

## **Chapter 2 Literature Review: Markets, Intermediation and E-Commerce**

### **Introduction**

This chapter describes a range of issues relating to markets and to the value chain, and considers the impact of electronic commerce in these areas. It discusses research strands aimed at developing the broader theory of markets, and complements this analysis by then considering the context for the case study on the impact of the Internet upon the value chain.

In section one it is argued that there are underlying themes emerging from the historical aspects of social and technological change. Technological development and improvements in communications technology have led to increasing efficiency of transactions, which supports more interactive and flexible market relations. However, at the same time market conditions and the increasing power of large manufacturers has led to the tendency for supply and distribution of products to be vertically integrated within these companies, rather than controlled by independent intermediaries. In the analysis of section one, supply and distribution arrangements are shown to depend crucially on the nature of the product and the nature of the market, as well as upon efficiency of transactions.

Section two investigates the contemporary effects of technological change in the context of information and communication technologies (ICT) and EC and draws parallels with the analysis of changing distribution patterns in section 2.1. It is argued that although modern ICT development has far-reaching and unpredictable ramifications, similar patterns can be found in this earlier analysis, and that these similarities are informative of a broader perspective of socio-economic and technological change. It is shown that current economic conditions are increasingly driving companies towards integrating their systems and working in closer coordination with their value chain partners, and that these restructuring processes under changing circumstances can also have important implications for intermediaries.

Section 2.3 reviews some theoretical models of technological change that incorporate sociological aspects and can provide a guide to model development, as illustrated in later chapters of this thesis. The section also considers the empirical findings of studies of Electronic Data Interchange (EDI), highlighting some important issues relating to technology diffusion. As precursor to the Internet, EDI shares many similarities, and can provide valuable insight into some potential benefits and problems. Section 2.4 provides a more detailed background on EDI and compares it with the newer technology of Internet-based e-commerce. We discuss the opportunities for leveraging the advantages of existing EDI systems, and the complications of operating them in tandem with Internet based systems.

Continuing in this vein, section 2.5 examines Internet technology and considers its advantages as a new medium for EC. Some initial comparisons are made between Internet-EC and EDI, and then the issue of how the two might be integrated is considered at length. This section discusses some common business models employed recently for Internet-EC and provides an up-to-date review of its short history.

The next section (section 2.6) extends the discussion of impacts of EC to the value chain, explaining why close interorganisational links are becoming increasingly important. New technological and competitive pressures are forcing this interdependence, which is manifest through tightly coupled collaboration amongst members of the value network, and sharing of information that is propriety. Thus, the performance of the company is dependant upon that of the network as a whole, and all of the partners of which it is composed.

Finally, section 2.7 introduces more empirical examples of these changing patterns of distribution, focusing upon the example of the air travel industry which has been heavily researched and written about, as it has both a history of electronic commerce and was an early target for Internet-based sales. We investigate the role of the intermediary in these new electronic systems and look for evidence of significant disintermediation. We conclude by placing these findings back into the context of the historical perspective described earlier in the chapter.

## **2.1 Historical Analysis of The Process of Exchange**

This section is concerned with the process of exchange and the patterns that emerge from a long-term historical perspective. In particular it looks at the American economy in the years 1830-1900, because this was a time of rapid economic growth and technological innovation which has been well documented and analysed. Business historians Chandler (1977) and Porter and Livesay (1971) discuss changing patterns of production and distribution over this period.

In 1830, almost all goods were generic. Production processes used relatively simple technology and were low volume, with nearly all products distributed within a small locality. Manufacturing companies were numerous, small in size and unspecialised. Markets were diffuse and problems of transportation and communication made it difficult to balance supply and demand. Producers relied on independent merchant middlemen for distribution and other services such as import, export, financial expertise and loans. In 1830, the all-purpose merchant dominated distribution.

The period 1830-1900 was one of rapid economic growth, largely driven by technological change and the introduction of railroad and telegraph networks. Demand steadily increased and markets expanded. The concentration of both production and consumption in fewer, larger firms, and the concentration of the population in the nation's growing cities, led to increasingly concentrated markets in all industry sectors. These market trends made it more economic for manufacturers to open sales offices to support their product lines.

Chandler and Porter and Livesay analysed many different industrial sectors in terms of the physical and technical characteristics of products sold and level of market concentration, and discussed how these factors determined the type of distribution system favoured.

The introduction of standards for many generic products allowed them to be exchanged more readily because there were no essential differences between the goods of different producers. However, during this period manufacturers specialised

to produce increasingly technological and non-generic products, requiring close and continued contact between the user and the marketing organisation. Installation and instruction in the use of the product, and repair and replacement services often have to be provided. This entails high correspondence and high level of technical expertise, which the traditional non-specialised middlemen did not possess.

Also, although generic goods are themselves simple, they may still require an expensive and complicated infrastructure for distribution, a situation which favours forwards integration over intermediation. Technological change encompassed wider technological innovations such as refrigeration for storing perishable products, which created markets for photographic film, dressed beef, and ice, for example. Another example is provided by the problem faced by the new electrical companies. These companies could not rely upon traditional channels of distribution: they needed to send trained company engineers to test and install their equipment in the premises of business and government customers. Similarly, the suppliers of technologically complex machinery needed to have mechanics working in close cooperation with their customers, as well as developing showroom facilities for demonstrating their products.

Product characteristics identified as important determinants of distribution included the complexity of the product, the generality of the product, the bulkiness of the product, and the expensiveness of the product. Minimum efficient scale in distribution is likely to be approached sooner if the product is lightweight and expensive, because long distance deliveries can be economically made directly from manufacturer to consumer either by salesperson or by parcel post. These types of distribution system, as well as that of the company-owned wholesale network, represent strategies of forwards integration.

However, with bulky or inexpensive products, minimum efficient scale will usually require the product to be distributed in bulk lots to regional storage facilities before being broken into smaller retail lots. This situation may favour intermediaries that can pool the products of many manufacturers and thus take advantage of scale efficiencies. This is particularly the case where markets are diffuse and it is difficult for manufacturers to achieve a high throughput.

Markets can be categorised as business-to-business (markets for manufacturers' goods) and business-to-consumer (markets for consumers' goods). A business-to-business market can be said to be concentrated (in the sense of being oligopolistic) if nearly all demand is concentrated in a few large firms making large orders and dominating the market. Business-to-consumer markets are concentrated if demand is very large in a particular geographical area due to a high concentration of population there. Markets which have neither large firms dominating the demand side nor large numbers of small consumers in one single area are diffuse.

The historical trend identified is the increasingly concentrated nature of the market, and the reduced costs of exchange. Changes in technology and market conditions created an economic situation that favoured manufacturer-controlled distribution systems. However, although the general pattern is clear, there are other factors which must also be taken into consideration, namely (1) that of minimum efficient scale in distribution, and (2) the complexity of the marketing system that is required. Furthermore, where markets remained diffuse, it would remain less economical for the manufacturer to create a sales network, so it could instead be better either to sell the goods locally or through independent intermediaries.

Chandler also argues that new technology is an important contributing factor to the changing organisational structure of firms. Alongside the development of rail and telegraph networks, was the emergence of a new class of professional salaried managers and the modern organisational structure, which had a very hierarchical form and relied upon divided labour to maximise mass production. Reorganisation was required to effectively manage the operations of increasingly large and complex organisations, exemplified by the first railway companies. Increasing profits after the onset of the Civil War in 1861, had allowed manufacturers to finance their own expansion.

In fact, this literature identified at least four ways in which technological innovations can have impact: by necessitating new organisational structures to handle complexities, by encouraging administrative or other process changes that reduce

costs or improve efficiency, by facilitating the development of new distribution channels, and by changing the power relations amongst organisations.

