* Corresponding author. Tel.: +44 1225 386153; fax: +44 1225 383223.
E-mail address: C.M.Harland@bath.ac.uk (C.M. Harland).

0272-6963/$ – see front matter
doi:10.1016/j.jom.2007.01.004

There is evidence of concern relating to barriers to some in their ability to adopt eBusiness. Different social formations and regions generate their own specific organisation arrangements for eBusiness practice (Berger and Dore, 1996; Castells, 2000; Damaskopoulos and Evgeniou, 2003). Size of firm has been highlighted as a driver of difference in eBusiness adoption.

Governments are showing increasing interest in the adoption of eBusiness technologies. It has been claimed that active government support impacts on eBusiness adoption (Castells, 2000; Damaskopoulos and Evgeniou, 2003). In India the government did not leave e-commerce diffusion to the market and instead pursued projects to bring IT access to remote areas (Kuthiala, 2003). The UK Government set targets for eBusiness adoption so that by 2006 the UK would be internationally leading in its business use of the internet. Using the public sector as a lever of technological reform, all UK government departments were instructed to deal with suppliers and citizens electronically by 2006. However, as the target date approached it became clear that the vision would not be achieved and that eBusiness adoption in the UK was not occurring at the expected rate. The UK Department of Trade and Industry sponsored this research study out of concern with the lack of integration in supply chains, particularly the lack of integrated eBusiness. They perceived some adoption of eBusiness by large firms but were concerned particularly that if UK small to medium sized enterprises in supply chains were not adopting these technologies at the same rate they would be 'dropped' from supply chains in favour of other larger, eBusiness enabled competitors, possibly outside the UK. The study aimed, therefore, to address a central research issue of providing deep understanding about barriers to information integration in supply chains relating to low adoption of eBusiness technologies. In particular the research sought to identify drivers of difference between firms within supply chains to explain different adoption practices, and also between supply chains in different sectors.

The literature review surfaced three research questions that were examined in four supply chain case studies involving 29 organisations. The empirical research was longitudinal, conducted over 4 years, providing the opportunity to revisit the chains to identify any changes in eBusiness adoption.

2. Literature review

The focus of this literature review is to examine barriers to supply chain information integration and, specifically, possible reasons why adoption of eBusiness technologies varies between firms in supply chains and between different supply chains.

2.1. Barriers to supply chain information integration

The main barriers to supply chain information integration discussed here are lack of strategic alignment of information strategies in the chain, firm size of some supply chain actors, lack of awareness of potential benefits of eBusiness, lack of motivation, and being in a less developed industry or regional context.

Bask and Juga (2001) propose that polarization of strategies in supply chains can lead to separation and give rise to semi-integration rather than full integration of information. There are challenges of co-operation between firms in achieving the necessary changes in business culture, in part arising from the diverse goals of the parties involved, and unequal risk and rewards (Boddy et al., 1998). Bagchi and Skjoett-Larsen (2003) discuss such difficulties in integrating information systems across firm boundaries in supply chains. However, apart from these papers there is little evidence of research on alignment of information strategies in supply chains, until Seggie et al. (2006). There is limited empirical research examining the relationship between strategies in supply chains and the use of eBusiness (Cagliano et al., 2003; Van Hoek, 2001). A possible reason is that the field is in its infancy and published research lags practice (Croom, 2005).

There is, however, an abundance of research on why smaller firms are less likely to adopt eBusiness technologies than larger firms. Existing evidence on SME use of IT reveals, not unsurprisingly, that SMEs are far less likely to use new technologies than larger firms. Levy et al. (2001) highlight that few SMEs make innovative uses of Internet technologies. Two forces they suggest drive IT investment—customer dominance and strategic focus. Mehrtens et al. (2001) suggests there are three main factors that influence SMEs' decisions about eBusiness technology investment—the perceived benefits, their organisational readiness and external pressures. While Poon and Swatman (2000) recognise that customer pressure is influential, a lack of customer use of an eBusiness technology acts as an inhibitor to SME supplier use, particularly of eMail (Sillence et al., 1998). Therefore, type of customer relationship and customer pressure seem to play important roles in SME's eBusiness strategy. SMEs' organic structure, owners' attitude, resource poverty, limited IT infrastructure, limited knowledge and

expertise with IS may influence their ability to plan effectively (Blili and Raymond, 1993). Ballantine et al. (1998) identify some of the major barriers to SME IT adoption as limited access to capital resources, influence of dominant customers, limited eBusiness expertise and a lack of business and IT strategy.

Despite significant research on poor SME IT adoption, to date there has been little empirical research within connected supply chains containing SMEs exploring larger and smaller firms' perceptions of the value of supply chain information integration. The literature espouses the benefits of supply chain integration but the generic validity of this is unquestioned. Little empirical research is conducted beyond dyadic relationships or in parts of supply chains containing smaller organisations. A small number of studies, however, have revealed some useful findings. When larger firms in supply chains attempt to impose eBusiness technologies on other members, SMEs do not have the skill or time to implement all the Intranet applications requested (Bridge et al., 1998; Stokes, 2000). Chapman et al. (2000) report a case of web-based alternatives to EDI between lower tier SMEs and first tier/OEM firms in an automotive supply chain. Their research shows the importance of assisting SMEs not only in IT, but also in business analysis and funding for creation and implementation of Internet solutions. Firm size also impacts on the level of resources available for investment in information technologies and associated training and education (Iacovou et al., 1995) which can inhibit SME adoption (Cragg et al., 2002). There may be difficulties in raising finance to invest in eBusiness (Damaskopoulos and Evgeniou, 2003). SMEs often rely too heavily on family members rather than exploit others' skills and expertise (Baines and Wheelock, 1998). Studies have highlighted that smaller businesses are often less aware of the full potential benefits of eBusiness. Beyond lack of awareness, SMEs have been shown to exhibit a greater uncertainty of the benefits of IT adoption than larger firms (Salmeron and Bueno, 2006), thus, impacting on their motivation to invest in eBusiness. Owner/managers of SMEs tend to lack vision for the potential contribution of IT/IS to competitive advantage (Cragg et al., 2002).

Fisher (1997) suggests supply chains can be managed according the nature of the product being supplied, such as 'innovative' products and 'functional' products. As this suggests difference in management according to product type, it is reasonable to conclude this may explain difference in management through the adoption of information technologies. Harland et al. (2001) show that there are two dimensions that have substantial impact on how firms attempted to manage the process of creation and operation of supply networks—the degree of dynamics, and the degree of focal firm supply network influence. The combination of the two dimensions provides four types of supply network each containing different problems, priorities and core activities, showing differences in focus on information integration according to type—highly routinised supply networks highly influenced by a focal firm are more likely to integrate information in the network.

The key drivers of difference that impact on the use, or lack of use of eBusiness technologies are grouped and summarised in Table 1.

The findings from the literature were used to design the research questions and methodology.

Table 1
Key drivers of difference of eBusiness adoption

Drivers of difference to use of/barriers to use of eBusiness technologies	Keypoints and key references of drivers of difference
Within chain differences	
Firm—size	SMEs' organic structure, owners' attitude, resource poverty, limited IT infrastructure, limited knowledge and expertise with IS (Blili and Raymond, 1993; Ballantine et al., 1998; Bridge et al., 1998; Stokes, 2000) Information integration applications such as ERP are less appropriate to SMEs who tend to integrate tacit and cultural knowledge rather than explicit knowledge (Koh and Maguire, 2004)
Firm—owner/manager capability/characteristics	SME business growth depends on the small business manager's capacity to manage growth and an ability to discover and exploit new growth opportunities (Wiklund and Shepherd, 2003) Perceptions of trust in security of online transactions is the most important factor impacting on eBusiness adoption (Damaskopoulos and Evgeniou, 2003) Strong ties help to fill the gap in the entrepreneurs own knowledge (Jack, 2005)

Table 1 (*Continued*)

