

# A Study on the Electronic Communications Technology and Electronic Commerce for Small-to-Medium Enterprises

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## I. Introduction

This paper results from an extensive literature review which was undertaken as the initial part of a research programme evaluating the impact of ECT(electronic communications technology) on business organizations and processes.

The use of EDI(electronic data interchange), as a trading mechanism in business has been discussed in many articles(Tracy, 1991; Robinson and

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Stanton, 1987) and in numerous diverse ways(Sloane, 1992, b). Many authors affirm the urgency of EDI implementation, but do little to show, in substantive terms, how particular businesses can benefit(or not) from the implementation of this technology. In particular, it is often difficult for the SME(small-to-medium enterprise) to see the benefit is the coercion by a large customer or supplier who has already embraced the technology and can force trading partners to follow the same route. EC(electronic commerce) or e-Business can be defined as "...the electronic exchange of all information needed to carry out inter-organizational transactions, which are specified predominately by structure and standards"(Cameron, 1994) or more simply as 'doing business electronically'(Cevic, 1995).

The term EC refers generally to commercial transactions, involving both organizations and individuals, that are based upon the processing and transmission of digitized data, including text, sound and visual images and that are carried out over open networks or closed networks that have a gateway onto an open network(U.S. Department of Commerce, 1998). Although much media attention has focused on on-line merchants selling books, wine and computers, the vast majority of products marketed electronically business-to-consumer are intangibles such as travel and ticketing services, software, entertainment, banking, insurance and brokerage services, information services, legal services, real-estate services, and increasingly health-care, education and government services.

It has been suggested that many companies are aware of the possibilities that EC can provide, but are afraid to adopt it as a medium for doing business(Bradeško, 1995). The reluctance of SMEs to implement ECTs such as EDI has been widely documented(Garcia-Sierra, Moreton and Sloane, 1994; Hoogeweegen and Wangenaar, 1995; Meier and Suhl, 1995; Gebauer, 1995; Parker and Swatman, 1995).

SEMs are major and growing provider of employment and can play a vital role in electronic regeneration(Beaver and Harris, 1995). They will quickly fail if they do not perceive or acknowledge the impact that environmental change has on their business(Kitchen and Proctor, 1995).

Hence, in order to optimize both business development and competitive advantage, it is of paramount importance that the contribution of contemporary, relevant and focused technologies which enable EC are maximized so that the future development of economic growth, prosperity and employment choice can be achieved(Beaver and Harris, 1995).

Many SMEs however regard such technologies as providing only 'a faster mail service'(Farhoomand and Boyer, 1994). This paper therefore focuses on the significant benefits which SMEs can gain when embracing and implementing EC, and also discusses some of the slow rate of acceptance of these technologies by such companies.

Table 1. EDI ladder of development

Stage	Typical EDI development
0 Base	No EDI
1 First use	EDI with one customer/ supplier
2 Extension	EDI with a number of customers or supplier
3 Link stage	EDI with suppliers and customers
4 Integration	Integration of EDI with business systems
5 Advanced	Use of EDI for internal/external functions
6 Innovative	Instigation of new EDI developments and research

## II . EDI

### 1. Categorizing the Business Use of EDI

The development of any business system is complex. This is especially true of an electronic system. It is, therefore, difficult to summarise the complete range of possibilities within a useful summary chart, indeed it would a multi-dimensional matrix to provide a more robust description. However, business often develop their use of technology in a step-wise

manner, as described by many authors including Nolan(1979), McFalan and McKenny(1983) and Galliers(1991). Following on the from these, the EDI ladder of development as shown in Table 1 can be used as a tool to categorize the business use of EDI. The ladder is intended to give a broad view only. There will be individual enterprise that will not take this exact progression through EDI implementation. For example, it is feasible that a company could start trading with one customer or supplier, and then expand their links to include several customers and suppliers. It is also conceivable, though unlikely, that stage 5 could be a business objective without stage 4 being considered.

The value of the ladder lies in its use as a tool to categorize the development of EDI within an organization. This can then be to develop a specific analysis for that particular business given the stage of the ladder they have reached. The following sections develop an analysis for stage 0 to stage 1 transition. The other case that could benefit from analysis are left discussion at a later date.

## 2. Justifying EDI in SMEs

Although a general analysis could be performed, it is often the case that SMEs are overlooked in the context of EDI. The following analysis aims to redress the balance and provide a basis for fully evaluating the argument for the use of EDI in SMEs. A small to medium enterprise is generally defined to be a business with less than 500 employees(Harris, Parfett, and R. Sarsone, 1989). There is, obviously some scope for variation within this broad band of companies. The smallest of businesses may not be able to take full advantage of the benefit of EDI, but there only needs to be a small turnover with one EDI-committed customer to influence the decision in favour of EDI.