Clearly the price reductions for transportation of materials, for sending communications and making financial transactions had a large impact upon market and firm activities. The study of transaction costs economics was taken further by Williamson (1975) who developed the theory and applied it to the study of organisational decision-making. According to Hindle, Checkland et al. (1995), a key concern of transaction costs economics is how to categorise amongst transactions that take place (a) on a day-to-day basis; (b) according to long-term contracts between firms, and (c) internally using solely the company's resources. Decision-making as to whether it is more efficient to internalise transactions or to outsource them therefore hinge upon carrying out cost analyses associated with these three options.

This approach therefore targets the familiar debate on markets versus hierarchies as alternatives to production and distribution, and develops it by considering also the stability of inter-firm transactions, i.e. whether they are one-off interactions or whether they persist over periods of time. In the transaction costs framework, Williamson considers the effect of technology in enabling cost-effective transactions, influencing decision-making, and thereby shaping economic activity of the firm.

Amit and Zott (2001) consider transaction costs theory in their model of value creation in e-commerce, arguing that this approach explains a number of the value-drivers they have identified. Most prominently there is a link between the e-commerce value driver of transaction efficiency (improvements through reducing uncertainty and complexity in any transaction) and the theory of Williamson, but that it also can help to explain other value drivers such as lock-in (switching costs are analysed within the transaction costs framework).

It is to this subject, the technological developments in e-commerce, that we turn in the next section, drawing upon the analysis of this section to inform an understanding of its impact as well as its potential.

## **2.2 Drawing Parallels with Today's Economic Development**

The parallels of the historical period 1830-1900 with today's economy are the rapid development and diffusion of new information and communication technologies (ICT), the opening up of markets to wider competition, new opportunities for intermediation, and the creation of new sales channels. Much current e-commerce research ignores these parallels by taking a short-term view of technological change. This section tries to redress this shortcoming by placing these new developments in the light of the above established literature. It will be argued that although modern ICT development has had far-reaching and unpredictable ramifications, similar patterns can be found from the analysis of the previous two sections, and that these similarities are informative of a broader perspective of economic change.

In recent times with the development of ICT we have seen increasingly fast and ubiquitous networks through which all types of digital information flow. This technology enables teleworking, the convenience of digital information storage and retrieval, and increasing automation of repetitive work, among other benefits. Many improvements have been possible thanks to the rapid communication of up-to-date and accurate information. In business terms, this allows not only a better customer service, but also greater internal efficiencies, brought about by improvements in inventory management, reduced product cycle times, etc. As an example of the impact of new ICT, Electronic Data Interchange (EDI) is examined in section 2.4.

As discussed in the previous section, researchers, economists and historians examining market and organisational structure, have given their attention to key issues about the conflict between competitive and cooperative relations in markets, and about how best to balance between markets and hierarchies as alternative ways to organise production and distribution. Markets have the advantage of flexibility in that activities which become unproductive or unnecessary can be easily exchanged, and that elements have a better opportunity to excel in their specific roles. However, market mechanisms do not usually produce good information flow. Integration via hierarchies has the advantage of improving coordination and control between the

component parts, and doing so at a lower cost. However, this benefit comes with a disadvantage: the requirement for competitiveness in many areas of activity.

In the context of new ICT, new models have been proposed that may shed light on these issues and provide us with new ways of thinking about them. For example Mowshowitz (1994) outlines his vision for the ‘virtual organisation’ by spelling out the principles underlying successful management in the ‘information age’. The essence of this is the uncoupling of the managerial planning of a goal-orientated activity from the implementation of the activity, in order to exclude extrinsic factors (i.e. irrelevant to the stated goals) from influencing the actual implementation. A related principle is that of systematic ‘switching’ between choices (for example, the choice of supplier), as the organisation’s needs change over the course of time, and doing so within the framework of an explicit decision scheme:

*“To achieve the benefits of such separation it is essential to be able with ease to couple and decouple actors in the business arena.”* (Mowshowitz 1994, pg. 279)

These principles, it is argued, are a form of ‘meta-management’ that will enable the efficient use of resources, and will enhance organisational responsiveness as well as organisational reflection upon the specification an activity’s requirements rather than an ad-hoc management approach. However, this vision has been contested by Walsham (1994) on the grounds that it is not straightforward nor sufficient to equate managerial decision-making with objective interpretations:

*“Mowshowitz’s assumptions in this area form part of the myth of management objectivity ... [their] own prejudices and self-interest play a large part in their view of the world and their choice of relevant factors.”* (Walsham 1994, pg. 290)

Furthermore, Walsham finds it difficult to accept *“the breaking down of decisions into rational choices with defined variables and objective functions”* as a description of management practice because it ignores evidence suggesting the prevalence of ‘holistic’ or intuitive approaches in the face of uncertainty and complexity of real situations.

This debate is a good example of one key conflict in the philosophical arguments underpinning different modes of research enquiry in information systems. These issues concerning notions of managerial objectivity / subjectivity will be returned to in section 4.1.1 where the research paradigm implications are discussed more fully.

Excepting the managerial imperative for flexibility through 're-coupling', the concept of virtual organisation says very little about the nature of inter-firm relations. On this issue, there can now be found many articles (Fabris 1997; 2001) emphasising the importance of collaboration over competition amongst members of a value network. One of the reasons for this is the requirement for excellence and trend towards outsourcing. This perspective is justified by the fact that interdependence and cooperation amongst members of such networks is becoming a more important factor of success.

The development of collaborative links is supported by a growing industry in extranet and other interorganisational networking technology, and the establishment of industry groups to promote the use of this technology. This initiative is also reflected in academia where, as noted in section 2.6, academics are increasingly turning their attention to trade networks as the unit of analysis of their research, and within these networks they are investigating independent business units, as alternative to the more traditional view of individual companies as essentially unitary elements. For example researchers are looking at cooperative processes between organisations (McIvor, Humphreys et al. 2000) which are now considered essential to improve business performance.

These types of relationships amongst firms do not easily fit into the traditional dichotomy between markets and hierarchies discussed earlier, and nor do they fit into a third category, long-term contracts, considered by transaction costs theory.

In the networked economy that is developing today, better information is available to companies operating in market systems, because they are making use of this new technology. Better information allows companies to better understand their markets, to customise their products and exploit niches with more precise marketing. However,

there is also an increasing pressure on the business units of modern organisations to operate more independently in terms of having greater responsibility and autonomy from the central office (i.e. a decentralised control structure) and having a distinct set of business goals to carry out some value adding activities.

These two points taken together imply that it might be less useful for researchers to consider the dichotomy between markets and hierarchies and between competition and cooperation as the focus of a study of e-commerce. A more appropriate analysis would identify the factors discriminating between successful and less-than-successful value chain performance.

This alternative viewpoint has been expressed elsewhere, (Rayport and Sviokla 1996; Swaminathan, Smith et al. 1998) where it is proposed that organisations are increasingly organising into 'virtual value chains' (see sect. 2.6) for the duration of individual projects, providing both flexibility *and* high levels coordination within trade networks.

Electronic networking (i.e. communications) technology appears to be the main driver of changes taking place today, and in contrast to the previous situation dominated by vertically integrated and centralised industry, we are now moving towards more tightly-coupled networks of business units with specific roles, in more flexible arrangements that can take advantage of the new technology to improve coordination and increase value.

Noting this evolution, it is possible to identify parallels with changes brought about by the introduction of railway and telegraph, and the formation of the hierarchical organisation. Section 2.1 showed that distribution patterns were consistent over many industries, but also that differences exist depending upon the nature of product and market. It was also clear that technological factors were critical in enabling and constraining these changes.

It is therefore important that we should recognise the importance of these factors also in electronic markets. In accordance with this analysis, we anticipate new products, new distribution arrangements, and the appearance of different types of intermediary

during these times of change driven by the development electronic networking and e-commerce.