Drivers of difference to use of/barriers to use of eBusiness technologies	Keypoints and key references of drivers of difference
	Owner/managers of SMEs tend to lack vision for the potential contribution of IT/IS to competitive advantage (Cragg et al., 2002) Lack of interest, lack of motivation, imbalance of benefits (Howard et al., 2003)
Firm awareness of benefits	Perceived rather than actual benefits of EDI impact on its adoption (Iacovou et al., 1995). Existing trusted relationships with, for example, trade associations, may be the route to SME engagement (Brown and Lockett, 2004) However, uncritical passing on of 'black box' technologies without support would not encourage SMEs to engage (Newell et al., 2000) SMEs exhibit a greater uncertainty of the benefits of IT adoption than larger firms (Salmeron and Bueno, 2006) Perceived benefits, organisational readiness and external pressure impact on eBusiness strategy (Mehrtens et al. (2001)
Firm—resources	Level of resources impacts on EDI adoption (Iacovou et al., 1995) Lack of resources inhibits SME adoption of IT/IS (Cragg et al., 2002)
Firm—employee capability	Lack of training schemes for employees in SMEs impacts on eBusiness adoption (Damaskopoulos and Evgeniou, 2003) Reliance on family members can limit employee capability and reduce exploitation of non-family member skills and expertise (Baines and Wheelock, 1998) Strong family bonds can limit the ability of the entrepreneur to expand a small business (Jack, 2005) SMEs are less likely to engage in complex eBusiness applications and more likely to use simpler forms such as email and web-hosting services (Poon and Swatman, 1999) SMEs engage in 'participative' eBusiness, such as email and web-sites, but not 'enhancing' eBusiness which is used to provide competitive advantage (Lund and McGuire, 2005)
Firm—ability to raise finance for eBusiness projects	Difficulties in raising finance to invest in eBusiness impacts on eBusiness adoption (Damaskopoulos and Evgeniou, 2003) Most small firms do not have sufficient finances to employ consultants to help implement eBusiness (Soriano et al., 2002) Less costly, informal contacts can result in poor and limited advice (Birley, 1985)
Between chain differences	
Product/service	Manufacturers and merchant wholesalers are the main users of eBusiness. Retail and services sector organisations are relatively minor users (Lund and McGuire, 2005) SMEs try to differentiate their products to form niches to protect themselves from price competition (Fligstein, 1996) The nature of the product and its distribution is a driver of difference between SMEs (Vincent, 2005) 'Innovative' and 'functional products will drive difference in management (Fisher, 1997)
Process	Degree of routinisation of processes impact on problems, priorities and behaviour change (Harland et al., 2001) Institutionalised practices that effect governance patterns are drivers of difference between SMEs (Vincent, 2005)
Supply chain	Business partner adoption impacts on SME eBusiness adoption (Damaskopoulos and Evgeniou, 2003) SMEs are less likely than larger firms to engage in more complex e-supply chains (Brown and Lockett, 2004) Lack of customer pressure and use of eBusiness (Poon and Swatman, 2000; Sillence et al., 1998) Diverse goals and unequal risks and rewards (Boddy et al., 1998) Lack of assistance from larger supply chain actors (Chapman et al., 2000) Different power relations between organisations drive difference (Vincent, 2005) Supply chain actors may have different power, legitimacy and urgency to act (Howard et al., 2003) Different types of supply network impact on problems, priorities and behaviour change (Harland et al., 2001)

Table 1 (*Continued*)

Drivers of difference to use of/barriers to use of eBusiness technologies	Keypoints and key references of drivers of difference
Industry—competitive factors	Competitive factors such as cost reduction, ability to compete in new markets and the level of competitor eBusiness adoption impact on eBusiness adoption (Damaskopoulos and Evgeniou, 2003)
Industry—different sectors	SME engagement in eBusiness is highly variable across sectors, reflecting the heterogeneity of this type of enterprise (Buckley and Montes, 2002)
Industry—presence of vertical or horizontal intermediaries	Despite the presence of intermediaries such as Covisint, SME engagement with them is low (Brown and Lockett, 2004) Fragmentation of a market, in terms of the number of players and their geographical spread, impacts on eBusiness adoption (Mahadevan, 2003)
Regional/national	SMEs in more highly developed national markets and industries are more likely to adopt eBusiness (Damaskopoulos and Evgeniou, 2003) Cost of telecommunications impacts on eBusiness adoption (Damaskopoulos and Evgeniou, 2003) Urban clustered SMEs are more likely to use eBusiness technologies than rural SMEs (Taylor and Murphy, 2004)
Regulation	Regulatory structure on which eBusiness evolves drives difference (Castells, 2000)

3. Research questions and methodology

It is important to take an 'integrated' perspective of small firms (Barrett and Rainnie, 2002) that combines examination of different variables (Edwards and Ram, 2006). The findings from the literature review demonstrate that most studies examine a limited number of variables. In this research we intended to perform a deep examination of supply chain information integration (or lack of it) and identify key variables or groups of variables that appeared to be barriers to adoption. The following research questions were posed:

3.1. Research questions

1. What might explain differences in adoption of eBusiness technologies within supply chains?
2. What might explain differences in adoption of eBusiness technologies between supply chains?
3. In the supply chains examined, does eBusiness adoption change over time?

3.2. Research methodology

The research methodology consisted of literature review, exploratory unstructured interviews, semi-structured interview design, case studies of 29 firms in four supply chains in different sectors, and follow-up interviews 3 years later to assess the extent of change. The exploratory unstructured interviews captured issues important to supply chain information integration. Combined with the literature, these interviews were used to design the semi-structured interview format for the cases.

Case studies were used to investigate multi-dimensional issues, drawing on the views of a number of sources (Yin, 1994) embracing more interpretive aspects relating to social and organisational issues (Serafeimidis and Smithson, 2000). EBusiness has been subject to over-hyping in terms of expectations and performance (New et al., 2003) so it was hoped that face-to-face interviewing might reduce this, whereas survey might not. SME research is notoriously difficult as owners and managers have little time to spare and do not perceive they will benefit from academic research, so a postal or on-line questionnaire would be unlikely to be successful. Connected supply chain research is also problematic as it requires collective participation of members of the same chain; partial response rates can lead to holes in supply chain data.

The selection of supply chain cases was determined to provide a contrast of public and private sector influenced chains, industry sector difference, level of technological development in the sector, and product/service difference, to allow exploration of the variables arising in the literature. Four supply chains were selected in industries with a high involvement of and dependence on SMEs. One chain was chosen in a high tech industry to contrast behaviour with the other chains. The selection of parts of the supply chain to be studied deliberately included a large firm/organisation and a number of SMEs. The SMEs were detached from the larger firm by an intermediary to provide a supply chain as a unit of analysis, rather than a dyad. The chosen SMEs were involved in an ongoing relationship

with the intermediary, so trust and richer exchange might be expected.

Four case studies of supply chains in construction, assistive technology, apparel and computer consumables were conducted. The choice of four supply chain studies is in line with Eisenhardt's (1989) guideline that a number between 4 and 10 usually works well. The supply chains included 19 SMEs case firms and 10 larger case firms. Table 2 provides details of each supply chain and the interviews conducted.

The focal firm interviews involved investigating eBusiness strategy and practice as well as the approach to upstream supply chains. The supplier interviews examined two directions—downstream to the focal firm to investigate their perceptions of that firm's approach to eBusiness, and upstream to their suppliers to investigate their perceptions of their approach to eBusiness with those suppliers. The SME interviews looked downstream to investigate perceptions of the supplier's eBusiness approach, and internally to examine behavioural and cultural enablers and barriers to exploitation of eBusiness. The semi-structured interviews were designed to investigate the variables highlighted in Table 1 as potential drivers of difference within chains and between chains. Each case interview was conducted with a senior purchasing manager and/or IT manager in the case of the focal firms and large suppliers, and an owner/general manager in the SMEs. All the interviews were taped and documented. Confidentiality of the participant firms was assured as, particularly with the SMEs, they were revealing information about their dominant customers' behaviours.

In addition to exploratory 'expert' interviews and the main case studies in the first stage of research, a follow up set of telephone interviews (Rosenthal, 1984; Lindsley and Blackburn, 1991) was carried out 3 years later to provide a longitudinal perspective to understand changes in eBusiness development, and supply chain information integration. This multiple method research methodology allowed more insight into dynamic processes. In the second stage, four firms were unavailable/unwilling to participate, three had changed their business and were no longer involved in the same chain and four businesses had ceased trading, leaving 18 of the original chain case firms as active participants. The interview questions explored eBusiness development since the first study, focusing particularly on the findings from that stage of research.

Each supply chain was analyzed to identify differences in eBusiness adoption within chains; cross case comparison was performed to identify differences and similarities between chains. For both levels of analysis, data have been analyzed according to identified specific themes derived from the drivers of difference identified from the literature review.

4. Supply chain case studies

This section provides overviews of the four supply chain cases. The findings related to the research questions are discussed in Section 5. Tables 3 and 4 provide overview data.

4.1. Construction supply chain

The first case explores a construction supply chain, involving a large construction firm that performs facilities management, a large manufacturer of elevators for use in civil engineering projects such as shopping centres and high-rise office buildings, and five SME suppliers to the elevator manufacturer. Of the five SMEs, three provide interior finish services, one supplies engineering products and one distributes spares mainly for maintenance.

