Manchester Metropolitan University Business School Working Paper Series

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Mapping the Scope of Information Technology Enabled Transformation: A Multi-Theoretical Framework and Review

WP04/04

January 2005

ISSN 1478 8209

Abstract

Existing studies looking at transformation enabled by information technology (IT) span from the micro to the macro aspects, and their theoretical foundations range from the institutional emphasis on cognition and normative social structures within and across organizational boundaries, to the focus of economics on the structure and competition in electronic markets and industries. The inter-level dynamics of IT-enabled transformation and the constant blurring of boundaries have as a consequence the growing significance of articulating both the social relations and economic-led interactions in the study of organizations, virtual inter-organizational business networks, electronic markets and industries. Studies, however, tend to adopt a single theoretical perspective and focus on a particular unit of analysis, preventing researchers and practitioners from gaining a comprehensive understanding of IT-enabled transformation. As research continues to advance in each one of the disciplinary areas concerned with the socio-economic, strategic and organisational transformation enabled by information technology, it becomes increasingly important to consider areas of convergence and controversy across separate perspectives and across levels. The aim of this paper is to critically review selected studies focusing on IT-enabled transformation in organizations, virtual inter-organizational business networks, electronic markets and industries in this era of technological convergence, and to generate recommendations for theory building. In so doing, this paper develops a multi-theoretical framework drawing from established strategic management, institutional and socio-organizational perspectives, and at various levels of analysis. The theoretical framework draws from the management literature of organization science and strategic management, as well as the more specialised literature of information technology management.

Descriptors: Information Technology, Transformation, Multi-theoretical Review, Virtual Networks, Electronic Markets

Introduction

The convergence of information technology and telecommunications, the spread of global interconnected databases, the ubiquitous presence of desktop computers in the workplace and home, the increasing adoption of intelligent mobile technology, and the increased embodiment of these technologies in new products and services have led to the formation of flatter and more flexible organizations, virtual inter-organizational networks and electronic markets (Wheeler 2002, Zahra and George 2002, Salazar et al 2003, Salazar et al 2004). This technological revolution has come hand in hand with radical industry transformations enabled by the diffusion of digital information infrastructures. This has been accompanied by a growing trend on trade and industry globalization, and the de-regulation of the telecommunication sector (Yip 2000; Cartwright 2002; Eccles 2002). Parallel to this trends, leading scholars have stressed the need to cross-fertilize ideas in social science research by proposing frameworks that take into consideration diverse theoretical perspectives and disciplinary stances, take into account the transformation processes within organisations and between networks of organizations, and acknowledge the inter-level dynamics of information technology. The scope of analysis widens even more when we consider the impact of information technology on institutional systems, electronic markets and entire industries (Coghlan 1998; Sarkar et al. 1998; Straub and Watson 2001; Holmqvist 2003; Salazar 2003; Salazar et al 2003; Banker and Kauffman 2004; Crowston and Myers 2004; Salazar et al 2004).

The specialised literature on IT-enabled transformation has, however, been dominated by the strategic management perspective, which often has a positivistic and prescriptive focus. Scholars adopting the strategic management perspective have typically neglected the complex organizational and institutional dynamics of IT-enabled transformation, including the constant blurring of organizational, institutional, market and industry boundaries. This theoretical gap brings as a consequence the growing significance of multi-theoretical reviews combining strategic management, institutional and socio-organizational perspectives (Morath and Schmidt 1999; Rubery et al 2002). It is advocated here that socio-organizational and institutional perspectives, both rooted in sociology, can assist researchers at gaining deeper and richer insights about IT-enabled transformation, including the dynamics

and interactions of organizational actors, and the adaptation and mimetic processes in virtual networks, electronic markets and industries.

Existing IT-enabled transformation studies span from the micro to the macro aspects, and their theoretical foundations range from the institutional emphasis on cognition and normative social structures within and across organizational boundaries, to the focus of economics on the structure and competition in electronic markets and industries (Coghlan 1998). The inter-level dynamics of IT-enabled transformation and the constant blurring of boundaries have as a consequence the growing significance of articulating both the social relations and economic-led interactions in the study of organizations, virtual inter-organizational business networks, electronic markets and industries. Traditional information technology studies, however, tend to focus on a particular unit of analysis, preventing researchers and practitioners from gaining a comprehensive understanding of IT-enabled transformation.

The aim of this paper is to critically review selected studies focusing on IT-enabled transformation in organizations, virtual inter-organizational networks, electronic markets and industries in this era of technological convergence. In so doing, this paper develops a multi-theoretical framework drawing from established strategic, institutional and interpretive organizational perspectives, and at various levels of analysis. The theoretical framework draws from the management literature of organization science and strategic management, as well as the more specialised literature of information technology management.

Overview of the Scope of IT-enabled Transformation

Before the advent of radical developments in information technology such as the Internet, the transformational attributes of information technology were confined to productive activity performed internally, within the organization's physical boundaries. There was a strong emphasis on the scientific management aspects of computer-based work prior the advent of more ubiquitous technologies such as the personal computer and the Internet in the early 1990s (Brancheau and Wetherbe 1987; Yap 1989). Since Internet-based technologies, and their applications, have become more widely adopted and diffused, the span of issues has shifted, for example, from computer-human interface and productivity-enhancing issues at the individual and

departmental level, towards wider organizational and strategic transformational issues. More recent studies on IT-enabled transformation have focused on such areas as Internet-based customer communities, Internet-based organizing, knowledge-based relationships, inter-firm business network governance, value co-creation and the co-evolution of strategic alliances in electronic markets and industries (Wiesenfeld et al 1999; Ahuja and Carley 1999; Rothaermel and Sugiyama 2001; Tomkins 2001; Chatterjee 2002; Nambisan 2002; Wheeler 2002; Rice and Juniper 2003; Salazar et al. 2003; Brews and Tucci 2004; Gittell and Weiss; 2004; Hackney et al. 2004; Schultze and Orlikowski 2004).

The implementation and exploitation of information technology is enabling the virtualization of social relations and work processes, which are increasingly spanning the traditional organizational boundaries of the firm. The specialised IT literature highlights the role of collaboration, knowledge sharing and learning in competitive strategies and innovation. The intensity and pace of innovation in knowledge-intensive and hypercompetitive industries has brought the need for organizations to exploit their collaborative networks to boost their own innovation capacity. Recent literature highlights the relationship of new technologies and new organisational forms, such as virtual organisations and virtual inter-organizational networks e.g., virtual customer-supplier communities (Nambisan 2002). Large companies and specialist supply firms have grown up to become virtual inter-organizational networks with their partners acting essentially as knowledge brokers in many of the value-creating relationships. A supplier can use the Internet and electronic commerce technologies in such a way that it can interconnect information systems across multiple sites in the value chain and let information flow across functional boundaries.

