

■ GLOBAL PERSPECTIVE

The Impact of Electronic Data Interchange (EDI) on SMEs: Summary of Eight British Case Studies

Electronic data interchange (EDI) has its roots in Morse code and the telegraph technology of the 19th century. In its present form, it dates from the 1980's and is a product of the synthesis of information and telecommunication technologies. EDI can be defined as the electronic transmission of information or documents between the computer systems in different organizations based on a standard, structured, and machine-retrievable format. EDI has been widely accepted as an essential business tool used to facilitate inter-organizational transactions and sometimes to enhance internal operations by integrating internal and external systems. It is also claimed to achieve quick response and just-in-time stock handling in order to gain competitive advantage. In addition, it is claimed that EDI improves trading relationships by sharing information between trading partners.

Although many EDI publications have become available, there are very few studies of the effect of EDI on small firms, and those that do exist are contradictory. There may many reasons why this may occur, for example: the studies may be uncritical because they are premised on an evangelical notion of EDI (EDI World Institute 1995); they may be written from the premise that SMEs are merely miniature versions of large enterprises (Holland, Lockett, and Blackman 1992; Pfeiffer 1992; and Hørlück 1994); they may be written from the perspective of large enterprises who wish to extend their span of control to SMEs using EDI (Iacovou, Benbasat, and Dexter 1995); they may be written from

an organizational rather than inter-organizational perspective (Parfett 1992); and so on. The purpose of this study is to report first-hand experience of the effect of EDI in a sample of small firms in the UK from an independent perspective.

The Study

A questionnaire survey was used primarily to make initial contact with SMEs using EDI and also to collect background statistical data on the firms. The questionnaire was divided into the following sections: company background, computer experience, EDI experience, impact of EDI, respondent's background, comments on the questionnaire, and an invitation to participate in the research.

The INS (International Network Service—one of the largest value-added networks in the UK) membership list was used to select organizations for the study. In this list there were 198 organizations that complied with the definition of SMEs given in the UK Companies' Act 1985. The questionnaires were posted with prepaid reply envelopes, and 76 were returned in two weeks. Of these 76 replies, 13 were returned blank, and 63 were completed. The final usable sample contained 44 companies, representing one per cent of EDI members in the INS community and a response rate of 22 per cent. Companies willing to participate in a follow-up study were contacted, and eight agreed to take part. Their profiles are summarized in Table 1.

The research comprised a series of in-depth interviews with key personnel in each of the eight organizations. The data gathered from these interviews have

Table 1
The Profiles of the Organizations Studied

Company*	Sector	Main EDI Partners	Respondent/ Interviewee
Steel Shelves Manufacturer	Manufacturing	DIY chain/Mail order/ Catalogue chain	Assistant to Managing director (EDI Coordinator)
Decorative Lead Manufacturer	Manufacturing	DIY chain	Managing director, DP manager, Accounting manager
Conservation Equipment Manufacturer	Manufacturing	Builders merchant	DP manager
Pillows Manufacturer	Manufacturing	Department store/ Mail order	Managing director
Clothing Importer	Wholesale	Department store chain	Managing director
Sports Equipment Importer	Wholesale	Mail order/Catalogue chain/Sports chain	Financial director
Office Equipment Supplier	Retailing	Oil industry	DP manager
Sealant Supplier	Retailing	Aviation industry	Managing director

*To preserve confidentiality, fictitious names are used.

been analyzed according to a number of emerging themes, discussed below.

Results

The findings from the cases are grouped together and discussed under a number of themes relevant to both SMEs and EDI. These themes include the organizational context of SMEs (particularly the role of the owner-manager); inter-organizational relations (power dependency and inter-organizational information systems); and the flexible responsive attributes of SMEs.

The eight companies in the study were all small in size. Half of them had fewer than 30 employees—even the largest company (Conservation Equipment Manufacturer) had fewer than 250 employees. Administrative staff were generally overloaded, and in most cases had to carry out more than one function. The management structures were very

simple, with no more than three levels in any company.

Generally, there was little change in staff levels or organizational structures following the implementation of EDI. Steel Shelves Manufacturer and Office Equipment Supplier did make staff cuts in telephone answering and order keying, while Pillows Manufacturer employed an additional part-time person to operate its EDI system.