4.2. Assistive technology supply chain

The assistive technology supply chain supplied wheelchairs. It included one Disablement Services Centre (DSC) in a large National Health Service (NHS)

Table 2
Data collection by supply chain case studies

	Construction chain	Assistive technology chain	Apparel chain	Computer consumable chain
Product	Elevators	Wheelchairs	Uniforms	Computer consumables
Face-to-face—large firm interviews	1 customer and 1 supplier	1 customer and 1 supplier	1 customer	3 suppliers and 2 customers
Telephone interviews—large firms	2	1	1	4
Face-to-face SME interviews	5 suppliers	4 suppliers	4 suppliers	4 suppliers and 2 customers
Telephone SMEs interviews	4	3	4	4
Total number of face-to-face interviews	7	6	5	11
Total number of telephone interviews	6	4	5	6
Firms no longer in business (all SMEs)	1	1 no longer in sector	0	2 and 1 no longer in chain

Table 3
Background to 19 SME case firms

Chain	Firm	Business	Ownership	Turnover	Employees
Construction	AS1	Interior finishing	Owner managed (65 years old)	£2.5 m	45
	AS2	Interior finishing	Owned and managed by two directors	£2–3 m	50
	AS3	Decorative finishes	Partnership of three co-owners	£1 m	20
	AS4	Manufacturer of engineering products	Family owned since 1851	£700,000	13
	AS5	Distributor of lift component parts	Part of a lift manufacturer	2.5 m	7
Assistive technology	BS1	Subcontracting CNC mechanisms	Private limited co and family owned since 1992	£1 m	16
	BS2	Metal stockholder	Private limited co, family owned	£6 m	22
	BS3	Distributor of industrial fasteners	Private limited co and family owned (16 years old)	£1.8 m	16
	BS4	Subcontracting wheelchair parts	Owned by one semi-retired person	£4 m	60
Apparel	CB1	Assembly of quality uniform	Private limited co	£9 m	100
	CS1	Distribution of packaging	Limited co (was family business, one family remain MD)	£9–15 m	100
	CS2	Manufacture of belts, waist banding and bindings	Family owned (50 years old)	£2.5 m	32
	CS3	Fabric manufacturer	Private	£8 m	53
Computer consumables	DC3	Publisher—incl. websites and e-brochures	One person	£300,000	13
	DC4	Estate agents for Italian properties	Owner entrepreneur	£70,000 (in commission)	2 full time plus assoc's
	DS2	Stationery supplier	Private	£2.5 m	12
	DB1	Distributor of computer consumables	Private limited	£14 m	80
	DI3	Graphic design	One person with network of contacts	£30,000	1 and more as and when
	DS1	IT solutions provider	Two partners	£3 m	13

Table 4
Characteristics of 10 large case firms

Chain	Code	Business	Position in the supply chain
Construction	AB1	Construction	Large focal firm
	AI1	Lift manufacturer	Large immediate suppliers
Assistive technology	BB1	NHS Trust Disablement Service Centre	Large focal firm
	BI1	Wheelchair manufacturer	Large immediate suppliers
Apparel	CB1	Uniform manufacturer	Large focal firm
Computer consumables	DC1	Private investment bank	Large customer
	DC2	Underwriter	Large customer
	DB1	Distributor of computer consumables	Large supplier
	DI1	Manufacturer of inkjet cartridges	Large immediate supplier
	DI2	Broadline IT distributor	Large immediate supplier

hospital, one large wheelchair manufacturer and four SME suppliers—one metal stockholder, one distributor of industrial fasteners, and two subcontractors for various wheelchair parts. The majority of wheelchairs for the DSC are of standard design. However, most SMEs in the supply chain provide low volume, bespoke products to support the customised wheelchair market outside the NHS. The high volume production part of this supply chain faced fierce global competition from low cost producers in China, Malaysia and India. SMEs in the supply chain appeared highly concerned about the risk of over-dependence on one customer and strategically were pursuing a wider customer base.

4.3. Apparel supply chain

The apparel case explored a clothing supply chain, containing a focal firm and three SMEs. The uniform 'manufacturer' was an assembler who co-ordinated and 'badged' imported garments and garment components. Whilst the manufacturer served mainly the European public sector police and armed forces, the SMEs supplied both consumer retail and public sector chains. Increasingly intense international competition was causing many UK firms in this sector out of business as low-cost foreign manufacturers were being favoured.

4.4. Computer consumables supply chain

The computer consumables chain was structured differently to the others; it consisted of one firm supplying to SME customers and being supplied by larger suppliers. Computer consumables are, in the main, commodities, sold on low margins. Nearly all computer consumables are manufactured in the Far East and imported; therefore consumable suppliers are resellers and distributors. The network form of this chain meant interviewing a wide variety of organisations, stationery suppliers, high volume PC and software resellers, micro-businesses as well as customers from financial services.

The assistive technology, apparel and computer consumables chain SMEs all supplied into public sector as well as private; the construction chain was serving the private sector. The computer consumables chain resided in a high tech industry, the assistive technology chain and construction chains were in medium tech sectors and the apparel relatively low tech, where high or low relates to general technological sophistication. All the SMEs selected were regular suppliers to the chains; they shared an ongoing relationship with the customers in the chain. In this way they represented a specific sub-set of SMEs, rather than the entire population which contains SMEs who provide commodity products where switching ability is high. Structural differences between the chains were not viewed as critical. The key factor for this research was supply chain connectivity to explore alignment in supply chain information integration.

5. Discussion

5.1. What might explain differences in adoption of eBusiness technologies within supply chains?

5.1.1. Use of eBusiness at the time of the first stage of research

There was almost no eBusiness for all the case SMEs. The majority of the SMEs still used phone, fax and personal visits as communication channels. Standalone websites and eMails were the main form of B2B technology for almost all SMEs. Most of the SMEs had eMail capability but rarely used it and where they did it was used externally. The SMEs started to use

eMail to communicate with large customers; most of the suppliers to the SMEs did not use eMail. A few SMEs in the assistive technology chain used eMail more frequently and the Internet for exchanging CAD diagrams, orders and for tracking parts. Some had a few inquiries by eMail or from the website. Only a few SMEs took orders through their website or by email. All uses of eBusiness tended to be external; there was little internal use.

The majority of SMEs had standalone websites. They used them for marketing reasons only. These sites often took the form of 'brochureware', providing limited product/service information and contact details. Most of the SMEs did not have detailed product, price or stock information available on their sites. The websites were not advertised, but a web presence was perceived as protecting them from their competitors. All the SMEs showed a lack of awareness of the potential benefits of enhancing websites to enable on line ordering, for example, rather than participative brochureware providing a small 'shop window'.

Almost none of the SMEs used eProcurement. Two in the assistive technology chain had on-line catalogues of their suppliers' products. One ceased using them as they found it was too slow. Two SMEs had had off-putting experience of eCatalogues and eAuctions; a few had used the Internet to purchase stationery as price comparison was easy. There were almost no EDI links between SMEs and large firms in the supply chains. The exception was in the computer consumable chain where there was an EDI link between a focal SME manufacturer and a large immediate supplier. One immediate supplier in the construction chain had asked two of their SMEs to link with their Intranet.

Only few SMEs had an internal information systems network and there was little internal systems integration. Hence, there was no internal–external systems interface. SMEs receiving orders through eMail had to re-key data, i.e., they took orders from the Internet into manual systems for orders and payment.

In the assistive technology chain, the lack of customer pressure to implement eBusiness was claimed to be a disincentive to other actors in the supply chain. Face-to-face communication was believed to be the best way of fulfilling customer needs and winning their confidence; the attitude was 'it's who you know' that secured supplier relationships. SMEs preferred to buy raw materials from established and 'trusted' suppliers, with whom mutual loyalty took precedence over price:

> "We only play the market if we have a problem with a supplier. People come to us generally on recommendation. We can't afford to try too many suppliers because we are right at the sharp end and it kills your reputation. It takes a long time to build a reputation and just one mistake to kill it." – Sales Director, BS4.

EBusiness development was more advanced in the large firms further downstream in supply chains. The large firms in the four chains used eMail both internally and external. They used their websites as interactive tools, examples included web-enabled enterprise systems. One large firm in the apparel chain tried to use IT to support strategic moves. A few large firms had online-ordering and eTendering capability. Others had eMarketplaces or eProcurement projects but in the majority of cases these projects had been put on hold.

Overall, at the time of the first stage of the research there was little eBusiness interaction between larger firms and SMEs in the four supply chains. All larger firms felt they had developed more eBusiness with their customers than with their suppliers. The SMEs tended to use phone, fax and personal visit with their key suppliers. None of the large firms had EDI links with SME suppliers in the chains studied. Some had tried to link their Intranet with selective suppliers. Of the four supply chains, the SMEs in the assistive technology chain used more eBusiness technologies than SMEs in other sectors.

5.1.2. Planned use of eBusiness at the time of the first stage of research

All the large firms and immediate suppliers had ambitious plans for eBusiness. For example, the focal firm in the construction chain tried to re-launch a B2B exchange with full back-office integration and eProcurement. They planned to increase eBusiness interaction with suppliers. In the case of the assistive technology chain, the focal firm planned to have full Internet procurement and electronic inventory management. The uniform manufacturer in the apparel chain planned to automate all their business information, except production. They were trying to implement an IT system for on-line ordering and stock control with the aim of delivering customised 'manpacks' to police forces, i.e., kits for each police officer.

However, despite the ambitious plans of the larger firms, none of the SMEs had plans for further eBusiness adoption. They held a watching brief, responding to customer demand and business need as they grew. Some SMEs wanted to enlarge their websites but still keep them as a marketing tool. Others wanted to use the Internet for developing a paper-free office. Only one

SME in the construction chain saw the potential benefit of investing in a system that allowed its customers on-line purchasing and internal purchasing, bypassing intermediaries; however, insufficient potential was appreciated to urge them to go ahead with this initiative.

Using the findings from the literature, the SMEs were asked questions to try to explain their lack of adoption and persistent caution even in their future plans. Despite the assertions in prior research about resource poverty of SMEs, it was not simply that they could not afford eBusiness, but rather they would invest in it only when forced to by customers. One interviewee stated '*When we first heard of TQM and all that, we were horrified, how would we ever afford the time let alone the money to do that. Now everybody, every small company does it. It'll be the same with eBusiness, when we have to we will do something, everyone will, but not 'till then...*' So whilst appreciating some cost of investment in eBusiness adoption, they accepted that they would bear this cost if customers insisted.