A firm's competitive strategies can be enhanced by the implementation of virtual organisational forms based on complex, interdependent social networks and knowledge-sharing relations, which are in turn enabled by developments in information technologies such as web-based applications and electronic communication. Firms are entering into wider alliances and networks of firms through electronic means. This includes the emergence of firms whose business strategies and marketing, production and innovation activities are essentially enabled by internet-

based information technology infrastructures, applications and services. These are key drivers for providing completely new products and services. Innovation originates from enabling dialogue between stakeholders about their products and services. (McLoughlin and Jackson 1999; Snow et al 1999; DeSanctis et al 1999; Cohen and Manking 1999; Child and McGrath 2001; Salazar et al 2003)

The implementation and use of information technology is also enabling electronic commerce and markets, which are characterized by multi-channel transactional and relational processes, which may span different activities of the value chain. Research shows that firms are gradually moving in the direction of outsourcing most aspects of their value chain and rely heavily on strategic alliances and collaborations with specialist and intermediary companies to become more flexible and faster to market. Electronic markets have evolved into interconnected one-stop shops, providing specialized services with affiliate firms. Worldwide Internet Commerce, both Business-to-Business (B2B) and Business-to-Consumers (B2C), will reach $12.8 trillion in 2006 as estimated by Forrester Research. Electronic business models have evolved from basic electronic procurement and electronic commerce into more complex electronic market 'ecosystems'. These electronic market environments are characterised by rapid exchange of information within a virtual network of customers and suppliers working and evolving together to create and re-create value-added processes. Scholars have suggested that electronic businesses are not just members of certain industries but parts of an ecology that incorporates different industries, where the driving force is not pure competition but co-evolution (Agre 2000; Huygens et al. 2001; Jenkins and Floyd 2001; Anderson and Anderson 2002; Amit and Zott 2002; Howells 2003; Salazar et al 2003; Salazar et al 2004; Salazar and Miles 2003; Hackney et al. 2004; Iansiti and Levien 2004; Park et al 2004).

Studying IT-Enabled Transformation at Different Levels

Existing studies looking at transformation enabled by information technology (IT) span from the micro to the macro aspects, and their theoretical foundations range from the institutional emphasis on cognition and normative social structures within and across organizational boundaries, to the focus of economics on the structure and competition in electronic markets and industries. The inter-level dynamics of IT-

enabled transformation and the constant blurring of boundaries have as a consequence the growing significance of articulating both the social relations and economic-led interactions in the study of organizations, virtual inter-organizational business networks, electronic markets and industries. Studies, however, tend to adopt a single theoretical perspective and focus on a particular unit of analysis, preventing researchers and practitioners from gaining a comprehensive understanding of IT-enabled transformation. As research continues to advance in each one of the disciplinary areas concerned with the socio-economic, strategic and organisational transformation enabled by information technology, it becomes increasingly important to consider areas of convergence and controversy across separate perspectives and across levels (Wheeler 2002; Zahra and George 2002; Banker and Kauffman 2004). This section reviews relevant research issues found in information technology studies, which have adopted, and sometimes combined, the strategic management, institutional and socio-organizational perspective. Table 1 provides a *synthesis* of relevant theories, assumptions and controversial issues in IT-enabled Transformation. The review draws from the management literature of organization science and strategic management, as well as the more specialised literature of information technology management. The ultimate aim of this paper is to critically review these selected studies, and to generate recommendations for theory building.

Table 1 Synthesis of relevant theories, assumptions and controversial issues in IT-enabled Transformation

	Organizations	**Networks**	**Markets**	**Industries**
SM	Organizations ought to organize their boundary-spanning activities to minimize the sum of production and transaction costs. Profit and growth are the major firm's objectives. IT should support a firm's business strategy. Examples are Baxter, CIGNA, BP Chemicals, and Skandia. Areas of controversy are that this perspective assumes homogeneity and rationality, and that it is unproblematic to create, codify apply and extend knowledge.	Theories and concepts include transaction cost economics, social exchange theory, strategic networks, strategic value chain, business models, boundary spanning networks, self-designing organizations, cluster organizations, and strategic alliances. Examples include Ford's EDI-enabled supply chain, Marshall's value innovation network, Cisco's global supplier integrated network, and BioSpace 's global R&D network. Little attention to the *formation* of networks.	Pricing and auction theory, contract theory, network externalities, intermediation, aggregation, value chain framework, business model, RBV, and TCE. Focus on electronic commerce, price information, demand issues, microstructure of electronic markets, bundling and differentiation of products, as well as the performance and governance of internet-based firms and markets. Controversies lie on the assumption of perfect information and rational profit-seeking behaviour. Most firms operate in a combination of competitive and relational markets.	Economic focus on the forces influencing industry structure and competition (e.g., effects of technological change on number an size of firms), as well as on aggregated impact of IT on productivity gains and return on investment of IT spending. Emphasis on traditional variance studies.
I	Institutional perspective is concerned with structures that are taken-for-granted aspects of organizational life. Organizational form and develop as its various members construct shared cognitions. Examples include the adoption and institutionalisation of IT at Pemex. Areas of controversy are the prescriptive and deterministic nature in relation to context variables.	Networks can be defined as institutional arrangements which are characterised by the logic of 'social embeddedness' (Granovetter 1985). Little attention to the relationship between institutional contexts and networks. Few studies focusing solely on environmental forces, often together with organizational factors, for the adoption of inter-organizational systems.	Focus on mechanism through which organizational fields are constituted in markets. Examples include Brandtweiner and Scharl's study on the structure and functionality of brokered electronic markets, and Jin and Robey's study combining TCE with institutional theory and social network theory to explain the emergence of 'cybermediaries' in electronic commerce in retailing.	Institutional researchers adopt a macro historical approach to origins of forms. Focus on the impact of institutional forces such as regulation on the birth rate and adoption of electronic business networks in different industry sectors and countries. Examples include transformation of the banking, finance, auto and retail industry.
S-O	Symbiotic relationship between IT development and the emergence of organizational forms. These can be facilitated by explicit and ongoing adaptation of technology to changing contexts of use. Reciprocal interaction between context and action.	The concept of network often equated to the concept of 'virtual organization'. Related concepts are coupling, social networks, interstitial linkages, and community. Reciprocal and symbiotic interaction between context and action. An example is Orlikowski's Zeta case illustrating *emergent change*.	Relevant concepts include the cultures of consumer communities. Exemplar cases constitute Schultze and Orlikowski's analysis of inter-personal interactions between customers and providers in business-to-business settings, and Rothaermel and Sugiyama study on virtual Internet product development communities.	There have been very few studies at the industry level. These include Crowston, Sawyer and Wigand's study investigating the interplay between structure and IT in the real estate industry.

*SM = Strategic Management, I = Institutional, S-O = Socio-Organizational

Organizations

Strategic management is rooted most strongly in the traditions and discipline of economics. This economic view focuses on how organizations should organize their boundary-spanning activities so as to minimize the sum of production and transaction costs, argues that all organizations must engage in exchanges with their environment to obtain resources, and advocates that profit and growth are typically the major firm's objectives that drive strategic behaviour (Baum and Rowley 2002; Wang 2003). Strategic management rests on the assumption that organisations can be characterised as having unified goals. The assumption that the organization is an effective 'information machine' is also firmly embedded in the rationality concept. At the firm or organization level, the 'economic' *strategic management perspective* assumes that computer systems can be implemented and exploited through rational and homogeneous organizations. From this economic perspective, it becomes unproblematic to create, codify, apply and extend knowledge across organisational units and firms. Flexible manufacturing technologies, together with computer networks; make it possible to innovate products rapidly from within a standardized system of information and knowledge distribution (Agree 2000; Grant and Baden-Fuller 2004).