Current economic conditions are characterised by increasing customer sophistication and demand for high level of service. In retail markets, product differentiation is a hugely influential factor, as is brand awareness. For business-to-business markets, the relaxation of trade restrictions coupled with the 24/7 schedule necessary for operating in worldwide markets has led to more dynamic and flexible organisational structures where information systems play a key part in strategic planning. With the onset of electronic commerce, we anticipate large-scale changes of a similar magnitude to those described in earlier periods upon customer and supplier relationships, organisational forms and market institutions.

Moving from this discussion of current market and technological trends and their historical parallels, the next section looks more closely at the likely impact of EC upon markets and upon organisations. We shall begin by considering the diffusion processes that are associated with the introduction of technological innovations.

### **2.3 Models of Technology Diffusion**

This section reviews the literature on diffusion of innovations with respect both to the general theories in this area and to empirical research on the diffusion of technology innovations. The standard introductory text is that of Rogers (1995) which presents several models of innovation diffusion. Rogers identifies the steps in the diffusion process and some now well-understood characteristics of innovations that help explain their different rates of adoption. Most relevant to the work undertaken in this thesis are the historical illustrations concerning the take-up of new technology, and discussion of the prevalence of signature s-shaped curves found in empirical studies.

There has been a lot of interest in applying the diffusion of innovations approach to the study of the impact of new communications technology. One example is the paper by Markus (1990) which considers all types of interactive communications

technology and looks at how they are actually used within communities. The author argues that:

*“In general, the benefits of using an interactive medium increase with the number of people who use it, and will be greatest when universal access has been achieved.”*  
(Markus 1990, pg. 195)

The definition of universal access is that any member of the community can reach any other member. However, it is not only universal access that is required to assure the success of an ICT innovation. As Markus points out, sub-groups of a population may adopt and continue to partake even if the technology does not spread more widely. One example of this is discussed later in the section - the case of EDI. There is a likeness between this approach and other research using the concept of network externalities, in which the probability of adoption is defined as a function of the known or anticipated number of users. However, this concept will not be discussed in detail here: it is sufficient to make the point that the existing level of usage may be a factor in the decision-making process of some people – it may inhibit or may encourage adoption. Markus describes how the diffusion mechanism works:

*“Innovation spreads when others either observe the early adopters and imitate them to replicate their profits, or communicate with the early adopters and are persuaded or induced to adopt.”* (Markus 1990, pg. 197)

However, one big problem with interactive technologies is discontinuance, where adopters decide to defect after an initial period of usage. This point brings us to a discussion of the concept of “critical mass”. Originating from nuclear physics, this term is, in the context of diffusion theory, used to describe situations where the level of adoption is high enough to ensure that benefits from universal access will subsequently drive more and more people to adopt, towards the point of saturation. Upon reaching critical mass, the technological innovation will spread amongst the population of potential users to an extent that it will be successfully established.

Thus, the outcome of interest (attaining universal access and successful adoption) is a property of the community, whereas the generative processes are the decision-making

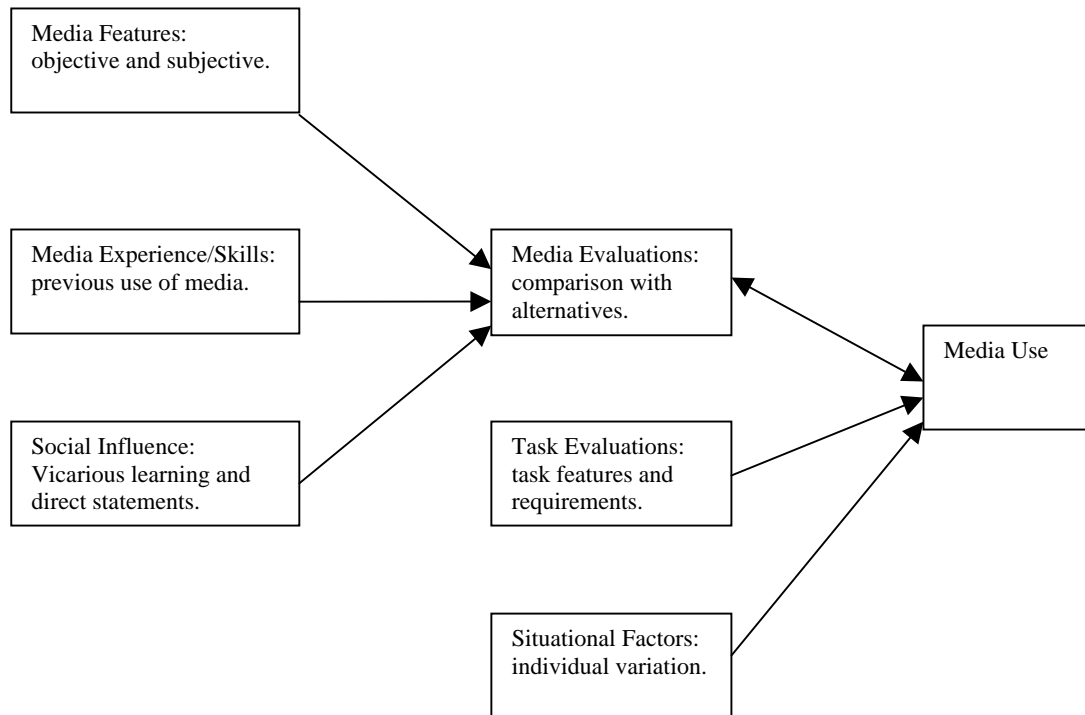
processes of individuals. The theory of critical mass relates micro behaviours to macro outcomes and generates several interesting hypotheses. Clearly, the consideration of social influence mechanisms is central to this research approach.

Fulk, Schmitz et al. (1990) in a similar vein of research, present a model of social influence in the context of media use. Central to the model is the idea that media use is highly dependent upon individual circumstances and individual attitudes.

*“Media perceptions are, in part, subjective and socially constructed. Clearly, they are determined to some degree by objective features such as ability to provide a permanent record, asynchronicity and the like. However, they are also determined to a substantial degree by the attitudes, statements, and behaviours of coworkers.”* (Fulk, Schmitz et al. 1990, pg. 121)

To the question of how co-workers exert social influence, the authors suggest two possibilities. Overt statements about characteristics of media may be assimilated into evaluation and decision processes of the recipient. They may also discuss particular features, increasing the saliency of those features, or may voice judgements. Secondly, social influence may take the form of vicarious learning from the experiences of others. In this case, one person may decide to emulate the behaviour of another, having observed that the activity was to some extent successful.

Figure 2.1 illustrates the causal links between media evaluations and media use:



**Figure 2-1: Factors affecting media evaluations and media use. Adapted from Fulk, Schmitz et al. (1990, pg. 128)**

Media evaluations are a function of three separate factors. The first of these is media features, which might be objective or fixed and with uniformly salient features, or they could be subjective and socially constructed. Secondly, evaluations will depend upon the skills and prior experience of the individual. Thirdly, as discussed above, social influence plays an important role in media evaluations. Media evaluations and media use are linked in a cyclic relationship. Each will influence the other, because knowledge and experience is picked up through using the medium. There are two other factors that influence media use: task evaluation will determine what the requirements are to carry out the task, and whether certain types of media are suitable for that task. Situational factors include all types of contextual factors such as individual differences, accessibility and availability of training in media use.

The relationships presented in the above model capture some of the key concepts in understanding media use choices and attitudes. An introduction to the sociology of attitudes can be read in the textbook by Zimbardo (1991). In the discussion that follows, some examples of media use and technology diffusion and its associated problems are presented by considering the case of EDI.