Regarding the characteristics of the owner/manager of the SMEs, almost all demonstrated a lack of vision and focused on the short term, reacting to customer wishes. This lack of vision restricted their appreciation of the potential benefits that eBusiness adoption might provide for them. However, the lack of use of eBusiness by SMEs was seen as a positive tactic to keep close personal relationships with customers. The majority of SMEs expressed the critical importance of close personal ties with customers. Business was being won through reputation and personal relationships not through 'selling':

> "Our customer base is mostly repeat. We visit customers to see what enquiries they have. The marketing doesn't have to be that fancy – it's down to straight forward personal contact and relationships." CS2 ... business is still face to face and reputation and relationship based" AS3

Owners' knowledge of IT was another factor highlighted in the interviews. Home use of IT by the owner or manager could facilitate SME interest in eBusiness. Non-professional IT knowledge and skills also influenced their eBusiness adoption decision. As the literature suggests, there are many examples of, say, an SME website coming about because the owners' son or daughter is interested and has done it as a project, or someone in the office has volunteered to do it. Where there was a lack of employee capability in the SME, owners were unwilling to pay for professional consultancy.

There were some technical barriers to eBusiness adoption for SMEs. First and foremost was security; they feared losing sensitive information to competitors. However, a further problem is the 'not always-on' system. There is resistance due to the time and effort involved in having to log on to use the Internet. Increased use of eBusiness may occur when more businesses use broadband technology. As this will mean an 'always on' Internet link, it will bypass the resistance. However, SMEs were concerned about additional Broadband costs (hardware, software, licenses, support and maintenance). They were also mindful of the potential for eVirus threats, eSaboteurs, eHackers and eEspionage with an 'always on' ePathway.

In summary, some of the possible explanations for lack of information integration within supply chains supported some prior research findings. Concern about additional investment requirements, short-termism and lack of vision of SME owner managers, lack of understanding about potential benefits, and lack of internal capability all featured in this research. However, by addressing a number of variables, it was possible to determine which were central and which were more peripheral. In this study the overriding factor that was stressed repeatedly was lack of push from customers; the bottom line was that, despite all the other concerns, if the customers pushed, SMEs would adopt. The core explanation for difference in adoption within the supply chains was lack of leadership in the supply chain to push information integration upstream.

5.2. *What might explain differences in adoption of eBusiness technologies between supply chains?*

Table 5 provides a comparison between supply chains of barriers to adoption.

Prior research provided a number of possible explanations for differences in adoption between supply chains which were grouped in Table 1 as product/service, process, supply chain, industry – competitive factors, industry – different sectors, industry – presence of vertical or horizontal intermediaries, regional/national and regulation.

The supply chains were selected to include different products/services and processes – these were elevators, wheelchairs, uniforms and computer consumables. Prior research had shown that product and process difference could impact on management. Initially, supported by the literature, it would seem reasonable to propose that highly customised products, such as bespoke wheelchairs and relatively customised products, such as uniforms, would require different types of

Table 5
Barriers to SME e-adoption

Behavioural and cultural barriers	Technical barriers	Business and supply chain related barriers
Construction chain		
Need for face to face to build relationships	Security concerns	Suppliers have no websites or not using emails
Owner do not see a current need	Difficulties with manually maintain large catalogues	Customer prefer printed catalogue
Lack of expense and time		Difficult to gauge the quality over the Internet
Lack of knowledge and expertise		
Lack of understanding by chief directors		
Technical and buyers not PC-literate		
Older employee reluctant to use PCs		
Very small firms		
Too expensive		
Assistive technology chain		
Too small	Worried about e-hackers and viruses	Customer like to order over the phone
Fear of losing personal touch	Not always—on system, takes time and energy to dial in	Suppliers not using email
Only buy from suppliers they can trust	Catalogue too big to update manually	Long term relationships with five suppliers
Strong loyalty to existing suppliers		Bespoke customers
Fear of losing sensitive information		Low volume business
Lack of information		
Belief that e-business add time and money		
Lack of confidence for buying or selling over the Internet		
Employees not PC-literate		
Apparel chain		
Fear of losing personal touch	Dial up and not on-line all the time	Too cheap to transport cheap product
No confidence of long term investment	Long, intricate tender documents	Lack of customer use of email
Have no confidence buying over the net	Difficult to study terms for Internet bidding	Standard supply and transportation costs
High stakes for the buyer in getting it right		Trade via personal network
		Shrinking UK textile industry
		Poor quality standards from overseas sourcing
Computer consumable chain		
People are afraid of technology	Security issues	Customer ordering wrong part more usual than lost orders
Prices is key driver	Incompatibility	Products are complex, tailored solutions
Customers will not transact for high value, complex and emotional purchases over Internet	Net going down	Customers/buyers not ready to 'trust' complicated product will arrive configured as ordered and no one has machines able to check
Further barrier of transacting with Italian estate agency	Cannot get broadband in the area but real barrier	Threat of local (Italians) being able to duplicate business may mean the organisation is reluctant to take a supply chain approach
May restrict some information to prevent buyers by-passing them	How to make them come out first in web search engines	Will supply more e-business and use e-billing, etc., as and when customers upgrade
Believes all technology is to aid communication, people still want to talk	Minor cost and time issues in revamping web site	
Web buying will hit margins	Cannot prioritise emails yet	

information integration compared to more standardised products such as computer consumables. In particular, computer aided design (CAD) might be anticipated in more customised than commodity product supply chains. This was borne out in the case studies – the assistive technology chain was the only one where SMEs were exchanging CAD drawings electronically. However, looking across the cases, product/process in itself did not consume much of the discussion or interest, nor did it 'leap out' as a critical driver of difference. There was far more concern with supply chain factors, relating to customer requirements.

In the computer consumables supply chains, while public sector organisations like local authorities and emergency services were mandating the use of eBusiness, private sector customers were not. The PC supplier in the chain bought little electronically, but increasingly had to supply more through eBusiness to government. This was a direct result of a roll out across local government purchasing of eProcurement. In the assistive technology supply chain, despite a highly ambitious UK government modernisation agenda, there was little evidence of eBusiness implementation in this public sector-led chain. This was because the roll out across the NHS was fragmented and partial. The particular disablement service centre in the assistive technology chain resided in a hospital trust that had not fully implemented eProcurement, in spite of the fact that the Department of Health had targets set for them on this by central government.

The apparel chain was relatively transparent in that costs were easy to estimate and the public sector tendering process was visible. Relationships within the supply chain were close-knit, with members remaining loyal and most communication was by word of mouth. The SMEs perceived their personal relationships as ensuring UK customer loyalty. As in the assistive technology case, despite the fact that the Home Office had targets imposed by central government, the implementation of eProcurement across all 44 independent police forces was patchy and fragmented.

Prior research indicated that competitive factors within industries impacted on eBusiness adoption. However, the picture that emerged in this research was slightly more complex than this. Whilst it was observed in some of the cases that international competition was indeed increasing, rather than compelling supply chain actors to compete through more effective information integration, it compelled them to adopt more differentiated, niche strategies, that emphasised the unique selling proposition of close ties and rich customer service. In the apparel chain international low cost producers were gaining more of the retail market business, driving many UK SMEs out of business. The niche uniform market was more protected from foreign competition because the higher quality garments required higher skill levels. UK eminence in textile education was viewed as providing competitive advantage, so high quality product and service, rather than information integration, dominated competitive strategy. In the construction chain the first stage of the research found that a close network of business associates was carefully maintained, supplies being ordered by telephone as part of regular, cordial, personal communications. The mutual loyalty of those involved made the parties reluctant to break with tradition, explore new suppliers and markets or try using eBusiness to search for alternate sources. The clannish industry nature was reinforced by the geographical concentration of this supply chain; the SMEs all traded principally within the M25 area (a major ring road encircling London). One of the competitive advantages all cited was the ability to be at any of their customers' sites within an hour. This contributed to this supply chain having no fear of foreign competitors, although elevators were imported from both Japan (high technology) and Mexico (low technology).

Prior research had shown regional and national differences in adoption of eBusiness. However, these mostly related to the level of development of technology infrastructure. As all four cases were UK based, this particular dimension was not tested sufficiently. However, even within the UK one of the cases (computer consumables) reported that the lack of broadband availability in their area was impacting on their ability to adopt eBusiness. Similarly with regulation, other than government regulating public sector purchasers to adopt eProcurement, regulation was broadly consistent across the cases, as all resided in a common UK regulatory framework regarding information technologies.

The first stage of the research, therefore, provided specific findings. First, there was a lack of integrated information in all the supply chains studied. Having examined a number of variables, it emerged that the central reason for this was lack of supply chain information leadership by the larger firms. Despite having their own ambitious plans and their own initiatives, most of these were directed at immediate customers, not the upstream supply chain. They seemed relatively unconcerned about supply chain information integration performance. Second, there was a lack of awareness of the benefits of eBusiness, particularly in the smaller upstream businesses; eBusiness was viewed

more as a cost and a threat than a business enhancing provider of benefits. Third, between chain differences were not as striking at the time as within chain differences; whilst differences were observed between chains, there was, overall, quite a similar pattern in barriers to adoption of eBusiness across the four supply chains.