Clothing Importer had begun EDI with one customer, but by the time of the study this had increased to six customers trading via EDI. Apart from running its EDI application on two PCs, the company did not plan to install other applications. Since the founding of the company, EDI has been seen as a survival tool for trading and even more important than the telephone or fax.

Neither Decorative Lead Manufacturer nor Pillows Manufacturer planned to

integrate EDI into their internal systems. Decorative Lead Manufacturer only had EDI links with two customers, and the number of the EDI transactions was small. The managing director was pleased with the existing two separate systems and unwilling to make any changes. Pillow Manufacturer was stretched by price cutting competition and had no resources to improve its systems. To introduce EDI, the company had to buy a new PC and two printers, one of them for printing bar-code labels requested by one customer.

Sports Equipment Importer was undergoing a cost benefit analysis of EDI integration when this study was conducted. Although it had EDI links with six customers for order messages, the number of transactions was small (typically one order from one customer every two weeks). Only one of these six customers also requested invoices. The frequency of the orders from these customers did not increase after EDI implementation, and the workload was similar to when orders were sent by post. The company said it would integrate EDI into its main system when more customers used EDI for orders and invoices via EDI. The financial director believed that the company was not able to influence its customers on EDI because it was too small.

To comply with BS 5750 (British Standard for total quality management) and other aviation standards, Sealant Supplier had to keep complete records of the detailed distribution and packaging information of its merchandise. This was done by a dedicated application on its main system. The computer system was also undergoing a redesign to increase its speed and functionality when the study was conducted. EDI was standalone at the time of the study, but there were plans for it to be integrated when the new system was completed. The company had links with two customers via EDI on two different networks and with two different standards. The EDI implementation and operations were said to be "smooth and easy."

Three companies had provided links, but not full integration, between EDI and their internal systems: Steel Shelves Manufacturer, Conservation Equipment Manufacturer, and Office Equipment Supplier. They all used a dedicated PC for EDI applications to link into networks and to transfer messages to and from their internal systems. Steel Shelves Manufacturer had six customers on EDI, most of whom used EDI for both orders and invoices. Office Equipment Supplier had EDI links with only two customers, but communications were very frequent. Conservation Equipment Manufacturer only had one EDI link with a customer. The company was able to postpone EDI implementation with the excuse that the internal system would need to be upgraded to cope with EDI integration.

A universal problem almost all EDI followers had on EDI implementation was how to adapt their internal systems to fit the different EDI requirements of different customers. Companies which had an EDI conversion application to link their internal systems seemed to have more problems than those in which EDI was a standalone application. Steel Shelves Manufacturer was a good example. Whenever a customer requested EDI to be used for the first time, the company had to seek help from both its EDI vendor and the software house who supported its accounting package to modify its system. On the other hand, the two companies (Clothing Importer and Sport Equipment Importer) who used modular EDI applications and kept EDI as a standalone system did not complain about problems with adding more customers on EDI.

Almost all these companies started EDI with a PC because it was quick, cheap, and easy. However, it has been used in different ways. Some companies ran a standalone PC EDI system which was seen as a kind of fax machine to receive orders from customers. With only a few customers on EDI and with a few transactions, this might be a short-term and inexpensive solution. However, if the number of transactions increased, it

would become inefficient and not cost effective. Others had an EDI system which needed a conversion process to generate incoming and outgoing messages from the internal system. The EDI system normally was installed on a dedicated PC. None of the companies in the study had EDI directly integrated into their internal systems.

Only Sealant Supplier was very positive and proactive in the use of EDI. The company planned to expand the use of EDI to invoices and also encourage other customers and suppliers to use EDI when its own EDI integration was completed. The managing director believed that large customers would attempt to form a closed supply group with fewer suppliers in order to be more efficient. The use of EDI could be one way of staying in business with large companies. Furthermore, by receiving orders earlier, the company had the opportunity to use the lengthened order time to combine orders from other customers to achieve quantity and price advantage over its suppliers. The managing director hoped that the ongoing development in the existing system, together with an integrated EDI system and staff training, would improve both internal and external operations and relationships. In the long term, the use of EDI with more customers with an integrated EDI system might result in an even shorter order lead time and further reduced stock levels.