### III. e-Commerce

#### 1. The Reluctance of SMEs to Adopt ECT

It is widely argued(U.S. Department of Commerce, 1999; Greenstein, 1993; Roboson, 1994) that national and international information infrastructure encompasses an increasingly broad spectrum of activities, ECT such as EDI, Fax, E-mail, are becoming the new de facto standard of communication in today's business environment. However the nature of EDI in particular has meant that it is primarily driven by large organizations(Amos and Cooper, 1995) even though the development and convergence of computer and communication technologies have made it technically and economically feasible for a small business to be active at a global level(Jiang and Conrath, 1995). Until today, however, 'the revolution in inter-organizational communication' has been described as still far away and the number of firms using such technologies remain quite small(Byles, 1993; Gebauer, 1995).

Many small to medium size businesses are suppliers to large organizations and if there is an acceptance problem amongst these businesses, this will ultimately have an affect on the larger organizations, who already implement EC, because the maximum benefits of adopting EC can only be attained when full integration is present amongst both parties(Parker and Swatman, 1995). It is clear that many SMEs are being forced to adopt ECT due to fear of losing existing or potential business partners(Gebauer, 1995).

Companies generally are becoming increasingly aware of the necessity to exchange computer generated information across organizational and national boundaries. However such inter-organizational and national boundaries. However such inter-organizational applications have been delayed by a general lack of understanding of potential strategic benefits

which can be derived from their effective utilization(OECD, 1997; Parker and Swatman, 1995). One of the most commonly documented reasons for SMEs' reluctance to utilize ECT is the general lack of understanding of the benefits available(Hoogeweegen and Wagenaar, 1995; Amos and Cooper, 1995). If SMEs are to be encouraged to adopt ECT it is therefore important to educate them in the potential benefits of such technologies and to demonstrate how these benefits can be directly applied to their enterprises.

## 2. The Benefits of ECT to SMEs

The benefits attributable to ECTs are not limited to the replacement of the inefficient and costly paper-based document flows within and between organizations as may well be assumed by SMEs.

Organizations can reap more significant benefits from these technologies when viewed as strategic resources(Pickerill, 1993), even standard IT (information technology) applications, when accompanied by corresponding changes in internal business processes, can result in significant advantages(Venkatraman, 1994; Grover, Fielder and Teng, 1994). EC can enhance business processes and improve internal communications for a single enterprise or it can be applied on an enterprise-wide basis(Hudson, 1995).

The strategic outcomes of unitizing EDI included better customer service, reduction in training costs; a reduction in operating cost, automatic cross-quoting at renewal; processing capability at any terminal; and standardized documentation.

Since its inception some 50 years ago, EDI has matured from functioning much like a simple fax-like facility to a sophisticated electronic highway, and can now create a more efficient communication link between buyers and sellers, resulting in a strategic trading relationship. Many SMEs already use relatively standard technologies such as fax, although there are inherent problems with fax technology, for instance delivery

notifications and plain paper writing are only possible on some fax machines. Also there is the need to re-enter information from a fax into a computer applications capable of processing the data. Every time data is entered manually in to a system, there is a chance of error(Blum, 1990). EDI helps to eliminate these errors in information systems.

EDI is capable of providing greater efficiency and enabling the development of strategic partnership with customers and suppliers. In the long term EDI will involve the entire trading cycle and a range of related information. In this way it is superior to fax as available purchasing time is dramatically reduced, for instance orders of small quantities can be more frequent which is consistent with JIT(just in time) philosophy in manufacturing and QR(quick response) technique in retailing.

The large range of benefits that can be accrued from EDI implementations are widely documented(Blum, 1990; Parfett, 1992; Robertson, 1992; Trauth and Thomas, 1993). Direct benefits include cost savings in personnel and paper, streamlining of administration, error reductions and time savings. In a highly competitive market, EDI can be a powerful business tool as, for instance, the ability to offer significant cuts in product delivery time may be the difference between winning and losing a contract. In view of the fact that many large organizations are demanding that their smaller suppliers implement EDI, those who do adopt will have a competitive edge against those who do not. Those enterprises who fail to adopt such ECTs will inevitably find themselves losing both existing and potential contracts.

The benefit that can be accumulated by EDI implementation can be divided into three categories: strategic benefits-which will effect the very business the company is undertaking; operational benefits which are of major importance to the daily operations of the company and opportunity benefits which are seen as offering potential future advantages(Parfett, 1992; Leyland, 1993; Sloane, 1994; Galliers, Swatman and Swatman, 1995). Strategic benefits for SEMs utilizing EDI arise from the improved service provided to customers. This almost inevitably leads to an increase

in business and allows SMEs to gain access to new markets and move to global operations(Robertson, 1992). In SMEs where speed and accuracy of the ordering and invoicing system is vital to the main operations, EDI can provide a faster trading cycle(Blum, 1990). EDI not only streamlines administration, but also enhances flexibility in manufacturing, particularly throughout the supply chain which is essential to SMEs that utilize the JIT technique.