To answer the third research question involved a later study to re-examine the same supply chains 3 years on. Rather than repeat the earlier study, the questions focused on the previous findings.

5.3. In the supply chains examined, how does eBusiness adoption change over time?

The interviews in this second part of the study focused on whether there was evidence of change in supply chain leadership, in lack of appreciation of the benefits of eBusiness in upstream supply chain actors, and if the 'within chain' drivers of difference were still more profound than the 'between chain' differences.

5.3.1. Evidence of change in supply chain leadership

The large construction firm managed the process of elevator tendering, installation and maintenance and had been actively developing eBusiness for marketing. On the supply side progress was slower; a European-wide intranet database of 'qualified' suppliers was started at the time of the first study, abandoned a year later and was still dormant at the time of the second study. The original thinking was to control more closely the engineers who sometimes by-passed purchasing, using different suppliers and technical standards; supplier rationalisation was expected as a by-product of the database. The construction firm's failed attempt to establish a database of preferred suppliers did not concern them or other actors, and no further progress had been made 3 years later. The construction chain showed the least change of the four supply chains over the period of the study. There was no evidence throughout the study of any integrated eBusiness strategy, plans or initiatives. Each actor in the supply chain remained isolated in its development and use of eBusiness.

> "... Nothing has changed since (the first study) – well except we use a lot more eMail... We still have a website but we get virtually nothing through it, it is only a promotional and information tool it has no transactional capability. And quite honestly it's way out of date" AS3

The smaller upstream businesses in this supply chain still highlighted that lack of adoption was due to lack of downstream requirement for adoption.

> "There is no demand from our customers for us to supply using anything to do with the internet" AS4

An SME distributor of industrial fasteners in the assistive technology chain maintained throughout the 4 years of the study that neither suppliers nor customers were interested in using IT. Whilst the SMEs expressed awareness of benefits of eBusiness, none had a strategy or plans to implement it. The SMEs viewed eBusiness as a tool for solving specific problems, not a panacea or an alternative to existing business models.

> "We had one customer used it briefly ... but we didn't like it and they didn't like it, they did not update it and so I could not close orders off even after I'd delivered them, so we'd both rely on the good old fax."BS3

> "No one is pushing us", BB1

> "To be honest, I can't see our customers taking it up at all; they are mostly small fabricators, 'oily rags'. When they want something they want it quick and just come and get it or shout down the phone". BS3

In the assistive technology supply chain, the natural supply chain leader would be the UK National Health Service, the largest purchaser of wheelchairs in the UK. However, in spite of much government rhetoric about the UK becoming a world leader in eBusiness, the NHS as a major public sector purchaser had still not taken a leadership role in any consistent way. Price and delivery dominated forward plans of the chain members, and, in the absence of customer leadership, appeared to mitigate eBusiness developing. Supply chain actors viewed low-cost international manufacturing as more of a competitive threat than other firms using eBusiness ahead of them. By the second study, one of the manufacturers in the assistive technology chain had migrated from supplying wheelchair parts to supplying seating frames for buses, reflecting the competitive pressures from low cost manufacturing countries rather than IT developments.

In the apparel supply chain, the business strategy of the manufacturer was changing during the study to become a one-stop shop distributor. Customers were being offered the ability to order all items of apparel on-line from one source, with rapid delivery to reduce their local stockholding; individual members of the police had budgeted volumes of each clothing item per year

and were able to order them themselves, as required. The apparel manufacturer's strategic diversification into a logistics ''managed service'' provider had been successful, although at only 10% of turnover it was not a large proportion of the business. What had made eBusiness work for this firm was how it supported 'outsourcing' by police forces of all responsibility for logistics related to uniforms:

> ''It is effectively internet shopping, they can see the wardrobe, sizes etc and then order direct into our back end systems, we pick and pack it (from stock) and of 110,000 items 97% have arrived in 3 days'' Finance Director, CB1

For this firm it was a public sector client's need to save money through outsourcing non-core operations that made eBusiness successful. In a cut throat and declining UK textile industry this initiative was crucial for survival but it was not without pain—during the 4 years of the study most actors in this supply chain made redundancies and some went out of business. The cloth supplier in the chain significantly upgraded its website during this time, but still did not transact through it; they stated that their military and police customers were not pressing for e-based supply. A packaging SME in the supply chain planned to start using eBusiness to enter a new internet-based packaging market. However, generally in the industry there was a sense that customers were not that interested.

> ''Our traditional customers – [High street retailers] are not interested in e-... There is no demand from them for eSupply'' CS1

> ''None of our customers are asking for electronic transactions, it's simply not a priority'' CS3

In the apparel supply chain, the police service stimulated the eBusiness initiative, but in practice little of the chain's business was transacted through that route. With industry decline and increasing competitive pressure from low cost international manufacturers, the emphasis was on fighting to keep existing business; until existing customers applied pressure on the supply chain to use eBusiness, business would carry on without it. The SMEs in particular had far too much to worry about fighting for survival, and did not see eBusiness as significant in that battle.

In the computer consumables chain, in the first study this chain was the only one to be actively hostile to eBusiness. The hub SME reported that it had had many expressions of interest in eBusiness but few orders. The SME supplier depended on social interaction through a small call centre, dedicated to daily interaction with customers. They perceived eBusiness as a potential destroyer of their competitive advantage held in their social capital. Their strategy was to underplay the internet and not to advertise their ability to supply via eBusiness. Another SME in this chain expressed the view that the growth of eBusiness would eventually encourage bigger and better-funded rivals into the market and put them out of business. A larger firm in the chain also had a lukewarm reaction to eBusiness capability promotion, preferring to maintain their personal contacts. They deliberately 'hid' direct sales of their products on their web site, offering only limited ranges at prices higher than the high street. Despite having had customer complaints about this they continued their recalcitrance, viewing purchasing over the internet as a 'last resort'.

It is ironic that in this 'high tech' supply chain customers preferred to buy computer consumables 'manually'. The main exception was a high volume reseller of PCs, who traded via EDI with major customers, and found it a good way to manage high volumes of data. However, they were also concerned at eBusiness eroding margins, and prices on the website were being used as negotiating points rather than final offers. EBusiness was perceived to bring volume but little profit. They found customers used eBusiness to see prices, then placed orders over the phone. By the second study this organisation was becoming more positive:

> ''The big change is that the number of (on-line) orders taken has gone up hugely ... but the average order value is dropping. This is super, exactly what you want – higher value orders are still done with negotiation, people talking, but the lower more routine things are done electronically''. Sales Manager, DI2

Again, public sector customers were stimulating eBusiness through local authorities and emergency services mandating this, but this was not sufficiently joined up to represent clear leadership in the supply chain.

This finding—of eBusiness being used for 'routine' buys, and negotiation still being used for critical purchases was reflected in how the hub SME changed its views on eBusiness. However, later in the study public sector customers, under pressure to meet Government targets, started to mandate eBusiness. As each local government customer adopted a different eBusiness platform, the firm had to support ten different platforms to gain public sector business.

In terms of supply chain information leadership the results suggest there is no such thing in these chains; organisations have been observed building electronic links with customers, but integration through chains of firms is missing. Even where public sector customer demand for eBusiness was observed, driven by central targets, that demand was itself fragmented, asking for many different varieties of eBusiness platform to be supported. Large firms in our study have not influenced or attempt to manage upstream suppliers, especially the lower tier SMEs. Lack of customer demand means that SMEs tend not to have an eBusiness strategy, however, an exception is the case in the computer consumable chain where DB1 responded reluctantly to customer pressure for eBusiness trading as their largest customer threatened to drop them if they did not.

5.3.2. Evidence of change in lack of appreciation of benefits of eBusiness in upstream businesses

Some initial fears of eBusiness damaging the core offering of personal relationships, changed during the study. Using eBusiness to deal with the 'drudgery' around ordering and supply was appreciated as releasing the sales team to spend more time and freedom to enhance other areas of the customer relationship. The implications for employment though were stark:

> "My directive from the MD whom I report to is a minimum of 33% of turnover coming through eBusiness ... seen as the big way to grow business without increasing size of office based employees – the more orders you can do electronically the less people you need to deal with customers... We have ... come away from seeing e- as a threat, to now think e- can enhance the relationship, freeing sales people up from administrative tasks such as inputting orders so that they can spend more time building the relationship with the customer, so our business plan is trying to stay the same size but use e- to help us personalise our offering" Sales Manager DI2

Most common changes in appreciation of the benefits of eBusiness related to customers, with little connection either to the rest of the internal business, and none to the supply base.

> "I had signed up with an internet business registry – £1000 [$2,000] a year for two years, and in two years I have not had a single call so I am looking forward to canceling that, a waste of time ... business is still face to face and reputation and relationship based" AS3

So during the study, even some recalcitrant SMEs were starting to appreciate some of the potential benefits of eBusiness, but only when led by customers to see them.