EDI is an e-commerce technology which has been in commercial use since long before the Internet became popular with business due to the time and costs savings, and data accuracy it provides. It involves the transmission of electronic data via private lines operated by Value Added Network (VAN) providers amongst trading partners in a supply chain. EDI is therefore rather expensive to set up and to maintain. It is based on propriety technology and therefore also has high switching costs. The larger companies have driven EDI because they are the ones with the most to gain due to having greater order throughput and information transmission requirements (Mukhopadhyay, Kekre et al. 1995). In particular, the availability of accurate and up-to-date information has led to great improvements in inventory management – an example of process innovation. EDI has also had impact upon the administration and upon the organisational structure of companies. Operational benefits are well documented. For example, reduced data and transaction errors, reduced data processing costs, and faster application processes. However, EDI has not found universal acceptance amongst small and medium sized companies, as the costs often outweigh the benefits in such cases.

From the initiator's point of view, this non-compliance is a missed opportunity to reap the benefits of a highly efficient and fully integrated supply chain.

*“This makes it difficult for the large customer to achieve 100% EDI compliance, leaving them supporting both electronic and paper-based systems, and creating a barrier to implementation of advanced supply chain and logistics management techniques.”* (Mak and Johnston 1999, pg. 1)

Riggins and Mukhopadhyay (1999) consider the reluctance of trading partner uptake of EDI and compare the findings of several case studies. They also concentrate upon the perspective of the initiator attempting to ensure widespread diffusion amongst trading partners. Riggins and Mukhopadhyay define two types of risk. Adoption risk exists when trading partner adoption is not always a certainty: the initiator may attempt to persuade partners by highlighting the benefits or by offering incentives. Implementation risk is where trading partners that do adopt might not use the technology to its maximum possible effect. Since the trading partners are dependent

upon one another, this can have a knock-on effect. Riggins and Mukhopadhyay (1994) also show that the issue of integration of the trading partner's internal systems with the EDI system is an important factor in data integrity and therefore has a direct impact upon the expected benefits.

Premkumar, Ramamurthy et al. (1994) identify several characteristics based upon the objective qualities of the technology and the internal situation of the trading partners, that are factors in the adoption decision. They found that relative advantage of EDI over other systems, technical compatibility of the EDI system with trading partners internal systems, and set-up cost were the most important factors that lead to non-adoption. Nault, Dexter et al. (1998) consider the supplier strategies available to combat the risks involved. Two of these are innovation support, which involves supplying financial or expertise resources as an incentive to adopt, and discount pricing, where the customer is offered a lower price after adoption.

Chau (2001) also carries out surveys researching the attitudes of small businesses towards EDI. He splits characteristic factors of influence into three categories. Firstly there is a relative cost and benefits category. We have already given several examples of these factors above. The second group contains factors relating to the degree of organisational readiness of the company, in terms of knowledge about the technology and the ability to use it, and the level of support available both internally in the company and externally from the initiator or supporting industry groups. Chau also includes attitudinal factors - positive or negative predisposition to the technology - and social influence in this category. The third category takes environmental factors into account, the other users in the network, and government and industry groups, which may provide information and expertise about the technology. The author's findings indicate that:

*“The three most significant “inhibitors” to EDI adoption in small businesses are all related to the degree of “organizational readiness” rather than to those factors related to the costs and benefits of adopting the technology”.* (Chau 2001, pg. 1)

Riggins and Mukhopadhyay conclude that:

*“Large organisations initiating these systems with their trading partners will continue to find it necessary to consider subsidizing both the initial adoption and subsequent internal usage of these systems.”* (Riggins and Mukhopadhyay 1999, pg. 1)

The difference of result between these quantitative studies underlines the fact that there are many different aspects to be considered when researchers try to address the question of why technologies do or do not succeed. It may also explain why there are so many theoretical approaches and analytical models of diffusion processes. Issues of communication technology diffusion are complex and ideally require triangulation of research methods to obtain the best results.

The next section focuses upon the developing technology of electronic commerce, highlights some of the issues relating to its diffusion, and identifies some of the business models that are prevalent in these early stages.

## **2.4 Electronic Commerce**

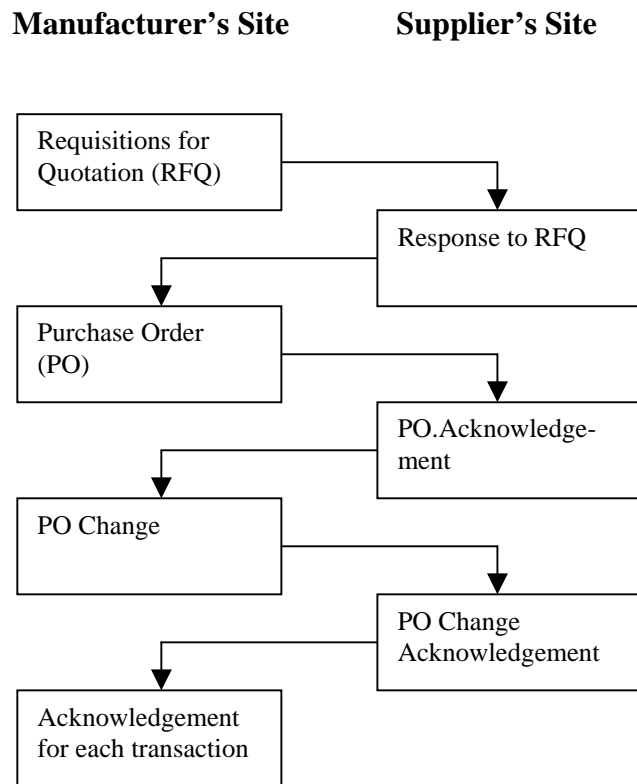
We shall use the definition of electronic commerce supplied by Turban, Lee et al.:

*“Electronic commerce is an emerging concept that describes the process of buying and selling or exchanging of products, services and information via computer networks including the Internet.”* (Turban, Lee et al. 1999, pg. 4)

As hinted above, electronic commerce can also be classified according to the distinct type of networks and technology upon which it is based, and it is worthwhile restating them at this point. EDI is the longer established form of electronic commerce, having been around for in excess of fifteen years. It allows businesses to communicate electronically through predefined message formats. The main problem has been the reluctance of small partners to participate and therefore EDI has not been successful in all market sectors. Internet-based electronic commerce on the other hand has existed for less than half as long: at the time of press approximately seven years (the start date of rapid uptake is variously reported as occurring between 1996 and 1998).

Rather than using private networks, it operates over public-funded networks that were originally designed for the use of academic researchers.

Figure 2.2 illustrates the functional difference between EDI and the Internet by considering the typical flow of EDI messages between a manufacturer and a supplier.



**Figure 2-2: Typical flow of EDI messages, Adapted from (Turban, Lee et al. 1999, pg. 223)**

Requisitions for quotations (RFQs) are announced by the buyer's procurement department which invite potential suppliers to make offers on a forthcoming order. Suppliers are permitted a fixed length of time to submit their offers and quote a price for their services, also via EDI. The bid prices are stored in the buyer's internal electronic catalogue and are accessible by employees of the buying company for evaluation. After the closing date for the competition, the manufacturer will choose from amongst the offers and place a purchase order with the winning supplier via EDI. A message is subsequently sent from the supplier to the manufacturer to acknowledge the receipt of the order (the purchase order acknowledgement). Any

subsequent change in the order will necessitate a further exchange of messages and acknowledgements. EDI networks are also used to transmit invoices, payments, shipping manifests and delivery schedules, hence accounting for the day-to-day transmission of most business documents.

Internet-based EC offers a significant benefit over EDI for smaller companies because it is much cheaper, being based on the public network and open protocols rather than propriety ones, resulting in lower switching costs and lower set-up costs. In addition, many people are familiar with Internet technology through their own home use and find it less complicated compared with EDI. In terms of the business tasks that can be carried out via the Internet, it adds order tracking, product availability and technical details querying. In other words, it allows several additional business tasks to be carried out as well as those listed above for EDI.