Strategic management researchers see information systems as important as long as they support a firm's business strategy. The specialised strategic IT literature is not short in relevant examples illustrating the strategic value and impact of information technology, including aspects of. Exemplar cases include Baxter's ASAP System and CIGNA's TED system (Scott-Morton 1991), BP Chemicals' commercial system (Jelassi et al 1994), and Skandia International's transaction processing and support systems (Earl 1994).

At the firm or organization level, institutional theorists are largely concerned with structures – forms and activities – that become taken-for-granted aspects of organized life (Palmer and Biggart 2002). IT-enabled organizations can then be defined from this institutional perspective as the taken-for-granted beliefs that arise within and across distributed organizational groups and delimit acceptable and normative behaviour for members of those computer-mediated groups. The *institutional view*

suggests that organizations would form and develop as its various members construct shared cognitions (Elsbach 2002). Such cognitions may manifest themselves as organizational structures, procedures, customs and routines. Organizations are distinguished in the institutional view from the interpretive stream of the socio-organizational perspective by their prescriptive nature. Very few studies have explicitly adopted the institutional perspective at the organizational level. Avgerou (2000) analyzed the history of the technical-rational and social forces shaping IT-enabled organizational change within one specific organization for a period of thirty years. Avgerou studied the relationship between information systems development and organizational transformation, which were conceptualized as two institutionalization processes: the increasing momentum and legitimation of IT innovation and the organizational efforts for the substitution of established structures and activities with new ones.

Prior studies adopting the *socio-organizational perspective* have focused on the organisational implementation, integration and alignment of new information technologies at the individual, group, and organization level of analysis. The theoretical and empirical issues surround IT-enabled organizational change, and more recently learning and knowledge management. More recently, scholars adopting socio-organizational perspectives have reviewed the role that information technology plays in promoting information sharing, collaboration and coordination both inside and across organizational boundaries; and transformational attributes include the role that information technologies have on re-shaping organizational collaboration. Socio-organizational researchers have also acknowledged the symbiotic relationship between the approaches for information technology development and the emergence of organizational forms and structures (Markus and Robey 1988; Orlikowski and Robey 1991; Barua et al 1999; Hinds and Kiesler 1995 and 1999; Orlikowski et al 1999; Wiesenfeld et al 1999). Researchers have observed that organizational forms can be facilitated by explicit and ongoing adaptation of technology to changing contexts of use. That is, activities of a few individuals can shape users' interaction with technology, modify features of the technology, and alter the context of use. Orlikowski et al. have also observed how incentives and technology development approached for traditional, hierarchical organizations may not be appropriate for the flatter, team-based organization. Other researchers have observed the communication

patterns within and between organizational units, and how these affect other organizational characteristics such as identity and trust. For instance, Wiesenfeld Raghuram and Garud (1999) explored the role of information technologies in the creation and maintenance of a common identity among decoupled organization members, and how do employees in a virtual context build and sustain organizational identification. The authors assume that organizational identity is a critical factor holding IT-enabled organizations together. The authors consider the construct of organizational identification and its importance in a virtual context, examine the relationship between communication and organizational identification with specific reference to type of communication media, and explore the role of virtual status as a moderator of the relationship between communication modes and employees' identification. Lea, O'Shea and Fung (1995) also adopted an 'Actor-Network' approach to studying the complex relationship between content and context in the design and implementation of computer-mediated communication systems

In summary, socio-organizational researchers are increasingly emphasizing the "complex and reciprocal interaction between context and action within organizations. Technology and social groups mutually shape each other within the dynamics of organizational life" (DeSanctis and Fulk 1999: 131).

Networks

There is a rich strategic management literature that examines when, where, why, and how organizations engage in inter-organizational networking. Diverse theories and concepts have been used in relation to inter-organizational business networks, including transaction cost economics, social exchange theory, strategic networks, strategic value chain and business models, boundary spanning networks, self-designing organizations, flexible organization, cluster organizations, network organization, and strategic alliances (Carrillo 1988; Volberda 1996; Timmers 1998; Young-Ibarra and Wiersema 1999; Mahadevan 2000; Larsen 2000; Lockett and Brown 2000; Porter 2001).

The specialised strategic IT literature is not short in relevant examples illustrating the strategic value and impact of information technology for business networks, including aspects of global product innovation, operational and logistics excellence, improved

customer relationships, strategic alliances and knowledge acquisition. Exemplar cases include Ford's EDI-enabled supply chain network (Webster 1995), Marshall's value innovation network (El-Sawy et al 1999), Cisco's global supplier integrated network (Kraemer and Dedrick 2002), and BioSpace's global R&D and knowledge management network (Salazar et al 2003). Another important research issue has been the impact of information systems on network structure (Holland and Lockett 1997).

From the strategic management perspective, interesting questions are raised by Chatterjee (2002). This author investigates what effect does satisfaction with partner's and own firm performance have on intention to continue with alliance, if firms in the online retail industry relatively which are more dependent on their partners more likely to continue with the alliance, and what are the effects of market and technological turbulence. This framework is rooted on transaction cost economics and inter-organizational exchange behaviour. Other important but less researched research issues have been the structural effects of internetworking and the formation of inter-organizational networks (Kreiner and Schultz 1993; Ebers 1997; Koza and Lewin 1999; Lee and Pennings 2002; Brews and Tucci 2004). Brews and Tucci investigated how the adoption of internetworking technology influences organizational form. The authors apply the transaction costs economics perspective to analyse the impact of internetworking technology on organizational form. The authors examined the effect of internetworking technology on organizational scope, specialization, internal hierarchy, and external partnering. Dependent variables are business scope, specialization, external partnering, and hierarchy reduction; independent variable is internetworking depth; and control variables are internetworking duration, firm size, location, global reach and overall performance, and internetworking operational performance. Also, Ebers (1997) reviewed the motives, contingencies and processes of inter-organizational networking. Ebers (1997:13) warns us that "we know much less about how inter-organizational networking relationships are built, develop, and dissolve. That is, we know little about the intermediate processes, the steps and activities that translate motives into particular network structures and about the contingencies that facilitate and constrain these processes".

As organizations vertically disintegrate and outsource services, inter-organizational coordination and learning mechanisms with external organizations become increasingly important. 'Pure' market mechanisms are often insufficient for coordinating the resulting interdependencies among organizations, thus requiring explicit attention to the design of institutional mechanisms for originating and maintaining inter-organizational business relationships (Gittell and Weiss 2004). Although business networks have been defined in different ways, a business network can be defined as an institutional arrangement among distinct but related and inter-dependent business firms, which is characterised by a logic of exchange that operates differently from that of markets and hierarchies. Granovetter (1985) refers to this logic as social embeddedness which implies that stable relationships among social actors shape their expectations and behaviour. The institutional perspective suggests that networks may be more than just an economic and organizational framework for the adaptation and cooperation of sponsors (Osborn and Hagedoorn 1997). 'Inter-firm' business networks should be conceived as resource-flows, mutual social expectations, and information flows. Among the critical issues highlighted by this literature include the institutionalization of inter-firm systems of rules and procedures, and coordination mechanism such as direct mutual adjustment among parties through joint decision-making. The inter-level integrative analytical device consists not on focusing in the characteristics of individual organizations, but what goes on *between* organizations, that is, the characteristics and processes of some lower-ties among organizations (Ebers 1997).