The main operational benefits that can be accrued by EDI include reduced costs, improved cash flow and security and error validation(Blum, 1990; Sloane, 1994). One of the major savings that can be offered to SMEs utilizing EDI is the reduction in document costs. The level of these cost savings can be quite substantial and result mainly from the cutting of paper and postage bills, a reduction in money tied up in stock and a reduction in manual processing methods. EDI will enable SMEs involved in distribution to send accurate and timely invoices. It has been acknowledged that customers have reported a vast improvement in matching invoices with purchase order and deliveries, and reductions in the number of errors and queries of those enterprises that employ EDI technology (Parfett, 1992).

The opportunity benefits achieved by SMEs utilizing EDI include enhanced image in the market-place and competitive edge. As mentioned earlier, as more companies insist on EDI trading, so the companies offering this service will enhance their chances of securing a wider choice of trading partners. An understanding of all these benefits is therefore important if a company is to adopt such technologies effectively.

#### **IV. The Role of Education**

The importance of effective education has been highlighted as a way in which to foster higher levels of EDI adoption in SMEs(Parker and



Swatman, 1995). The need to educate SMEs senior management about the strategic benefits which can accrue from the use of EDI and telecommunications has been advocated for many years(Keen, 1986). It is considered that the key to a companies adoption and strategic use of this technology is due to the active support and awareness by senior and upper management(Keen, 1986; Willcocks and Mason, 1987). It is therefore suggested that, if the attitude of SMEs owners or managers can be altered through education thereby promoting an understanding of the strategic benefits, a 'proactive' approach towards these technologies will result, including the adoption of EDI.

One popular technique that has been used world-wide to promote and educate business people and trading partners about EDI involves running which can arise from utilizing ECTs(Harris, Parfett, and Sarson, 1994). However, the effectiveness of this technique could be disputed by Pfeiffer(1992) whose survey demonstrated that seminars had a minimal impact on the decision to adopt such technologies. Other factors especially pressure from major customers, were much greater determinants for adoption.

Another potential promotional activity is business simulation, a laboratory-based approach that enables concepts of inter-organizational international trade using ECTs to be taught to owners or managers of SMEs. It has been suggested that business professionals acquire knowledge more effectively when they are given the opportunity to experiment with the concepts that they are anticipated to use and apply in their own companies(Hoberman and Mailick, 1992; Wagenaar, 1992; McCubbery and Gricer, 1994). Hence this promising laboratory-based approach enables owners or managers of SMEs to adopt a role in laboratory-based companies and to trade in simulated business situation with other laboratory-based companies using actual EDI software, telecommunications and private and or public infrastructure facilities. This provides hands-on experience of handling EC and has been found to be an interesting method which enhances understanding of the concept being taught(Parker and Swatman,

1995). There are obvious benefits from utilizing such techniques and these may possibly be maximized even further if a hybrid of simulation and a laboratory-based teaching approach is used simultaneously; potentially providing a more effective educational and training programme.

When educating SMEs about EC implementation, the potential for failure must also be addressed. In this context it is worth considering the benefits to the management process described by Ward(1994). This process considers that Information Systems or Information Technology investments should be considered as outcomes(which will always occur) rather than benefits(which may or may not occur). This will take into account positive, negative and expected/unexpected outcomes. By considering these four aspects of what is recognised as the Benefits Management Matrix and enterprise will improve its ability to manage benefit delivery, hence maximizing the positive outcomes and minimizing potential negative outcomes. This can be achieved by good management practice within SMEs and therefore used to optimize any particular investment benefits that may remain.

## V. Conclusion

In conclusion, it can be seen that those SMEs who adopt EC can gain economic advantages over those who do not. If SMEs are to survive amongst their larger trading partners and between themselves, the implementation of ECTs such as EDI are essential.

It has been stated that EDI is "only one element in the electronic market-place"(Sarson, 1991) where e-mail, fax and interactive database access from additional components of paperless trading suggest that it will take for EDI to achieve widespread usage.

EDI has firmly established its place within many businesses and its potential as a vehicle for inter-organization business is substantial. It has

built on new technologies and as these technologies have improved so has the exchange of information as EC.

As ECTs are expanding so must their exploitation by SMEs if they are to successfully compete within today's economic climate. It is obvious that there is still some reluctance for SMEs to adopt such technologies, so it is vital, that they are encouraged to accept EC in ways that are suggested in this paper, and that measures are taken to explain their impact.

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## 국 문 요 약

### 중소기업을 위한 전자교환기술과 전자상거래에 관한 연구

곽두진\* · 공문수\*\* · 주원식\*\*\* · 김성국\*\*\*\*

본 연구는 기업의 경쟁전략으로서 크게 공헌하고 있는 전자교환기술, 특히 EDI(전자자료교환)의 다양한 이점에 대하여 기술하고 있다. 선행 연구된 문헌을 통해서 중소기업이 전자적 기술을 채택하지 않으면 안 되는지에 대하여 살펴보았다. 이 연구에서 중소기업에서 전자상거래 기술을 완만히 수용하는 주요 요인을 밝혔는데, 이러한 요인으로 인하여 중소기업에서는 전자상거래의 장점을 살리고자 전자교환기술을 광범위하게 채택하고 있다. 향후 이 연구는 이러한 주제에 대하여 심도 깊은 연구를 하고자 한다.

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