5.3.3. Were 'within chain' differences still more profound than 'between chain'?

Across the chains where eBusiness was observed it remained customer facing and not integrated with the supply base:

> "... some of our vendors – big technology ones – are miles off where their customers are e.g. Sony, Brother, HP, DI1, none of them are pushing for [us being] e-enabled. DI2 have online ordering but as we are a customer they don't insist we do it so we can ring up and order, So we are e-enabled for customers but our supply base is not." Sales Manager, DB1

Construction remained a highly fragmented sector containing many SMEs where operations were managed largely by paper and visual control. Few people were involved in purchase negotiations, so reputations counted, and communication tended to be personal and face-to-face, with eMail support. Business was still high variety, with low volume purchasing and transactions; therefore, technologically mediated communication was less relevant. The engineering education and backgrounds of interviewees suggested adapting to new technology would not be a problem if warranted. The construction supply chain could still be characterised as being populated with individual professionals, such as architects, surveyors and civil engineers, who behaved relatively independently, with no clear supply chain leadership. The culture was a 'hands-on', practical approach, with visual control of materials in the supply chain. The actors interviewed were complacent; SMEs in the chain did not feel at threat to loss of business and felt their personal relationships would secure them future orders.

The main differences in supply chain information integration across the supply chains related to whether the chains supplied the UK public sector, and what action the public sector customers were taking. Where they mandated the use of eBusiness, this stimulated eBusiness development in the supply chain. However, because public sector organisations purchased in a relatively devolved, fragmented way, in practice there was no clear leadership, leading to fragmented and varied demands for different eBusiness platforms.

On reflection, there appears to be differences in culture between the supply chains that also may impact on the potential future development of supply chain

information integration. The UK construction industry lagged behind other industries because of its complacency and its structure as a collection of individuals; it is difficult to see where supply chain leadership for eBusiness will emerge from. The sector has a reputation for lack of business professionalism and organisation. The textile supply chain culture was quite depressed; the dramatic recent decline of the industry in the UK had left few survivors who are all so battle weary it is difficult to imagine they will transform into inspired supply chain leaders of an eBusiness revolution. Supply chains into the NHS will respond to the NHS. As one of the top three global organisations in terms of its size, the NHS could be a supply chain leader in eBusiness. However, in practice, it does not operate as a single organisation and all attempts to have an NHS eBusiness solution have failed because of the enormity of the task of integration across so many NHS sites containing different systems and technology platforms.

The study showed a disparity in eBusiness strategy between large firms and SMEs. All the large firms and large first tier suppliers had more ambitious plans for the future use of eBusiness technologies than their SME chain members. In comparison to an SME stating eBusiness is not even on the horizon, the quote from a large firm below sees eBusiness as crucial:

> "IT strategy is a big part of the business strategy. In the next five years we will continue to grow the market, continue with eProcurement, possibly over the next five years we might extend the system to deal with our suppliers, possibly. It is crucial as an opportunity to add services to the cut throat and low margin supply of uniforms. It's one thing customers really appreciate." Large firm, CB1

However, large firm eBusiness strategies were more associated with downstream customers than the upstream supply chain. In contrast, the SMEs interviewed tended not to have an eBusiness strategy. None of the SMEs had plans for further e-adoption. They were still cautious, holding a 'watching brief', responding to customer demand only. Most of the SMEs did not anticipate adapting their business model for eBusiness and perceived little customer or competitive pressure to do so. As the SME strategies were to be flexible, adaptable, and provide greater personal service and personal contact to their larger customers, they perceived this as being in conflict with having an eBusiness strategy, as they perceived that their services would become commoditised, therefore, eroding their distinctive competence.

None of the SMEs saw a risk in larger downstream firms forging ahead with their own eBusiness agendas and themselves still adopting a cautious approach. None of the larger firms, despite pressing ahead with ambitious eBusiness initiatives, were hurrying towards supply chain information integration, other than downstream. Despite some minor changes between supply chains the most stark differences still appeared within supply chains.

6. Conclusions

6.1. Implications for theory

This study raises four main implications for theory (i) research methodology implications; (ii) the challenge of supply chain management rhetoric of generic benefits of supply chain information integration; (iii) the need for configurational, contingent approaches to supply chain leadership relating to information integration; (iv) the need for more linkages back to existing theory on leadership and strategic management.

6.1.1. Research methodologyl implications

The implications for research methodology relate to unit of analysis, temporal versus static research, interpretive versus positivistic research, and wide variable sets versus small variable set studies.

Most research studies in supply chain management have not genuinely explored connected chains of dyadic relationships, and have actually, in the main, been surveys of focal firms. As can be seen in this study, larger focal firms have their own information strategy agendas that they pursue in isolation and absence of consideration of upstream suppliers. This is in part pragmatic as it is easier to design and execute a survey of a number of professionals within larger firms, selected from a database, than it is to facilitate connected supply chain research. However, it is misleading to label the unit of analysis of such studies as the supply chain.

Furthermore, few studies are temporal; most are snap-shots at an instant in time. Using longitudinal case studies has enabled a deeper, richer understanding, with explanations across a wide number of variables. The frankness of the conversational responses reveal some of the depth that would be unlikely to be gained through a survey instrument—for example, the admittance that, whilst one firm had established a web site, it was hardly used and was out of date.

Methodologically, this research was more interpretive and less positivistic than many other studies. The

research questions were derived from exploratory research as well as literature. But the most important finding related to a variable – leadership – emerged strongly in the interviews. Interviewees steered the research away from some of the variables from prior research, and enforced their own variables through the discussion that occurred in semi-structured interviews, causing the researchers to revisit the literature. Whilst not providing statistically generalisable findings, there was sufficient depth and commonality of views to provide clear pictures of what was occurring within supply chains, between chains and over time.

This research, in part, confirms some prior research findings relating to examination of single variables or small numbers of variables. For example, resource poverty and owners' attitudes and capabilities (Blili and Raymond, 1993; Ballantine et al., 1998; Croom, 2000) were identified in the study as influencing adoption of eBusiness in SMEs. Barrett and Rainnie (2002) and Edwards and Ram (2006) highlighted that, particularly when performing research involving SMEs, an integrated perspective should be taken that examines a wide number of different variables. This logic can be extended into supply chain research more generally. Most supply chain research to date has failed to recognise the heterogeneity of organisations and practice within chains, often focusing instead on a single issue with one methodological approach. In the chains studied, different discussions were held with different types of actors to be more appropriate to their role and situation in the chain, despite being guided by a consistent set of broad research questions and semi-structured interview themes. This is only possible in deep, connected supply chain case studies.

6.1.2. Challenge of supply information integration rhetoric

A dominant theme from the literature review was the claimed benefits to performance of supply chain integration and the achievement of this through information integration. It was also highlighted that the greatest benefits of eBusiness occur when its application is fully integrated throughout the chain. However, there is insufficient empirical evidence to support this 'one-size fits all' assertion. Even large organisations, some with reputations for advanced supply chain management appeared in this study not to be concerned with integration of information in their supply chains. This finding raises real doubt as to the strength and reliability of some of the more advanced claims for supply chain management, or more cautiously, speculation that supply chain approaches are still limited largely to their logistical roots, rather than IT development. Or that may be integrated information systems might only be appropriate in certain types of supply chains, or within certain parts of supply chains. As Levy et al. (2001), Poon and Swatman (2000), and Mehrtens et al. (2001) contend, customer dominance and pressure is a key driver for SMEs to adopt eBusiness; as Sillence et al. (1998) observes, if customers are not pressuring then this acts as an inhibitor to SMEs pursuing eBusiness. Therefore, the 'e-isolation' of eBusiness strategy development in the larger downstream firms in the supply chains studied does not motivate the upstream SMEs to join in. If downstream, more powerful customers forced them, they would implement eBusiness technologies but they will not in the absence of this pressure. Indeed, very recent research is also questioning the rhetoric; Das et al. (2006) suggest a more complex, configurational, contingent approach to information integration in supply chains.

6.1.3. The need for configurational, contingent approaches to supply chain information integration

The main thrust of Das et al.'s (2006) argument is that optimum supply chain performance will only be achieved through *appropriate* supply chain integration. They venture to suggest it is possible to over-invest in supply chain integration, giving rise to sub-optimal performance. Rather, they propose a 'balanced approach' to supplier integration, with a 'mid-range' position. They suggest that different shapes of configuration of information integration may be appropriate to specific industry and market environments, but as yet have not provided empirical evidence to support this. Soliman and Youssef (2001) emphasise that an eBusiness strategy should specify the aims, goals and context of the application; these choices should be aligned with other organisational and managerial choices, and integrated with the organisation's processes (Graham and Hardaker, 2000). These authors therefore suggest eBusiness should be adopted in a manner contingent to the specific organisation, i.e., that large and small firms will have different objectives and different strategies. Koh and Maguire (2004) extend this thinking into specific eBusiness applications, highlighting that ERP is less appropriate to SMEs who wish to integrate tacit and cultural knowledge, than to larger firms who integrate volumes of explicit knowledge.