It is assumed by the strategic management perspective that organizations are free to make choices about potential partners without reference to wider institutional or industry norms (Marchington and Vincent 2004). The institutional approach is concerned with *cognitive* elements of institutions, that is, the frames through which meaning is made and social action constructed. It focuses on *institutional effects*, that is, how organizations and their members are influenced by institutionalized rules and institutional environments, rather than on how organizations become institutions in the first place. Institutional processes create both *cognitive* and *structural* constraints, or an 'iron cage' in Max Weber's terms (Baum and Rowley 2002). Institutionalised modes of organizing can provide legitimated ways of proceeding in inter-organizational interaction. These modes may, however, hinder free choice and

innovation. As established inter-organizational level activity become widely accepted, organizational actors may be affected by the increased risks of innovating (i.e., modifying and expanding the network), the demand for further reflection, and the potential reduction of legitimacy (Phillips et al 2000). The specialised IT literature has, unfortunately, given comparatively less explicit attention to the relationship between institutional contexts and inter-organizational networks embedded in those contexts. Relatively few studies have focused on the effect of environmental *factors* or *forces*, which is often performed together with the analysis of organizational factors, on the adoption of inter-organizational systems and the development of business networks (King et al 1994; Kumar and Dissel 1996; Wang and Cheung 2004). From the institutional perspective, there are several central research questions that are being studied at different levels of analysis. For instance, a topical question dictated by emergent empirical requirements is what effects institutional structures have on virtual networks? Also, how business networks' organisational characteristics influence their ability to adopt and deploy information technology, can be studied at the 'inter-organisational' level using a multi-organisation survey. The same question can be investigated at the 'individual' organizational level and then aggregated to the 'inter-organisational' level contrasting and comparing across case studies. Also, while economic and structural issues (i.e., return of investment, size of firms) are widely discussed in variance information technology studies, the effects of the dynamics of inter-organizational business networks and changing institutional environments have not yet been considered as research questions at the industry level, e.g. how the effects of IT on industry and firm structure are mediated by the dynamics of customer-supplier networks?

From a broad socio-organizational perspective, 'virtual' business network can be roughly equated to the concept of 'virtual organization'. A virtual business network can be broadly defined here as a geographically distributed organizational units that are bound by a long-term common interest or goal, whose production processes transcend the boundaries of a single firm, and, as a result are not controlled by a single organizational hierarchy, and that communicate and coordinate their work and business activities through information technology (Ahuja and Carley 1999; Kraut et al 1999; Howells 2002; Salazar et al 2003; Shin 2004). Recent socio-organizational literature highlights the relationship of new technologies and new organisational

forms, such as virtual organisations and virtual inter-organizational networks e.g., virtual customer-supplier communities. For instance, Ahuja and Carley (1999) examined to what extent virtual organizations may be *similar* to traditional organizations, and what are the relevant structural dimensions of virtual organizational networks. The authors adopt a socio-organizational 'structuralist' perspective to examine network structure of a virtual design organization using a social network approach. The analysis is based on a case study of the communication structure and content of communication among members of a virtual organization. The authors assume that in a virtual organization, the fit between task 'routineness' and network structure is associated with superior network performance.

Increasingly, socio-organizational researchers are acknowledging the *symbiotic* relationship between information technology development and the emergence of organizational forms. Inter-organizational forms can take the shape of interconnection between firms, such as strategic alliances and federated organizational structures enabled by inter-organizational information systems (DeSanctis and Fulk 1999). More recently, scholars adopting socio-organizational perspectives have focused on the study of diverse inter-organizational forms and the mechanisms that contribute to effective coordination and communication. Diverse concepts have been used in relation to inter-organizational business networks, including inter-organizational coupling, strategic alliances, and interstitial linkages (Fulk and DeSanctis 1995). Other useful concepts include the notion of ' community'. This concept is used to theorise the relationship between inter-organizational information systems and the formation of larger social networks within a business context (Hinds and Kiesler 1995; Boland and Tenkasi 1999; Pickering and King 1999; Constant; Sproull and Kiesler 1999). Recent studies have also observed that inter-organizational networks can be facilitated by explicit and ongoing adaptation of technology to changing "contexts of use". Schultze and Orlikowski (2004) analyzed the implications of using IT to mediate electronic brokerage relationships that are enacted through work practices and interactions of actors representing customer and provider firms. The authors view business-to-business settings as typically maintained through inter-personal interactions between customers and their providers. They adopted a 'practice' socio-organizational perspective and examined the structural and interpersonal elements that produce and are produced by everyday activities. The

authors contend that adopting a practice lens requires neither a choice between a macro- or a micro-level of analysis, nor a conflation of the two. The authors assume that a practice lens directs attention to how macro-phenomena are constituted by micro-interactions, and how those micro-interactions, in turn, are shaped by macro influences and effects. The authors' analysis is grounded on a major case study of WebGA. Likewise, Newell, Scarbrough and Swan (2001) investigated the adoption of intranet technology as a vehicle for encouraging organization-wide knowledge sharing within a large, global bank. The outcome of the intranet adoption was that it actually helped to reinforce the existing functional and national boundaries with electronic fences. The authors adopt a broad interpretivist perspective to advocate that the intranet can be conceptualised as an interactive and decentred technology, which therefore has the potential for multiple interpretations and effects. Likewise, Tomkins (2001) explores the interaction between trust and information in personal relationship against the information needs of various types of inter-organizational relationships, including strategic alliances, technology licensing, research consortia and joint ventures. The author assumes that regular patterns of trading create social bonds between parties based upon mutual understanding and trust and consequently, lower transactions costs, and the interactions between companies often develop much further into supply chain partnerships with an implied sense of sharing in knowledge, decision-making and collective rewards.

Markets

In this era of business value maximization, researchers often apply strategic management theories to investigate strategies to add value, mechanisms to reduce transaction costs, optimal designs and the strategic role of partners and intermediaries in electronic markets. The study of electronic markets have been associated with theories and concepts from pricing and auction theory, contract theory, network externalities, intermediation, disintermediation and reintermediation, aggregation and disaggregation, value chain framework and business model concept, resource based view of the firm, and transaction cost economics, which are strongly rooted on the economic view (Wigand 1997; Jansen et al 1999; Amit and Zott 2001; Kauffman and Walden 2001; Berthon et al 2003; Geoffrion and Krishnan 2003; Banker and Kauffman 2004; Park et al 2004). From a strategic management perspective,

electronic markets tend to reduce transaction costs between the buyer and supplier, coordination costs in multiparty bargaining, information acquisition costs for customers, and communications costs for suppliers. Electronic markets typically have buyers, suppliers, market mechanism providers and financial service firms (Raisch 2001). Berthon et al. (2003) highlight relevant research issues from a strategic management perspective. These authors investigated key transactions costs associated with electronic markets, and how technology is affecting these costs. Also, they investigate what is the within- and between-company potential for dis/reaggregation and dis/reintermediation; and explore what is the dominant form of economic coordination and mode of interplayer interaction; and which form of Web-enabled organization is most efficient within a given context. The authors base their framework on transaction cost theory and the notion of social capital. Business-to-business interactions are mapped onto two broad dimensions: economic coordination and mode of interaction. These authors advocate the use of transaction cost theory for the study of 'non-price' costs, which can be substantial in heterogeneous markets. These are coordination and motivation costs. The authors acknowledge the relational nature of business-to-business interactions, besides the transactional nature. Business-to-business interactions can be thought of as attempting to maximise one of four processes: matching, aggregation, integration and creativity. The authors assume business-to-business as relatively unproblematic, where economic parties believe in the long-term utility of the interaction.