One of the most important functions of the Internet and World Wide Web for businesses is the ability to disseminate information via the corporate home page. Sullivan (1999) carried out a quantitative survey which suggested that marketing was not an important function of the corporate home page. However, he argues that a home page would perform the function of “*guiding users towards Web searches more focused on obtaining positive than negative information on the corporation*” (Sullivan 1999, pg. 20), therefore acting as a kind of ‘gatekeeper’ or filter to encourage positive attitudes towards the company. Sullivan argues that corporate home pages act as (1) gatekeepers, (2) uncertainty-reducing sources, and (3) tools that define the corporate image.

Another important aspect of Internet communications is the flexibility of the medium in providing different formats for data exchange. Whilst the Internet can comply well with EDI standards for exchanging business documents via Web forms, etc., it also gives scope for other types of text communication such as electronic mail, hypertext, spreadsheets and various other document formats. In fact, the World Wide Web is much richer in content than EDI because it can integrate different types of digital information and multimedia content. Information richness theory is difficult to apply to e-commerce as a whole because it encompasses a range of different technologies. Whilst multimedia undoubtedly adds another aspect to the corporate Web page, in

most industries applications of multimedia are not usually a core part of business processes. However, the key benefit of the Internet is that it does provide a flexibility of communication that has never been available with EDI.

Timmers (1999) suggests there are nine key characteristics of the Internet which can provide advantages for businesses: 24-hour availability, ubiquity, global connectivity, reinforcement of local presence and relationships, digitisation, multimedia, interactivity, one-to-one relationships, network effects, and integration of information. Clearly, VANs running EDI systems share a number of these characteristics with the Internet. When examining the context of Internet use for supply chain integration, we therefore must note the importance of EDI systems and how they impact upon the propensity of businesses to adopt Internet-based EC. It is quite common for researchers to substitute the term 'Internet-EDI' for Internet-based EC because it is widely regarded to be closely linked with the history of EDI.

In the last section it was discussed why EDI does not always seem a worthwhile investment for many smaller customers. Internet take-up may be motivated by removal of these barriers that existed for EDI. Plenty of evidence suggests that the Internet is seen as an alternative 'transportation layer' to EDI that is able to comply with existing EDI standards whilst having several advantages. For example, Mak and Johnston (1999) describe a case study with the large retail organisation Coles Myer Limited. The company is developing an intelligent gateway system to connect with its suppliers, where the aim is to *"use the Internet-based system, not as a replacement for the existing system, but to leverage the investment in existing systems in order to obtain the benefit of near 100 percent compliance among suppliers."* (Johnston and Mak 2000, pg. 47)

Interestingly, the authors report that two perceived disadvantages of Internet-EDI are that it has reduced security and reliability in comparison to traditional EDI. They sketch a set of principles describing how these two EC technologies could be integrated to provide a solution to benefit all trading partners. This vision is being borne out by recent developments in business-to-business e-commerce, where there is a tendency towards integrating via a gateway or universal translator system several different channels of communication and their corresponding different document

formats and protocols. This will be demonstrated in the detailed case study presented later in this thesis.

Although it may be expensive to maintain and difficult to synchronise different systems, integration provides great advantages in improving internal efficiencies and providing a level of service adequate for the needs of many different customers. Gebauer and Buxmann (2000) describe a conceptual model for evaluating inter-organisational systems in which they assess both the situation of the initiating organisation, and the perspectives of its trading partners using the system. The authors argue that the situation of the partners is critical to determining the success of the system, and present a case study at Lawrence Livermore National Laboratory in which this is shown to be the case.

Not surprisingly there is a similarity to be found here with the conclusions drawn from our earlier discussion of success factors for traditional EDI. Nevertheless, it is clear that with Internet-based EC, as with traditional EDI, it is the larger players that are driving the adoption process. In many cases where EDI has failed to make an impact, Internet-EC is seen as the only feasible way to get smaller businesses online.

The next section examines Internet technology and considers its advantages as a new medium for EC. Some initial comparisons are made between Internet-EC and EDI, and then the issue of how the two might be integrated is considered at length. The discussion is then brought up to date with a review of the short history of Internet-based electronic commerce.

## **2.5 The Arrival of the Internet**

The commercialisation of the Internet has been accompanied by the rapid take-up of networking technology. Not only have new Internet-based businesses appeared, but also many traditional businesses have been developing their strategies for capitalising on these new opportunities by shifting part of their business operations online. Especially in the United States, new electronic markets have sprung up at an

unprecedented rate and companies and their trading partners have been widely establishing electronic links. Suddenly, in April 2000 however, we saw a spectacular drop (>20%) in the stock market due to lack of profitability of (and lack of confidence in) the Internet-only (the so-called 'dot-com') companies (Konrad 2000). This ultimately led to many of them disappearing entirely from the business landscape within a few short months of their inception, despite spending vast amounts of venture capital. Investment funds started to dry up at this point (Olsen 2000) and some commentators were quick to point to these developments as a sign of failure of e-commerce to deliver the expected benefits. However, media coverage has ignored the more mundane facts establishing that EC has become firmly entrenched in the working practices of many large and well-established companies, where it has been very successful in improving many aspects of business operations.

Furthermore, although the failure rate of e-commerce start-ups has indeed been quite high, this is quite normal in comparison to other periods of rapid technological change such as was described earlier in this chapter. It is not an unexpected result that new businesses have a high probability of failure in a very uncertain environment and in their very first years of trading, as explained by Konrad (2000):

*"...The business of the Internet is simply experiencing the kind of natural consolidation that recast many other landscapes, from automobiles to banking."*  
(Konrad 2000)

This view was later echoed by UNCTAD:

*"If the comparison with other disruptive technologies of the past is accepted, there is nothing surprising in the Internet share bubble and its implosion or in the high mortality rate prevalent among early Internet start-ups. Hype, herd instincts and unrealistic business models also accompanied past technological revolutions."*  
(UNCTAD 2001, pg. 6)

Another problem has come about because of hasty implementation of EC systems, leading to problems with performance along with occasional high-profile security glitches which result in poor perceptions of Internet-based EC. Despite these setbacks,

the early stages of Internet-EC growth can provide indicators of future trading patterns and business models. The term 'business model' was defined by Timmers as:

*"An architecture for product, service and information flows, including a description of the various business actors and their roles; and a description of the potential benefits for the various business actors; and a description of their sources of revenue."* (Timmers 1999, pg. 32)

These patterns have been put forward in the e-commerce literature. In Turban, Lee et al. (1999), three models are classified according to who controls the marketplace. The most common model is the mall model, where Web sites are set up and operated by the seller (or by some intermediary on behalf of the seller). Customers visit the Web site that the supplier has prepared, view products or services that are on offer, make comparisons between products and between sellers, and then select the most appropriate options. Benefits to suppliers include increased sales to business while reducing costs associated with order processing, customer service, technical support and confirming order status.

In contrast, in bidding or requisitions for quotations (RFQ) markets it is the buyer (or alternatively, an intermediary on behalf of the buyer) who maintains the market and initiates the transaction. The marketplace is designed to facilitate procurement management such as reduced purchase price (through product standardisation and consolidation of buys) and reduced cycle time (there are no longer delays in waiting for bids). Buyer-controlled markets are set up either by one powerful buyer, or by many small buyers who aggregate their purchases to increase collective buying power. Benefits to sellers include boosted sales, expanded market reach, lowered marketing costs and shortened selling cycles.