This suggests for theory development that existing contingent approaches to supply, such as portfolio approaches (e.g., Kraljic, 1983; Reck and Long, 1988) might usefully be extended to supply chain information

integration strategy. Some parts of supply chains dealing with routinised, high volume requirements (Harland et al., 2001) might usefully employ eBusiness based information integration, whereas others dealing with more dynamic, innovative activities, might seek integration of a richer sort of information in more tacit forms. This leads to the final area of implications for theory, relating to leadership and strategic management theory.

6.1.4. Implications for leadership and strategic management theory

Despite calls for research in logistics leadership (Closs, 1998; Andraski, 1998), there is a dearth of publications in supply chain leadership. Internet searches across the major international management journals reveal few empirically researched studies; most references relate to text in books. As a subject, supply chain leadership has not been sufficiently defined, scoped or researched. Two notable exceptions are Williams et al. (2002) who address leadership styles in managing electronic logistic supply chains, and Thuong (2002) who examines market leadership for development of business to business electronic markets. Some aspects of leadership were considered by Howard et al. (2003) who classified different actor types in automotive supply chains according to their power, legitimacy and urgency; they found that vehicle manufacturers controlled major information processes because of their power and legitimacy over other supply chain actors.

Williams et al. (2002) provided a theoretical basis from the leadership literature to classify supply chain leadership as autocratic, command and control style leadership (Oakley and Krug, 1991, p. 21; Drucker, 1980); participative, stakeholder oriented (Miles and Snow, 1994 p. 26; Yukl, 1989); and transformational, expectation changing (Howell and Avolio, 1993). However, there is no empirical exploration of supply chain information integration to test this categorization. Whilst they describe autocratic as 'traditional', they suggest that eBusiness enabled supply chain information integration can encompass both autocratic and participative leadership styles, and that transformational leadership is about designing appropriate configurations of these in chains. This suggests that 'between chain' differences might be dealt with using different configurations. However, our research has highlighted the importance of differentiating approaches 'within chains'. Thuong (2002) usefully differentiates required leadership style as contingent upon price and non-price factors, the former being suitable to aggregation, transactional information integration, the latter to long-term relationships and process integration. Our research suggests that long-term relationships with SMEs require the latter style of leadership and information integration.

The other area of strategic management literature that resonates with the findings is Granovetter's (1973) strong ties, weak ties. Close strong ties have been seen to be important for entrepreneurs (Hansen, 1995; Lechner and Dowling, 2003). In Jack's (2005) study, there was only evidence of exploitation of strong ties and very little of weak ties. Strong ties in these supply chains would serve as bridges from pontoon SMEs, anchoring them to larger firm eLands. Within supply chains, SMEs are already attached with temporary bridges, across which tacit, informal knowledge flows; however, if more large firms and public sector organisations pursue eBusiness in supply chains they may build strong bridges to other, larger e-enabled firms. Without the existing informal bridges SMEs would be adrift. Strong, routinised, more permanent bridges, such as integrated ERP and EDI, are unlikely to be built to them, and the costs of the SMEs' part of the construction would be prohibitive.

6.2. Implications for management

Despite the theoretical espousing of Currie's (2000) preferred supply chain integration, it appears that larger firms have to be smarter in their eBusiness initiatives, differentiating between chains and within chains on the type of information they wish to integrate, and how they achieve this. Within chains, if SMEs are to remain strongly connected, this cannot easily be devolved to intermediaries such as eExchanges as SME engagement with them is low (Poon and Swatman, 1999). It also cannot easily be passed over as a black box technology without support (Newell et al., 2000). Rather, larger firms need to build appropriate information integration bridges to smaller supply chain members, and, adopting a portfolio, contingency approach, appropriate might be using different technologies that enhance the flows and capture of tacit, informal information. Strong bridges to SMEs would carry mutual trust: trust towards the trading partner is a major factor leading firms to share knowledge with partners (Ke and Wei, 2006).

The finding over a 4-year period of 'eLands' is not just a lack of leadership, but a vacuum of leadership, an abdication of authority by the major actors in each chain. Further research is needed to understand the full consequences of eLands and how they might build different bridges to different supply chains and to different actors in supply chains. However, the

technology is only one part of the story. Those who wish to create eBusiness enabled supply chains must appreciate and support the business models of chain actors and participants—and that these vary by size of chain actor and position in the supply chain. A traditional operations management focus on the component parts of the supply process will fail to deliver supply chain integration if strategies in the chain are not aligned. It is likely that some information integration bridges to and within supply chains should carry education, training and investment support to strengthen ties with critical smaller firms. However, others could quite legitimately be cut adrift.

References

Andraski, J., 1998. Leadership and the realization of supply chain management collaboration. Journal of Business Logistics 19 (2), 9–11.

Bagchi, P., Skjoett-Larsen, T., 2003. Integration of Information technology and Organisations in a Supply Chain. International Journal of Logistics Management 14 (1), 89–108.

Baines, S., Wheelock, J., 1998. Reinventing traditional solutions: job creation, gender and the micro-business household. Work, Employment and Society 12, 579–601.

Ballantine, J., Levy, M., Powell, P., 1998. Evaluating information systems in small and medium sized enterprises: issues and evidence. European Journal of Information Systems 7 (4), 241–251.

Barrett, R., Rainnie, A., 2002. What's so special about small firms? Developing an integrated approach to analyzing small firm industrial relations. Work, Employment and Society 12, 579–601.

Bask, A., Juga, J., 2001. Semi-integrated supply chains: toward the new era of supply chain management. International Journal of Logistics: Research and Applications 4 (2), 137–152.

Berger, S., Dore, R., 1996. National Diversity and Global Capitalism. Cornell University Press, Ithaca, NY.

Birley, S., 1985. The role of networks in the entrepreneurial process. Journal of Business Venturing 1 (1), 107–117.

Blili, S., Raymond, L., 1993. Information technology: threats and opportunities for small and medium-sized enterprises. International Journal of Information Management 13, 439–448.

Boddy, D., Cahill, C., Charles, M., Fraser-Kraus, H., Macbeth, D.K., 1998. Success and failure in implementing supply chain partnering: an empirical study. European Journal of Purchasing and Supply Management 4, 143–151.

Bovel, D., Martha, J., 2000. From supply chain to value net. Journal of Business Strategy 21 (3), 25–36.

Bowersox, D., Closs, D., Cooper, M., 2000. Ten mega-trends that will revolutionise supply chain logistics. Journal of Business Logistics 21 (2), 1–16.

Bridge, S., O'Neill, K., Cromie, S., 1998. Understanding Enterprise, Entrepreneurship and Small Business. Macmillan, London.

Brown, D., Lockett, N., 2004. Potential of critical e-applications for engaging SMEs in e-business: a provider perspective. European Journal of Information Systems 13, 21–34.

Buckley, P., Montes, S., 2002. Main Street in the Digital Age: How Small and Medium Sized Businesses are using the Tools of the New Economy. Economics and Statistics Administration, US Department of Commerce, Washington, DC.

Cagliano, R., Caniato, F., Spina, G., 2003. E-business strategy; how companies are shaping their supply chain through the internet. International Journal of Operations and Production Management 23 (10), 1142–1162.

Castells, M., 2000. The Information Age I–III. Oxford University Press, Oxford.

Chandreshekar, A., Schary, P.B., 1999. Toward the virtual supply chain: the convergence of IT and organisation. International Journal of Logistics Management 10 (2), 27–39.

Chapman, P., James-Moore, M., Szczygiel, M., Thompson, D., 2000. Building internet capabilities in SMEs. Logistics Information Management 13 (6), 353–360.

Child, J., Faulkener, D., 1998. Strategies of Cooperation. Oxford University Press, Oxford.

Christiaanse, E., Kumar, K., 2000. ICT-enabled coordination of dynamic supply webs. Journal of Physical Distribution and Logistics Management 30 (3–4), 268–285.

Closs, D.J., 1998. Preface. Journal of Business Logistics 19, 2.

Cragg, P., King, M., Hussein, H., 2002. IT alignment and firm performance in small manufacturing firms. Journal of Strategic Information Systems 11 (2), 109–132.

Croom, S., 2000. Managing operations improvements through relational capabilities in the context of small firm networks. International Journal of Logistics 3 (1), 83–96.

Croom, S., 2005. The impact of e-business on supply chain management. International Journal of Operations and Production Management 25 (1), 55–73.

Cross, G.J., 2000. How eBusiness is transforming supply chain management. Journal of Business Strategy 21 (2), 36–43.

Currie, W., 2000. The Global Information Society. John Wiley and Sons, Chichester.

Damaskopoulos, P., Evgeniou, T., 2003. Adoption of new economy practices in SMEs in Eastern Europe. European Management Journal 21 (2), 133–145.

Das, A., Narasimhan, R., Talluri, S., 2006. Supplier integration—finding an optimal configuration. Journal of Operations Management 24 (5), 563–582.

Drucker, P., 1980. The New Realities. Harper Collins, New York, NY.

Dyer, J.H., 1996. Specialized supplier networks as a source of competitive advantage: evidence from the auto industry. Strategic Management Journal 17 (4), 271–292.

Dyer, J.H., Singh, H., 1998. The relational view: cooperative strategy and sources of interorganizational competitive advantage. Academy of Management Review 23 (4), 660–679.

Edwards, P., Ram, M., 2006. Surviving on the margins of the economy: working relationships in small, low-wage firms. Journal of Management Studies 43 (4), 895–916.