From a strategic management perspective, another transformational issue of information technology constitutes enabling the development and delivery of new products and services. Firms can use information technology to create new products and services and reformulate existing ones. Transformational issues include the effect that information technologies have as the new basis of competition in more dynamic industries and markets (Kollmann 2000; Dewett and Jones 2001; Straub and Watson 2001). The convergence of information technology and telecommunications and the increased embodiment of information technology in new products have lead to creation of these new electronic markets and changes in evaluating returns to investment (Chatterjee 2004). The Internet has affected the pricing of products. The Internet allows for the possibility of many prices for the same good or service, as well as the opportunity for firms to post prices with simple updates to their databases.

Electronic commerce, price information and demand issues sharing has been of great interest to strategic management researchers, and studies have spanned upstream and downstream supply chain issues. Studies have considered issues such as the distortion of information to upstream suppliers as buyer's orders exhibit a greater variance than their sales, information sharing when there are capacity constraints on the supplies, and when there is competition between suppliers (Banker and Kauffman 2004). Other related issues include the microstructure or design of electronic markets, and the bundling, sharing, and differentiation of products. Financial services and electronic procurement markets have offered appropriate contexts for this type of studies. Other issues include the performance and governance of internet-based firms and electronic markets (Grover and Saeed 2004). One important stream of research in the strategic management literature centres on the concept of the business model (Timmers 1998; Kauffman and Walden 2001). The boundary of the firm is an important issue here, as new technologies blur inter-organizational and market boundaries. Timmers (1998) provides an overview of current European business models for electronic markets. These are classified in a framework based on the degree of service innovation and functional integration.

Controversial issues include the limitations of the strategic management perspective to account for institutional and organizational factors, such as consumer and partner trust formation and the role of regulation (Jin and Robey 1999, Pavlou and Gefen 2004). Key questions posed by researchers include: what aspects of Internet business models are most likely to be regulated first, and what forms such regulation take? (Kauffman and Walden 2001) Anand et al (2000) examined a mechanism through which organizational fields are constituted in the music market. They suggest that markets can serve as magnet around which groups of actors consolidate, and that cognition of markets occurs through the creation, distribution and interpretation of a web of information about the market.Brandtweiner and Scharl (1999) used an institutional approach to study the structure and functionality of brokered electronic markets. They reflected upon issues associated with the identification of the major structures, processes and players in physical markets, and on the transformation of these elements into the virtual domain.

There have been very few successful attempts to combine the strategic management and institutional perspective to study electronic markets. Jin and Robey (1999) extended their analysis based on transaction-cost economic with institutional theory and social network theory in order to explain the emergence of 'cyber-mediaries' in electronic commerce in retailing. Beside the economic benefits of reducing buying time and providing new products and services, Jin and Robey found that cyber-mediaries persist in electronic form because they are institutionalised structural forms, which conform to regulative, normative and cognitive expectations, and are therefore seen as legitimate. They also found that cyber-mediaries occupy strategic positions in complex social networks, thereby acquiring social power. Brousseau (2000) also explored the type of institutions that may be more effective for organizing electronic markets.

From a broad socio-organizational perspective, IT-transformation is not restricted to myopic reliance on means-ends rationality. Scholars may assume perfect information and rational profit-seeking behaviour, i.e., buyers and sellers already have a great deal of information about each other and always seek to reduce costs and maximise profits. Electronically mediated market and network exchange should not, however, be conceived solely as the "silent exchange far removed from the traditional sources of information and discourse without context-embedded interaction" (Kallinikos 1995: 123). The socio-organizational perspective forces the analyst to consider when such rationality is flawed and when other logics of action can serve as suitable substitutes. Strategic management assumes homogeneity, but the world, according to the socio-organizational perspective, is not homogeneous. Communities' cultures and consumers' tastes differ, as do market structures, regulatory systems, and other features of organisations and markets (Tsoukas 1996, Rothaermel and Sugiyama 2001, Bieber et al 2002, Salazar et al 2003). The socio-organizational perspective is devoted to the examination of deviations from the "strategic management" rationality on the part of individuals and organisations, and the ecological and institutional constrains that society imposes on strategic action (Ruef 2003). By contrast, strategic management assumes that individual agents work on behalf of collective actors such as firms, who are committed to long-term, prospective decision making (Agree 2000). These assumptions are increasingly being challenged in organisational sociology (Koza and Thoening 2003). From the socio-organizational perspective, when actions

of organisational agents become motivated by emotions, e.g., trust, or do not display opportunistic behaviour, the rational assumption fails (Foss 1996, Berthon et al 2003, Fowler et al 2004, Pavlou and Gefen 2004). These assumptions have direct implications on how scholars approach the study of electronic markets. There have been few attempts to combine the strategic management and socio-organizational perspective in IT studies. Rothaermel and Sugiyama (2001) studied the characteristics of virtual Internet communities to commercial success, and the motives of individuals to engage in commercial, e-based transactions within virtual communities. They draw ideas from the anthropology and the sociology of communities. One of the authors' basic assumptions is that virtual communities form through an electronic medium and are not bound by space and time. The authors' analysis is grounded on a major case study of TimeZone. The authors ask the following questions: What are the characteristics of virtual internet communities to commercial success, and what motivates individuals to engage in commercial, e-based transactions within virtual communities?

Industries

At the industry level, strategic management researchers focus on transformation in key sectors, including manufacturing, services, and science-based industries (Kambil and van Heck 1998, Brynjolfsson and Hitt 2000, Cassiman and Sieber 2001, Amit and Zott 2002). An examination of the forces influencing industry structure indicates that the deployment in Internet technology will likely continue to put pressure on the profitability of many industries (Porter 2001). While consolidation among players progresses, most industries are likely to end up with a net increase in the number of competitors and fiercer rivalry before the advent of the Internet. Industries such as biotechnology, semiconductors, software and hardware production, and telecommunications have become high value, competition-intensive sectors, where competition is centred on continuous product innovation and speed. Information systems such as SABRE automated reservation systems have made possible radical transformations in industries such as airline reservation industry and the tourism industry. This technological revolution has come hand in hand with radical industry transformations enabled by the diffusion of digital information infrastructures. This has been accompanied by a growing trend on trade and industry globalization, and the

de-regulation of the telecommunication sector (Yip 2000; Cartwright 2002; Eccles 2002).

Traditional variance studies extend the scale of analysis to the aggregated economic impact of information technologies on national and regional economies, and the changing competitive dynamics of global industries (Garud and Kumaraswamy 1993; TAP-ASSESS Consortium 2000; Bakos 2001; Borenstein and Saloner 2001; Lucking-Reiley and Spulber 2001). Studies have focused on the economic performance and the scale of industry transformation and innovation, and the diffusion trajectories of e-Business technologies and services (Yip 2000, Kshetri and Dholakia 2002, Salazar et al 2004). Another important body of literature has focused on the productivity gains and return on investment of IT spending at the firm level and aggregated at the industry level. Other studies have looked at the impact of IT on industry structure and the size of firms (Brynjolfsson et al, 1994 and 1996, Brynjolfsson and Hitt 1996, Dewan and Kraemer 2000, Gurbaxani et al 1997, Srinivasan et al. 1994).