These models are best suited for buyers and sellers of raw materials and components within industry supply chains. Large companies favour these arrangements because it allows them to select the participants, and define how their products and materials are traded, and thereby create favourable conditions for themselves. The third type of model is the intermediary-orientated marketplace. The buyers and sellers are businesses who have to deal with many suppliers and many customers, and benefit

from the expertise and understanding brought by an independent intermediary. The intermediary operates a marketplace where buyers and sellers can meet, therefore reducing the search complexities and costs for the participants. When the participating buyers and sellers are large businesses, coupling the EC platform with their corporate systems is very important, and these capabilities are now being developed. The benefits are improved customer service, reduced operations costs and new sales opportunities.

The current EC environment supports many alternatives for the organisation of electronic markets. For example, in an early analysis of e-commerce, Ticoll and Lowy (1998, pg. 24) discuss e-business communities “*networks of suppliers, distributors, commerce providers, and customers that use the Internet and other electronic media as platforms for collaboration and competition*” and classify four possible types:

1. Open market – any trader may join and no single player has overall control.
2. Aggregation – one business controls a hierarchical arrangement.
3. Value chains – hierarchical but highly integrated with the goal of attaining maximum value from the arrangement.
4. Alliances – non-hierarchical value chain with shared vision of the partners.

In this sense, the hierarchy represents the situation where the trade network is arranged around a large manufacturer, and is composed of a large number of suppliers, customers and intermediaries. Benjamin and Wigand (1995) in their early and influential paper, predicted that electronic commerce based on the public network would cause restructuring of trade networks and the introduction of new electronic markets that would potentially threaten intermediaries while bringing more choice to the consumer. The authors defined “single source” as a sales channel linking one supplier with many customers. It is a hierarchical arrangement, with the supplier determining the conditions of exchange. In the terminology of Ticoll and Lowy above, this is equivalent to the definition of an aggregated market. It is evident that in the current electronic networked environment, there are few examples of open markets but many single source examples. Benjamin and Wigand explain the prevalence of single source sales channels as opposed to electronic markets:

1. Many processes demand tight electronic linkages, which are easier to maintain through partnerships between small numbers of firms.
2. Fear of losing profit margins to electronic brokers.

Berryman, Harrington et al. (2000) define three kinds of electronic market, in which they highlight the issue of control over the market as a distinguishing factor: those controlled by sellers (single-source channels), those controlled by buyers, and those controlled by neutral third parties (i.e. intermediaries). This is a similar analysis to that of Turban, Lee et al. described above.

Today, the first type is still the most commonly found arrangement. Electronic markets as envisioned by Benjamin and Wigand (1995) have been slow to appear. They predicted that electronic markets are more appropriate for asset-specific markets where products are easy to describe. If they turn out to be correct, it will be interesting to see if manufacturer controlled markets will survive in the future, under competition from buyer controlled or neutral markets. They may only survive if the company has a strong brand, or positive reputation, or many loyal customers. All the classifications we have been discussing are based on the hypothesis that all types will co-exist on the Internet, which is itself perhaps a questionable assumption.

Another possibility is that online markets created by manufacturers may also allow competitors to sell their products. Such markets can become more successful and profitable themselves than the manufacturer's direct sales operations (e.g. SABRE and parent company United Airlines) (O'Connor 1999). These markets attract the competitors because they favour the seller more than in other distribution systems, and are especially attractive to smaller competitors because of the high costs of setting up a market. Some traditional intermediaries certainly are threatened by developing markets that allow the manufacturer to sell direct. We shall discuss issues of disintermediation by considering the tourism travel industry, and in particular the distribution of tickets for air travel in section 2.8.

First, however, we shall briefly discuss the new products and services that have resulted from the development of electronic commerce. We can identify new products such as e-commerce software for creating electronic malls and markets and

networking hardware, in addition to products where the Internet has changed the distribution process such as digital documents (e.g. academic papers) and ticket reservations. New services include the EDI and Internet supporting infrastructure including access providers such as VANs and Internet Service Providers (ISPs), digital document handling services, and payment facilitators. All of these services represent new niches for intermediaries. In addition we have neutral markets set up by third - party intermediaries to match buyers and sellers, thus augmenting the traditional role of the intermediary. This role encompasses: assisting the buyer in the tasks of searching and evaluation, needs assessment, product matching, risk reduction, and product distribution and delivery. This benefit suppliers by creating and disseminating product information and awareness, providing information about customers, reducing exposure to risk and reducing the cost of distribution. So long as these needs exist, clearly there will continue to be opportunities for certain types of intermediary.

It is also possible to classify electronic commerce according to the type of system by which it is facilitated. An interorganisational information system (IOS) can be defined as a networked information system used by two or more separate organisations to perform a joint business function. The business relationship and transactional arrangements are defined in advance. The traditional IOS is based on EDI standards, but since the appearance of Internet technology, many companies have implemented systems based on Internet protocols and software in order to extend connections to partners that were previously outside the scope of their IOS. They have been able to do this due to the lower cost structure, lower complexity and better availability of the Internet compared to EDI.

Internet technology was first used by companies to create internal systems linking employees called intranets. An extranet, on the other hand, is a collaborative network that uses Internet technology to link businesses with suppliers, customers, or other businesses that share common goals (Watson and McKeown 1999). In other words an extranet is a more recent type of IOS. Some compare the dichotomy between hierarchies and markets with that between intranets and extranets (Gebauer and Buxmann 2000). Research (Murphy 1998) suggests companies moving away from intranets towards extranets because it allows them the advantage of tighter integration

and coordination of activities across business partnerships. Extranets foster collaboration because they enable access to internal systems and data of business partners. In the eyes of Watson and McKeown, extranets constitute a third form of electronic commerce:

*“Extranets do more than extend IOS to a greater number of partners. They offer a new way of fashioning interorganisational structures by altering information structures and decision functions. Extranets are further evidence that the widespread adoption of Internet technology will fundamentally change commerce.”* (Watson and McKeown 1999, pg. 43)

## **2.6 The Value Chain and the Impact of EC**

Interorganisational systems can therefore be thought of as systems to link partners in the value chain model. This model describes how the different stages of business operations are organised, including all processes involved in designing, manufacturing, and distributing products from the initial blueprints to the final delivery to the end user. Each step in the chain adds value to the overall operation. Traditionally, this perspective views a company as a chain of activities. Porter (1985) distinguishes between value chains, describing activities internal to one company, and value systems, describing several organisations, each carrying out different processes and linking them with its trading partners. However, we are not going to make the distinction here, as many researchers use both terms to discuss interorganisational processes.

A large company may control several steps in the value chain and will obviously be aiming to improve in as many areas as possible. However, extensive value chains often suffer from problems with the information flow, where some of the links might not be as good as others in providing the necessary information. In order to ensure the greatest benefits are attained, all of the links should perform well. There should be no weak links in the chain acting to block or suppress the flow of information (in both directions). The development of new ICT, and in particular e-commerce technology,

has the potential to improve the networking aspects of the value chain. This includes design and production, inventory management, distribution, customer relations management and marketing operations.

The availability of EC technology creates a tension between the more technologically orientated companies wishing to strengthen the links, and their business partners, some of whom might be reluctant to change their existing processes. The most technologically sophisticated companies normally are the initiators of technological solutions, and they drive the improvements in the value chain. Many case studies have described such companies initiating electronic markets based on the seller-orientated or buyer-orientated models described earlier. These companies are normally the larger companies which head the hierarchy, have a large budget to invest in ICT and stand to gain the most from such a transformation.

The value chain perspective, which focuses on collaboration between partners to share information that is proprietary or strategic (e.g. product forecasts and replenishment plans) is nowadays recognised as very important. The key to why this perspective is so important is that companies are increasingly under pressure to streamline their activities and improve productivity. To do so they will have to identify which parts of their business are core and focus on improving these areas, whilst outsourcing other parts of the business and coordinating them with their partners.