Apart from Sealant Supplier, the other companies in this study were all reactive to the use of EDI. These firms indicated that if EDI had not been requested by their large customers, they would not use it. Most of the companies could not see any benefit from using EDI apart from keeping business with those customers. Three companies (Decorative Lead Manufacturer, Pillows Manufacturer, and Clothing Importer) tried to do as little as possible, doing just enough to satisfy their customers' requirements without disturbing their existing systems. Sports Equipment Importer could see the benefits if EDI were integrated, but it was not cost effective for that firm at the

time as its EDI transactions were few. The financial director also doubted whether it could influence its customers' use of EDI.

With the exception of Pillows Manufacturer, whose one customer intentionally paid late, most of the companies agreed that they received their payments punctually after using EDI. This implied that the use of EDI might have improved their customers' internal operations so that they were able to receive their payment on time.

Most of these small companies did not have any recognizable corporate or IT strategy. However, even if they had, it is most likely that the strategy would have been more concerned with production or marketing. In fact, when a trading partner did not compel but only suggested using EDI, then the use of EDI had the lowest priority in company planning.

Discussion

For the SMEs in this study, organizational culture, especially the characteristics of the owner-managers, appears to have affected the perception, adoption, and development of EDI. It seems that EDI was not only used to improve customer services in addition to stabilizing trading relationships, but also in some cases as an essential tool for administration, operation, and manufacturing. Most of the companies in the study had close trading relationships and a significant proportion of their trade with EDI initiators. It implies that they ought to follow what is requested by their large customers, since loss of these customers represents a severe loss to their businesses. However, EDI is only a part of the threat from large trading partners—there are many others, such as price negotiation, payment terms, delivery period, and so on, which may have more influence on SMEs.

Most SMEs in the study tried to respond quickly to customers' requests by implementing a minimal isolated EDI system. A few provided links into their existing systems but have suffered from the problems resulting from the differing

requirements of different EDI initiators. As SMEs generally lack resources and experience, most of them seem to have difficulty organizing their systems properly, or implementing a complex internal and integrated EDI system, or planning their EDI development. Most chose the EDI vendor directed to them by the EDI initiator without any further investigation.

The belief that being small allows SMEs to be more flexible, adaptable, and able to respond to the market or customers quickly has been supported by EDI adoption in this study. Firstly, most appear not to carry more inventory to satisfy the shortened delivery period requested by EDI initiators, as had been expected. Furthermore, they seemed to be able to cope eventually with different EDI requirements without any in-house expertise, perhaps with only a little help from an EDI system vendor. Although some of them felt they were not warned about the considerable extra requirements that would be imposed by the EDI initiators after implementation, most could foresee benefits of EDI in the long term. Some were even able to reject the demands from their customers due to their niche position or market advantage. One SME withdrew from a trading network which demanded an EDI link when its trading volume did not justify the EDI expenditure.

To summarize, this study shows that a positive attitude to EDI may bring some advantages to using this form of information technology, and for the long-term, it will provide benefits for SMEs. However, EDI cannot promise growth for SMEs. This is dependent on the way EDI is used and the co-operation and common goals between EDI trading partners. Furthermore, the culture of an SME and the characteristics of its owner-manager are the most important factors related to its development.

Therefore, three types of SME responses can be identified from this study in relation to the use of EDI. First, an SME may see advantages in using EDI. As a minimum, it may regard EDI as an essential business tool to deal with

large customers as well as enhancing its own operational efficiency. This would be through the integration of EDI into its existing internal information system, making use of the early delivery of machine-processable information. Secondly, an SME can be pessimistic and reactive, see EDI as just an extra cost for staying in business, and do as little as possible to satisfy customers' requests. Thirdly, an SME may be conscious of its strengths and opportunities and develop itself without yielding to demands from large customers and necessarily participating in EDI. This may, of course, result in the loss of its business with these customers.

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Jui-Chih Chen
Department and Graduate
Institute of Accounting
Tamkang University
Taiwan

Bernard C. Williams
School of Management
University of East Anglia
Norwich, UK