Institutional researchers treat institutions as residing largely at inter-organizational and supra-organizational (i.e., society and industry) levels. Institutional researchers typically adopt a macro historical approach to origins of forms (Batiz-Lazo and Wood 2002). Some institutional theorists, however, acknowledge the failure of institutional theory to adequately take into account interest and agency (Elsbach 2002). At the macro industry level, institutional researchers are interested to study the impact of institutional structures on organizational founding or failure rates, and the relationship between organizational age and survival (Palmer and Biggart 2002). The concern has largely been with finding *variation*. Institutional researchers also give recognition to the role that institutions, such as trade associations, play in shaping preferences. In context to information technology studies, most institutional analysis has focused on large-scale institutional environments such as countries to examine the effects of constraints and institutional predisposition to adopt and diffuse IT-enabled organizational forms and business networks. Other analyses adopting broadly defined institutional approaches have looked at the variation in the birth rate and adoption of electronic business networks in different industries and sectors. Another topical question has been the effects of IT on industry structure, and how this is mediated by changes in regulation. For instance, Kshetri and Dholakia (2002) distinguished

between country-level effects, technological effects and organizational factors. Country-level factors included culture of a society, availability of information and skills, market and infrastructure factors. The authors advocate that Institutions in a country can respond to these barriers by legal and non-legal influences such as new laws, investment incentives, foreign technology transfer, and other supply-push and demand-pull forces. The authors identify technological factors such as technological globalization, extent of collaboration among firms, and international exploitation of national technological capabilities. Other topical questions in existing studies included *what are the mechanisms by which environmental forces affect the global diffusion of business-to-business commerce?*

There have been very few successful attempts to combine the strategic management and institutional perspective to study IT-enabled transformation at the industry level. Li (2001) reviewed existing studies on the use of the Internet in banking. The author highlighted two models, the deconstructed and integrated banking model, and discussed the implications of the Internet for the working of these business models. The author implicitly adopted an institutional perspective, which is evident in the following excerpt: “The transformation would necessitate the abandonment of values firmly embedded in the banking industry since the seventeenth century, even the potential reward can be substantial” (pp. 320). Similarly, West (2000) found that the institutional context within which organizations operate exerts an influence on their choice of organizational form. The author adopted an information-processing and institutional *contingent* approach to understanding optimal organization structure. Also, Sato el al (2001) investigated the development of electronic finance and the policy implications. Besides analyzing strategic factors such as online product characteristics, intermediaries, exchanges and trading systems, and market coordination environment, the author examine changes in individual institutions in the financial sector. Likewise, Helper and MacDuffie (2003) investigated the evolution of electronic business in the auto industry, and their effects on consumer and supplier relationships. The analysis included analysis of the industry value chain and employee unions.

From a socio-organizational perspective, there have been relatively few authors who have investigated the enabling role of information technology in several industries

(Mitev 1996, Crowston et al 2001, Crowston and Myers 2004). Crowston et al investigated the interplay between structure and information technology in the real estate industry, while Mitev investigated the failure of implementation and adoption of a computerised reservation system in the French railways. Overall, there have been very few attempts to integrated economic, institutional and socio-organizational perspective in single analysis on IT-enabled transformation (Crowston and Myers 2004). Crowston and Myers successfully developed a framework and investigated transformation enabled by information technology from these three perspectives in the real estate industry. Their analysis included the economic analysis of IT-induced reduction in cost of locating properties and disintermediation of real estate agents, the institutional analysis of the use of IT mandated by the regulatory environment and the role of rules and agreements between agents in transactions, and the socio-organizational analysis of the role of agents at contextualizing information from databases and use of IT to support social networks of agents, customers and other professionals.

Suggestions for Theory-Building

The diversity of issues, levels and perspectives in information technology studies raises important questions about the degree of integration between the fields of strategic management and the sociology of organizations and their underlying perspectives, and the extent to which a clear cumulative body of theoretical knowledge is emerging. Such "diversity of perspectives need not lead to fragmentation and a lack of consensus, however. Indeed, multiple views are vital to scientific advancement and do not condemn the field to an excess of unsubstantiated assertions disguised as new theories. *What is required is an epistemology capable of encompassing diverse, even seemingly contradictory, approaches*" (Baum and Rowley 2002: 23, emphasis added). As research continues to advance in each one of the disciplinary areas concerned with the strategic and organisational transformation enabled by information technology, it becomes increasingly important to consider areas of convergence and controversy across separate perspectives. This section *synthesises* the relevant research questions and theoretical issues manifested across perspectives and analytical levels in extant information technology studies and also generates recommendations for theory building, including aspects for research design.

Emergent Issues found across Theoretical Perspectives

In this post-net era of value maximization, researchers apply strategic management th eories to investigate strategies to add value and mechanisms to reduce transaction costs, and analyze the strategic role of partners and intermediaries (Berthon et al 2003, Geoffrion and Krishnan 2003, Banker and Kauffman 2004). Well known strategic management models have, however, clear explaining collaborative behaviour and strategies in electronic markets (Clay et al 2002; Gadde et al 2003; Easton and Araujo 2003; Kim et al 2004). For instance, the five forces model of Porter (2001) advocates independence and power over buyers and suppliers, and competition against rival firms becomes the strategic focus. Most firms, however, operate in a mix of markets with relational and competitive characteristics (Easton and Araujo 2002). Relational markets, however, are more complex and less understood that 'competitive markets'. Relational markets involve buyers and sellers forming strong, long-term relationships in a very similar way to virtual organisations. As organizations vertically disintegrate and outsource services, coordination with external organizations becomes increasingly important for achieving high performance outcomes. 'Pure' market mechanisms are often insufficient for coordinating the resulting relational interdependencies among organizations, thus requiring explicit attention to the design of mechanism for managing inter-organizational networks (DiMaggio and Louch 1998; Gittell and Weiss 2004). Strategic management models rests on the assumption that adaptive behaviour is a natural feature of most formal organisations and markets (Sarkar 1998; Powell and Wakeley 2003). It is relatively unproblematic for organisations to gain competitive advantages through the rapid emulation of successful competitors or the adoption of business models enabled by information technology. Strategic management also rests on the assumption that adaptive behaviour is a natural feature of most formal organisations and markets (Sarkar 1998, Powell and Wakeley 2003). It is relatively unproblematic for organisations emulate successful competitors or adopting business models enabled by information technology.

Some recent developments in strategic management theory are contributing to this theoretical gap. One of these developments constitutes the relational and dynamic capabilities views of strategy; which has clearly been enriched by the sociological

perspective (Dyer and Singh 1998; Stabell and Feldstad 1998; Wheeler 2002). Wheeler (2002) identified and measured the organizational capabilities that comprise the ongoing work net-enablement in electronic markets. This author developed a 'Net-Enabled Business Innovation Cycle' (NEBIC) theory, which is rooted on the strategic management's dynamic capabilities perspective and the notion of absorptive capacity, combining both variance and process explanations. The author contends that 'net-enablement' is a dynamic capability, and defines four constructs: choosing emerging and enabling information technologies; matching economic opportunities with enabling IT, executing business innovation, and assessing customer value; and develops various variance and process propositions/explanations. The author assumes that dynamic capabilities create resource configurations that generate value-creating strategies, which can be imitated and developed through multiple learning paths. The authors define 'creating customer value' as the dependent variable from an economic variance view, and define 'net-enablement' as the process variable from a socio-organizational view. For a more general discussion on strategies for theorizing from process data, the reader can see Langley (1999).