Eisenhardt, K.M., 1989. Building theories from case study research. Academy of Management Review 14 (4), 532–550.

Fawcett, S., Magnan, G., 2002. The rhetoric and reality of supply chain integration. International Journal of Physical Distribution and Logistics Management 32 (5), 339–361.

Fisher, M.L., 1997. What is the right supple chain for your product? Harvard Business Review 105–116.

Fligstein, N., 1996. Markets as politics: a political–cultural approach to market institutions. American Sociological Review 61, 656–673.

Frohlich, M., Westbrook, R., 2001. Arcs of integration: an International Study of Supply Chain Strategies. Journal of Operations Management 19 (2), 185–200.

Graham, G., Hardaker, G., 2000. Supply-chain management across the Internet. International Journal of Physical Distribution and Logistics Management 30 (34), 286–296.

Granovetter, M., 1973. The strength of weak ties. American Journal of Sociology 78 (6), 1360–1380.

Gunasekaran, A., Ngai, E., 2004. Information systems in supply chain integration and management. European Journal of Operational Research.

Hansen, E., 1995. Entrepreneurial networks and new organization growth. Entrepreneurship Theory and Practice 19 (4), 7–21.

Harland, C.M., 1996. Supply chain management: relationships, chains and networks. British Journal of Management 7 (Special issue), S63–S81.

Harland, C.M., Lamming, R., Zheng, J., Johnsen, T., 2001. A taxonomy of supply network. The Journal of Supply Chain Management 37 (4), 21–27.

Howard, M., Vidgen, R., Powell, P., 2003. Overcoming stakeholder barriers in the automotive industry: building to order with extra-organizational systems. Journal of Information Technology 18, 27–43.

Howell, J.M., Avolio, B.J., 1993. Transformational leadership, transactional leadership, locus of control and support for innovation; key predictors of consolidated business unit performance. Journal of Applied Psychology 78 (6), 891–902.

Iacovou, C., Benbasset, I., Dexter, A., 1995. EDI and small organisations: adoption and impact of technology. MIS Quarterly 19 (4), 47–60.

Jack, S.L., 2005. The role, use and activation of strong and weak network ties: a qualitative analysis. Journal of Management Studies 42 (6), 1233–1259.

Ke, W., Wei, K.K., 2006. Factors affecting trading partners' knowledge sharing: using the lens of transaction cost economics and socio-political theories, Electronic Commerce Research and Applications, in press.

Koh, S.C.L., Maguire, S., 2004. Identifying the adoption of e-business and knowledge management within SMEs. Journal of Small Business and Enterprise Development 11 (3), 338–348.

Kraljic, P., 1983. Purchasing muse become suplpy management. Harvard Business Review 61 (5), 109–117.

Kuthiala, K., 2003. E-commerce in India: challenges and choices. Journal of Services Research 2 (2), 139–155.

Lancioni, R., Schau, H.J., Smith, M.F., 2003. Internet impacts on supply chain management. Industrial Marketing Management 32 (3), 173–175.

Lechner, C., Dowling, M., 2003. Firm networks: external relationships as sources for the growth and competitiveness of entrepreneurial firms. Entrepreneurship and Regional Development 15, 1–26.

Levy, M., Powell, P., Yetton, P., 2001. SMEs: aligning IS and the strategic context. Journal of Information Technology 16, 133–144.

Lewis, I., Talalayevsky, A., 1997. Logistics and information technology: a coordination perspective. Journal of Business Logistics 18 (1), 141–157.

Lindsley, W.B., Blackburn, J.D., 1991. Time and product variety competition in the book distribution industry. Journal of Operations Management 10 (3), 344–362.

Lorenzoni, G., Lipparini, A., 1999. The leveraging of interfirm relationships as a distinctive organisational capability: a longitudinal study. Strategic Management Journal 20 (6), 317–338.

Lund, M.J.F., McGuire, S., 2005. Institutions and development: electronic commerce and economic growth. Organisation Studies 26 (12), 1743–1763.

McIvor, R., Humphrey, P., 2004. The implications of electronic B2B intermediaries for the buyer–seller interface. International Journal of Operations and Production Management 24 (3), 241–269.

Mabert, V., Soni, A., Venkataramanan, M., 2003. Enterprise resource planning: managing the implementation process. European Journal of Operational Research 146 (2), 302–314.

Mahadevan, B., 2003. Making sense of emerging market structures in B2B. California Management Review 46 (1), 86–100.

Mehrtens, J., Cragg, P.B., Mills, A.M., 2001. A model of Internet adoption by SMEs. Information and Management 39 (3), 165–176.

Miles, R., Snow, C., 1994. Fit, Failure and the Hall of Fame: How Companies Succeed or Fail. Free Press, New York, NY.

New, S., Oh, Y., Siddall, M., June 2003. Understanding B2B e-commerce. In: Proceedings of EUROMA/POMS Joint International Conference, Como Lake, Italy, pp. 179–188.

Newell, S., Swan, J., Galliers, R.D., 2000. A knowledge focused perspective on the diffusion and adoption of complex information technologies; the BPR example. Information Systems Journal 10, 239–259.

Oakley, E., Krug, D., 1991. Enlightened Leadership: Getting to the Heart of Change. Simon and Schuster, New York, NY.

Olhager, J., Selldin, E., 2003. Enterprise resource planning survey of Swedish manufacturing firms. European Journal of Operational Research 146 (2), 365–373.

Patterson, K., Grimm, C., Corsi, T., 2003. Adopting new technologies for supply chain management. Transportation Research Part E 39, 95–121.

Poon, S., Swatman, P., 2000. Internet-based small business communication. In: Schmid, B., Selz, D. (Eds.), EM—Electronic Commerce in Asia, EM—Electronic Markets, 7, 2, 05/97.

Poon, S., Swatman, P., 1999. An exploratory study of small business internet commerce issues. Journal of Information and Management 35 (1), 9–18.

Reck, R., Long, B., 1988. Purchasing: a competitive weapon. Journal of Purchasing and Materials Management 24 (3), 2–8.

Rosenthal, S.R., 1984. Progress toward the 'factory of the future'. Journal of Operations Management 4 (3), 203–229.

Sahin, F., Robinson, E.P., 2002. Flow coordination and information sharing in supply chains: review, implications and directions for future research. Decision Sciences 33 (4), 505–536.

Salmeron, J.L., Bueno, S., 2006. An information technologies and information systems industry-based classification in small and medium-sized enterprises: an institutional view. European Journal of Operational Research 173, 1012–1025.

Sanders, N., Premus, R., 2002. IT applications in supply chain organisations: a link between competitive priorities and organisational benefits. Journal of Business Logistics 23 (1), 65–83.

Seggie, S.H., Kim, D., Cavunsgil, S.T., 2006. Do supply chain IT alignment and supply chain interfirm system integration impact upon brand equity and firm performance? Journal of Business Research 59 (8), 887–895.

Serafeimidis, V., Smithson, S., 2000. Information systems evaluation in practice: a case study of organizational change. Journal of Information Technology 15 (2), 93–105.

Sillence, J., MacDonald, S., Lefang, B., Frost, B., 1998. Email adoption, diffusion, use and impact with small firms. International Journal of Information Management 8 (4), 231–242.

Soliman, F., Youssef, M., 2001. The impact of some recent developments in eBusiness on the management of next generation manufacturing. International Journal of Operations and Production Management 21 (5/6), 538–564.

Soriano, D.R., Roig, S., Sanchis, J.R., Torcal, R., 2002. The role of consultants in SMEs. International Small Business Journal 20 (1), 95–103.

Stokes, D., 2000. Marketing and the small firm. In: Carter, S., Jones Eves, D. (Eds.), Enterprise and Small Business: Principles, Practice and Policy. Pearson Education Ltd., London.

Taylor, M., Murphy, A., 2004. SMEs and e-business. Journal of Small Business and Enterprise Development 11 (3), 280–289.

Thuong, T.L., 2002. Pathways to leadership for business to business Electronic Marketplaces. Electronic Markets 12 (2), 112–119.

Van Hoek, R., 2001. Epilogue: UPS logistics - practical approaches to the e-supply chain. International Journal of Physical Distribution and Logistics Management 31 (6), 463–468.

Venkatraman, N., 1991. IT-induced business reconfiguration. In: Morton, S. (Ed.), The Corporation of the 1990s. Oxford University Press, New York.

Vincent, S., 2005. Really dealing: a critical perspective on inter-organisational exchange networks. Work, Employment and Society 19, 47–65.

Wiklund, J., Shepherd, D., 2003. Aspiring for and achieving growth: the moderating role of resources and opportunities. Journal of Management Studies 40 (8), 1919–1941.

Williams, L.R., Esper, T.L., Ozment, J., 2002. The electronic supply chain: its impact on the current and future structure of strategic alliances, partnerships and logistics leadership. International Journal of Physics and Logistics Management 32 (8), 703–719.

Yin, R.K., 1994. Case Study Research: Design and Methods, 2nd ed. Newbury Park, California, Sage.

Yukl, G., 1989. Managerial leadership: a review of theory and research. Journal of Management 15 (2), 251–289.