ICT is therefore important in this regard because it greatly facilitates in linking and coordinating those activities undertaken jointly. It enables both functional and productivity improvements of the value chain. For example, Benjamin and Wigand argue that:

*“It is becoming increasingly difficult to delineate accurately the borders of today’s organizations. Driven by IT’s ability to produce ever cheaper unit costs for coordination, organizations are implementing, increasingly rapidly, new links for relating to each other...the new forms indicate an ongoing transformation of value chains due to technological change.”* (Benjamin and Wigand 1995, pgs. 62-63)

Borrowing the idea of the value chain, researchers have gone on to discuss the value chain in which interorganisational processes are linked together through electronic networks, to the benefit of both customer and supplier. This concept is known as the 'virtual value chain'. Swaminathan, Smith et al. (1998) describes them as dynamic virtual networks of trading partners and service providers, which form and reform dynamically. The emphasis is therefore upon improving efficiency through coordination of networked processes, whilst retaining the flexibility of market-like interactions. This challenge of e-commerce technology for business is spelled out by Hackney and Burn:

*"This new business paradigm is one where core business processes need to be rethought and redesigned, new organisational forms and interorganisational forms may need to be developed and where the emphasis will be upon collaboration rather than competition within the virtual market". (Hackney and Burn 2001, pg. 1)*

The objective therefore is to use e-commerce technology to streamline the value chain. This will involve bypassing some steps in the old value chain, and making others more efficient.

A useful distinction can be made between push – type and pull – type market systems, both of which are used in business-to-business trading arrangements. The two models are distinguished by the position in the value chain where products are allocated to the customers. In push - type systems, the finished goods are allocated from inventory that is held by the manufacturer or intermediary. At the point of ordering, they have already been manufactured and are normally immediately available for collection or delivery. In pull - type systems, the goods are allocated at the top of the value chain, before the manufacturer begins the production cycle. Of course there are many intermediate positions we can consider, but in general push-type systems are said to have some stages of production preceding ordering.

A similar classification is made by Burn and Hackney (2000) who describe the Order Penetration Point (OPP) and the Value Offering Point (VOP) to identify where the supply and demand chains meet. Moving these points further back in the chain represents large savings in inventory costs to the manufacturer, though slowing order

fulfilment and delivery. Now, EC is generating renewed interest in supply chain management (SCM) because of the potential to speed up interorganisational processes which comprise the value chain. Traditional malls do not easily support pull - type systems because of the length of time required to process orders, produce goods, arrange shipping and make deliveries. However, electronic commerce provides an excellent solution where pull - type systems are required because cycle times are reduced; this is a very important factor for 'made to order' items. It supports customisation of items and also order tracking, both of which are important value-adding services for pull - type systems.

In view of the advancement of ICT for networked processes and the potential value chain improvements that can be achieved, we must now consider how value chain reorganisation will be coordinated, which companies stand to gain from it, and which are at risk. In the next section we look at some examples evidencing that changes of this nature have already started to happen. In particular we examine what role do intermediaries play, in which situations are they under threat of disintermediation, and what new opportunities exist for them.

## **2.7 Some Empirical Examples**

There are now many examples in the literature of e-commerce that have empirical content and improve understandings of the impact of the new technology and support the theoretical arguments that have been put forward. Case studies are one such approach to empirical research that we promote in this thesis. Since the case study is a key component, we present an outline of the methodology in chapter four. In this section we shall therefore not elaborate much upon the research methods used but rather focus upon the conclusions of the studies.

One research question often posed concerns the identification of industries which might be at risk from the development of e-commerce. For example, many researchers have focussed upon financial markets (Bakos 2000) tourism and leisure (Chircu and Kauffman 2000), (McCubbrey 1999), or car dealerships (Watson and McKeown

1999; Marshall, Sor et al. 2000) as markets potentially subject to upheaval. Particularly anticipated as at risk are those companies involved in facilitating the information and communication handling requirements of other customers and suppliers, where those functions are open to potential improvements through the use of computer networks. In other words, the functions of intermediaries are under threat of discontinuity. Other researchers posit competition from Internet-only companies, the so called 'cybermediaries' e.g. (Jin and Robey 1999) that may come to dominate. In this section we examine these claims and discuss whether the findings are consistent with our earlier analysis of changes in the distribution system due to the introduction of railway, telegraph, and other technologies.

In the early stages of development of the Internet, EDI and other electronic networking technologies, researchers argued that we would see much disintermediation (Malone, Yates et al. 1987) (Tapscott 1996) i.e. traditional intermediaries would be bypassed in the process of reshaping certain industrial sectors. More recently, some researchers have started to question whether the disintermediation of traditional intermediaries is as universal as was first suggested. For example, we consider the more sophisticated model of Chircu and Kauffman (2000) who introduce the concept of the intermediation / disintermediation / reintermediation (IDR) framework which they argue applies to the introduction of new IT innovations that cause structural adjustments. The idea is that changing market conditions also bring new opportunities for intermediation to which the threatened intermediary should adapt, or reintermediate:

*“A disenfranchised traditional player is able to compete again by leveraging technological innovations with cospecialized assets.”* (Chircu and Kauffman 2000, pg. 7)

There unquestionably are many new opportunities for intermediaries in the online commercial environment. An intermediary has access to large amounts of information and is therefore able to augment the range of increasingly sophisticated information filtering, compiling and sorting services that can be provided. The emergence of new roles of aggregation, trust provision, facilitation, matching, monitoring, and integrity guarantor provide these opportunities. Intermediaries also provide one-stop shopping,

and will fulfil the role of price comparison enablers if seller-orientated market-makers are reluctant to do so.

For example, the U.S. air travel industry has been extensively researched in relation to intermediation as it was one of the first, and the largest, industries to undergo structural change due to the introduction of electronic networks and EDI technology. Air travel encompasses both business-to-business and business-to-consumer markets, since customers can be either corporations or leisure consumers. In this market, the intermediary, i.e. the travel agent, carries out information-intensive activities that are considered easy to disintermediate, and it could therefore provide a counterexample to the disintermediation hypothesis of Malone and others.

As explained by O'Connor (1999), the airlines originally began using computerised reservation systems in the late 1950's because it enabled them to find information and make bookings more efficiently. As the costs of computing decreased, they began to install them in the offices of travel agents so that they could make bookings for themselves rather than telephoning the airline to make enquiries and reservations. This benefited the travel agents because it gave them access to up-to-date information, speeded up the booking process, and reduced communications costs. It also benefited the airlines because it was cheaper for them to install terminals than to employ more staff. to handle telephone reservations. Deregulation in 1978, spurred the growth of the industry and increasing competition between airlines, and the reservation systems evolved into global distribution systems (GDS) upon which several airlines would have their flights listed. The GDS also developed to allow hotel rooms, car hire, concert tickets etc. to be booked, a service which became increasingly important for the travel agents after the airlines imposed a cap upon their commissions. Today, there are just four major GDS, each of which are operated independently of their parent airlines. However, new forms of electronic distribution which utilise the Internet are now appearing which threaten to disrupt the structure of the industry.

McCubbrey (1999) addressed the question of whether or not traditional travel agents would lose significant amounts of business to new Internet-based competitors. A panel of seventeen industry experts forecasted a reduction in the number of travel agents of 25% between 1997 and 2002, and a reduction of 42% between 1997 and

2007, and estimated a fall in market share for both national / global agencies and for independent local agencies. The author concludes that *“travel agents face serious competition from both airline direct services and from cybermediaries”* (McCubbrey 1999).