Another important development constitutes the knowledge management and organizational learning views of strategy; which has been enriched by the sociological perspective. From a sociological perspective, IT-transformation can be characterised by two broad assumptions about the nature of knowledge. These two broad assumptions emphasize (a) the content, intensity and frequency of the knowledge production and sharing actions; or (b) the social patterns or structure of the connections between heterogeneous actors across multiple levels (Dierkes et al 2001; Argote et al. 2003; Borgatti and Foster 2003). The first assumption advocates that information and knowledge can be made explicit and be transferred easily regardless of the characteristics of the organizational context. The second assumption acknowledges a more reflective "interpretative" view -that information and knowledge sharing are characterised by being highly tacit and inter-dependent to the social setting. Likewise, IT-transformation can be characterised by two broad assumptions about the nature of learning. These two broad assumptions emphasise (a) that learning primarily occurs within individuals, or (b) learning is the result of a wider and richer socialization process. Some scholars have attempted a combination of these socio-organizational views, e.g., Schultze and Boland (2000), Newell et al.

(2001), Swan et al. (1999); and others have attempted to combine the socio-organizational perspective with the strategic management perspective. For instance,

Nambisan (2002) investigated the knowledge creation issues, customer interaction, and motivations in a computer-mediated and community-oriented environment; what are the boundaries of effective customer involvement in new product development set by new technologies; and how should organizations establish and govern a customer community of value creation with permeable boundaries. The author devises a theoretical framework that relies primarily on a 'hybrid' knowledge-based view, and also includes principles from systems theory and organizational design. The author combines the strategic management literature with work from organization theory, innovation management, and knowledge management. The author treats customer roles as 'resources', 'co-creators', and 'user'. The author acknowledges that implementing these roles requires bonds of interdependencies and the establishment of increasingly complex social networks crossing traditional organizational boundaries. The author generates a set of propositions that relate specific virtual customer community design elements to successful customer value creation and new product development success. Also, Boer, Van den Bosch and Volverda (1999) explored the management of organizational renewal within an emerging industrial complex as a process of integrating existing component knowledge into new architectural knowledge that serves as a platform for carrying out new product-market combinations. The authors investigated organizational forms and combinative capabilities at the individual firm level, which are then aggregated at the industry level using two case studies. The authors develop a multi-theoretical framework combining the organizational forms and combinative capabilities perspectives. They focus on the management of organizational knowledge integration in the emerging multimedia complex. The authors assume that firms are previously operating in a relatively stable industry.

The numerous unresolved issues depicted above pose further theoretical and methodological challenges and opportunities for socio-organizational and institutional researchers. Institutional analysis can take into account both the isomorphic and the constitutive nature of institutional forms and processes of formation of Internet-enabled business networks and electronic markets. Scholars have not yet

appropriately studied organizational form at birth, birth and survival rates, or the mimetic processes of form replication and the distinct institutional and socio-organizational forces shaping these processes. (Salazar et al 2004). Although management studies have already developed robust frameworks which combine the strategic and institutional perspectives (Oliver 1997; Roberts and Greenwood 1997), there are still very few IT studies following that route. Some pioneering IT studies have started to implicitly combine the strategic and institutional (and ecological) perspectives. For instance, Hackney, Burn and Salazar (2004) suggest a co-evolutionary approach to value creation and the management of change in electronic markets. They recognise a view of strategy, which includes an evaluation of the stages and processes of evolution for electronic markets. Their model could be extended to explicitly include both strategic and institutional perspectives. This would contribute to the advancement of our understanding about the isomorphic and evolutionary nature of electronic markets.

Institutional theorists have, however, shown far less concern with the origin of forms as the product of ongoing interaction. Endogenous organizational dynamics are rare in accounts of institutional change (Strand and Sine 2002). The dynamics of organizational transformation is also treated different by institutional theorists (Newman 2000). Institutional theorists suggest that organizations become more similar over time because of normative processes that reward similarity. Combining the focus on institutional norms of the institutional perspective can supplement the strategic management perspective and contribute to understand how and why new cognitive and structural forms of such virtual network of firms and electronic ecosystems are created and replicated (Palmer and Biggart 2002, Strand and Sine 2002).

Likewise, the focus on ‘adaptive structuring’ and identity of the socio-organizational perspective can supplement strategic management and assist researchers at gaining deeper and richer insights about the relational aspects of inter-organizational interactions and the endogenous dynamics of electronic markets. One of the problems of applying transaction-cost logic to the adoption of electronic markets is that the transaction is the unit of analysis, instead of the exchange relationship (Christiaanse 2004). Alternative forms of coordination to the price systems involve social

relationships and dialogue (Kallinikos 1995; DiMaggio and Louch 1998). As one of the growing area of controversy focuses on how organizations come to share cognitions and norms about appropriate behaviour, and how different organizational forms or designs develop, the institutional and socio-organizational perspectives need to be adopted by researchers attempting to fully understand IT-enabled transformation. From the socio-organizational perspective, when actions of organisational agents are driven by personal motives and emotions or do not display opportunistic behaviour, the rational assumption fails (Foss 1996; Berthon et al 2003; Fowler et al 2004; Pavlou and Gefen 2004). Organizational transformation from a socio-organizational perspective, which is informed by Giddens' structuration theory, is defined as the social interaction in which individual agents try intentionally and reflexively to shape structuring processes and relationships in order to coordinate the activity within an organization or network (Sydow and Windeler 1998). In summary, organizations, networks and markets need to be re-conceived as "resource-flows, information flows and webs of significance " (Kallinikos 1995: 123); and, therefore, there is a need for additional empirical studies integrating multiple theoretical lenses.

In summary, recent developments in strategic management, applied to the IT domain are contributing to fill the theoretical gap: Wheeler's (2002) "Net-Enabled Business Innovation Cycle" adopting a relational and dynamic capabilities view, Nambisan's (2002) 'hybrid' knowledge-based view on virtual new product development communities. Future studies should extend strategic management with institutional analysis to account for isomorphism and the constitutive nature of institutional forms and processes of formation of Internet-enabled business networks and markets. Future studies should also extend strategic management with socio-organizational analysis to account for endogenous organizational dynamics such as 'adaptive structuring'.

Emergent Issues found across Levels of Analysis

The present review has illustrated that existing studies looking at transformation enabled by information technology can span from the micro to the macro aspects, and their theoretical foundations range from the institutional emphasis on cognition and normative social structures within and across organizational boundaries, to the focus of economics on the structure and competition in electronic markets and industries. Very few studies have, however, attempted to articulate and explain the competitive,

strategic, institutional and organizational aspects of transformation at various levels of analysis (Wheeler 2002, Zahra and George 2002, Banker and Kauffman 2004, Oliver 2004). This section synthesises relevant research issues found across levels of analysis in information technology studies.