This analysis points towards the intuitive conclusion of widespread disintermediation in this industry. But is it supported by other research? Chircu and Kauffman (2000) carried out a longitudinal study of the corporate travel industry over the period 1995-1999 in which they investigated the activities of five representative travel agencies developing services for online booking via the Internet. The authors reported the significant impacts of online bookings on the strategic positioning of the five companies. The first company to enter the market was an e-commerce only company, but shortly thereafter the established travel agents started to develop their own computerised reservation systems and regain market share. Three distinct reintermediation strategies were identified: forming alliances for technology development, portfolio partnering with several technology providers, and strategies involving technological focus, market timing and pre-existing industry expertise. The reasons the traditional travel agents were able to reintermediate are related to the ease with which existing services could be imitated, the ownership of cospecialized assets of traditional agents that could not be imitated (for example, the ability to negotiate with suppliers, knowledge of non-routine travel reservations, etc.), and economies of scale that come with having a large existing customer base. The authors suggest that their analysis might generalise to many other industries affected by e-commerce, concluding that:

*“...traditional nontechnological middlemen have a greater opportunity than heretofore claimed by most analysts to reintermediate in the long run, and even to strengthen their position in the market as e-commerce-able intermediaries”.* (Chircu and Kauffman 2000, pg. 35)

This research appears to throw doubt over our earlier intuitive conclusion. However, upon closer inspection of this study, we can argue that Chircu and Kauffman consider only the large companies participating in Internet-based e-commerce. For smaller companies, such as those considered by McCubbrey there may indeed be risk of

disintermediation. We can accept both the conclusion of Chircu and Kauffman that established travel agents will be able to leverage their existing expertise to fight back against the cybermediaries, and also the conclusion of McCubbrey (based upon the intuition of 17 industry experts) that small companies do not have the financial backing and technical know-how to avoid disintermediation risk.

The example of the travel distribution industry we have explored here illustrates that it is not easy to forecast general outcomes, and that in some cases multifaceted interpretations can arise. It is clear that the existence of a disintermediation risk depends on several factors, including what kind of products are being exchanged, how the market is currently structured and how much market power and assets the intermediary has.

Putting these findings into the context of the chapter, it can be noted that there are few examples of the IDR cycle suggested by Chircu and Kauffman in the historical studies of the late nineteenth century. There is some evidence of merchant middlemen being disintermediated and then regaining their role as commission agents working in partnership with the manufacturers. This could be interpreted as reintermediation with a change in power relations, the manufacturer becoming more powerful and therefore dictating the terms of the relationship. In general, however, the historical perspective does not suggest that intermediaries, once disintermediated, can easily find a new role in the marketplace and at the same time retain their independence. Upon reflection, Chircu and Kauffman appear to take a rather optimistic view of reintermediation.

Looking at the more general picture of the impact of e-commerce, we can identify structural change, new business models and roles for intermediaries in many market sectors. For example, McIvor, Humphreys et al. (2000) discusses the impact of EC upon inter-organisational processes by means of analysing three case studies. Case one shows how the distributor is carrying out the traditional procurement function which was traditionally done by the customer, and case two describes an electronics manufacturer devolving engineering design work to its suppliers. These cases exemplify how e-commerce has allowed the O.P.P and V.O.P to be moved back in the supply chain. The third case is an example of how a neutral market can be set up. Case three illustrates an intermediary coordinating through an Internet-based inter-

organisational information system, the export of commodity products of small Chinese supplier organisations to US retailers.

Both seller-orientated and buyer-orientated types of market can be observed on the Internet. Cisco Connection Online (Turban, Lee et al. 1999, p211) is an example of the first type and LLNL's Zephyr (Gebauer and Buxmann 2000) is an example of the second type. There are many markets also using exclusively EDI networks, and many more now offering a mixture of Internet and EDI, such as the air travel distribution industry.

An example of the mixed strategy pursued by many organisations is provided by BASF UK & Ir<sup>1</sup>. BASF Plc. and its subsidiaries participate in various forms of EDI/EC markets. The company has, for a period of four years or more, used EDI links with its larger partners. However, smaller partners needing to process just a few orders per month cannot justify the expense of the EDI link. Recently there has been much development of extranet networks: in a period of just five months since it was put in place, one eighth of customers have converted from traditional procurement to extranet-based procurement. At BASF extranet is to a large extent replacing EDI.

In addition to developing their own markets for each particular business unit or product, BASF also participate in neutral or intermediary-controlled markets for chemical products which have several investors (including BASF). These intermediary-controlled markets benefit all participants because they save the expense of individually setting up the markets and also the expense of attracting business partners to them. It is also more convenient for businesses to carry out all their transactions and the supporting communications within one electronic marketplace.

BASF makes very limited use of e-markets that are controlled by the companies it is doing business with. It is only in the case of small and non-critical transactions, such as the procurement of stationary items, that the company will use such markets. In the chemicals industry, large companies are leveraging their market power to create

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<sup>1</sup> The author obtained these data from interview at BASF UK & Ireland.

markets that they control and set the terms for participation, whilst avoiding entering markets controlled by business partners.

In this section we have discussed the impact of electronic commerce upon the role of intermediaries, examining theories found in the literature. These have been illustrated with case studies drawn in particular from the air travel industry, and we have also put these recent developments into the context of a historical perspective on technological change.

To summarise, many opportunities for intermediation exist with low barriers to entry. Competition can be expected to be tough and there is danger of disintermediation if not sufficiently value-adding. However, intermediaries that can rely upon their knowledge and cospecialised assets will be fully able to share the benefits of e-commerce. Further, small companies may be more at risk, whereas larger companies can leverage their existing customer base and market share to speedily acquire the new technology.

We have given examples of the different types of market models facilitated by e-commerce, and shown that large companies are pursuing a mixed strategy of participation, as well as continuing to use both EDI and Internet EC in combination.

## **Conclusion**

This chapter reviewed the literature on e-commerce and intermediation, looking at various perspectives including an historical analysis of changing marketing and distribution patterns, transaction costs analysis of the efficiency of exchange, and understanding market relations from the perspective of value chain. This latter was found to be the most appropriate level of analysis when applied to technological change in the electronic commerce era.

The first section examined the historical tendency towards hierarchical organisational structures, vertical integration, and domination of supply and distribution by large manufacturers. These studies suggested that, although the type of distribution system depends upon the nature of the market and the nature of the product, there are broad similarities across large sectors of industry.

The next section showed how this trend stands in contrast with more recent economic conditions that point towards more flexible value systems composed of tightly collaborating organisations with specific roles. The section then reconsidered the advantages of markets compared to hierarchies, and the relevance of this dichotomy in the electronically networked era. Nevertheless it was seen that the earlier discussion provided a worthwhile and relevant basis for analysis, by framing our understanding of market and value chain restructuring issues relating to e-commerce.

Section 2.3 re-examined the theories of technology impact in the light of this understanding of value chain relations. The main problem for the initiator of an e-commerce system is to encourage a sufficient number of business partners to participate. Studying this problem involves considering a great number of sociological issues relating to the design and use of new technological systems. However, there are many similarities with problems encountered in the introduction of EDI systems in industry over the past fifteen years.

Section 2.4 discussed whether the Internet could be thought of as a replacement for EDI, or whether EDI provides certain unique benefits. These issues are also discussed

extensively in the later case study and thus this section is an important starting point for interpreting the fieldwork findings. Analysis of the impact of e-commerce indicated a shift towards more tightly coupled interorganisational links, and emphasised the importance of the value chain perspective for management. Managers are increasingly coming to see e-commerce as a strategic imperative: companies that initiate e-commerce systems can take advantage of both market flexibility and close coordination. This is likely to provide opportunities for improving the performance of the whole network.

Section 2.7 addressed hypotheses considering the scale of disintermediation, and the IDR hypothesis which recognises cycles of reintermediation. This led to a discussion of the emergence of new roles for the intermediary and to the question of which market models will dominate on the Internet, and whether these different models can co-exist. Taking the example of travel and tourism, findings pointed towards limited disintermediation amongst small firms perceived to be most at risk. For large firms it suggested low risk of intermediation, but implied that strategic reorganisation was necessary.