The inter-level dynamics of IT-enabled transformation and the constant blurring of boundaries have as a consequence the growing significance of social relations and economic-led interactions in the study of virtual inter-organizational networks, electronic markets and industries (Morath and Schmidt 1999, Rubery et al 2002). Various researchers warn us of the distinction between levels is often blurred and that macro (i.e., industry, market) researchers can probably learn more organizational phenomena from studies at the meso (i.e., networks) and micro-level (i.e., inside the organization). Also, traditional 'variance' studies are less useful for examining questions about the dynamics of the processes of change, that is the order and sequence of events that unfold in institutional and organizational change processes being studied (Garud and Van de Ven 2002, Wheeler 2002, Brews and Tucci 2004, Gittell and Weiss 2004).

Information technology implementation and exploitation at the organizational level is increasingly being associated with a wider range of inter-organizational and industry institutional dimensions, while the organizational aspects at the 'micro' level still remain problematic (Damsgaard and Lyytinen 1998). As structures of meaning inhabit every level of analysis, there is an opportunity to understand the relationship between 'micro', 'meso' and 'macro' levels by encouraging multi-level analysis, or at least, promoting explicit connections across levels. For example, *how are patterns of organizations related across levels of a social system? Are patterns of organization reproduced across levels?* Inter-level and cross-level level analyses can contribute to understand issues of causation and reproduction of form in virtual organizations and electronic markets.

The inter-level and temporal nature of the diffusion of information technology and formation of associated organizational forms, have direct implications for the study of IT-enabled transformation. The unit of analysis has to be extended beyond the organizational level and the time scale needs to be extended beyond a single epoch. This requires moving from "*situational control"* and "*contingent causality*" of

variance studies to a "*process logical structure*" of analysis, and from a *unitary level* to a *micro/meso/macro level* analysis" (Klein et al 1994; Damsgaard and Lyytinen 1998; Rodrigues and Child 2003; Brews and Tucci 2004; Kurnia and Johnston 2004). Strategic management and institutional analysis tend to regard the relationship between contextual economic and regulatory factors *and* the content of transformation as 'deterministic'. The more embedded an organization is in its institutional and market environments; however, it is more likely that their relationships will be symbiotic.

Variance' studies are limited in that they assume that a number of predicting variables identified at a *particular* time determine actions or decisions regarding the organizational phenomena under study. Analyses need to move beyond '*first-order* 'explanations towards '*second-order'* explanations. First-order "variance" explanations assume that certain essentially fixed independent and contingent variables can explain phenomena at the organization, network, market or industry level. First-order analyses are useful at identifying some factors that are necessary for the adoption of information technology, the variation in levels of adoption observed across industries and across organizations. The inter-organizational and temporal nature of virtual business networks and electronic markets requires the modification of the first-order model in which the impact and consequences of the inter-organizational institutional context are explicitly recognized. Second-order analysis acknowledge that some factors treated as external contingent forces in first-order models need now to be regarded as part of the relevant emergent organizational interactions. More specifically, the (micro-) institutional and socio-organizational literature has already highlighted the need for a '*process*' longitudinal view. Several authors have demonstrated how recognition of inter-organizational institutional context leads in a natural way from the variance approach to a 'process' longitudinal approach (Markus and Robey 1988; Johnson et al 2000; Kurnia and Johnston 2000; Pettigrew et al 2001; Soh and Roberts 2003). Controversial issues dictated by emergent empirical requirements are the forms of virtual inter-organizational networks and electronic markets and the processes by which individuals build and maintain their network and market exchanges in context of these virtual environments.

The above issues need to be addressed more explicitly in information technology studies, that is, how the links between the organisational and the inter-organizational network, market and industry levels are established. Very few scholars have made explicit their analytical framework used to link the organizational level with inter-organizational network level, and explain how analyses performed at the organizational level are *aggregated* at the market or industry level. For instance, Damsgaard and Lyytinen (1998) examined patterns of adoption and diffusion of electronic-data-interchange systems at three level of analysis: local dyadic level, industry-wide networks, and national level. The authors used value chain analysis and power dependency analysis to capture events and behaviours on the meso level, and institutional theory to identify macro level factors. Using comparative analysis of multiple case studies, the authors sought to generalize types of diffusion patterns. The interview sample included nine organizations from three industries: transportation, retail and paper and pulp in Finland. Also, Salazar (2004) developed an integrative theoretical framework that makes explicit the various links between the IT implementation process, the wider organizational and external context. The framework was grounded on a substantive case to integrate relevant organizational levels and distinct activity domains, as well as the interconnections between those levels and domains through time. Gittell and Weiss (2004) developed a framework that links intra- and inter-organizational coordination in context to patient care. Organization design and network perspectives are adopted to span multiple levels of analysis. These authors investigated what are the features of organizational design that give rise to effective coordination at one level and can also generate effective coordination at other levels. The authors contend that coordination of patient care is an important organizational phenomenon that cannot be examined without crossing levels of analysis. The authors assume that organization deigns shapes networks. Information systems are included in the analysis, and are conceptualized as linking devices, which support organization design to create a virtual organizational network.

Conclusion

The present paper reviewed selected studies focusing on IT-enabled transformation in organizations, virtual inter-organizational business networks, electronic markets and industries. In so doing, this paper developed a multi-theoretical framework drawing

from established strategic management, institutional and socio-organizational perspectives, and at various levels of analysis. Prior reviews and frameworks have examined and synthesised extant research in the information technology management, organization studies, strategic management, and innovation literature (Sarkar 1998; Mauldin and Ruchala 1999; Dewett and Jones 2001; Straub and Watson 2001; Beard 2002; Ngai and Wat 2002; Argote et al. 2003; Bruun and Hukkinen 2003; Chen and Hirschheim 2004). The present multi-theoretical framework has extended prior research by addressing the following limitations of existing frameworks, which include narrow scope of information technology impact and transformation, not properly addressing the issue of unit of analysis, their relationships and levels of aggregation, in context to the widening scope of organisational boundaries, not explicitly articulating the relationship between strategy and organizational innovation, not taking the appropriate consideration of the interplay between context and process, and often undermining one or both of these elements. The discussion of research design issues such as internal and external validity are, however, outside the scope of the present review. For a recent discussion about these issues, the reader can see Morgeson and Hofmann (1999) and Scandura and Williams (2000). It is also worth mentioning that the purpose of the present paper was not to add another critique of management literature, but rather to present a search for potential synergies by identifying issues where the intersection of theoretical lenses is likely to produce progress in the study of IT-enabled transformation. For recent synthesis of management theory, the reader can see Pettigrew and Whittington (2002), Baum (2002) and Tsoukas and Knudsen (2003).

While new insights from recent studies have broadened our perspective on technology-enabled change and transformation, there is still little empirical evidence as to how intra- and inter-organizational innovation and market and industry dynamics can be articulated in the formulation of coherent strategies and policies and the promotion of new organisational forms and business processes. To advance our understanding and build more robust and integrated theories, researchers need to adopt research designs that systematically combine the ‘exogenous’ industry, market and institutional forces, and ‘endogenous’ organizational forces shaping transformation, and also integrate ‘variance’ and ‘process’ variables. Integrated longitudinal models should incorporate industry and market-level data with network

and (intra-) organizational-level data in order to capture the complex dynamics of inter-organizational networks and markets (Mahoney and Sanchez 2004, Oliver 2004). As new technological innovations, and business models and market-creating propositions emerge and converge, researchers need to continually review their implications for IT-enabled organizations, virtual business networks, electronic markets and industries. Extending the strategic management perspective *with* institutional theory *and* socio-organizational perspectives *at various levels of analysis* has the potential to explain *second-order* transformation.

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