Area	Partner	Description
Voice	MCI AuditTel CallPoints	The MCI Voice deal was the original product of RETEX and has established an impressive record of building member minutes. RETEX is now MCI's second largest customer. In addition to the MCI deal, RETEX has voice-related deals with CallPoints and AudiTel.
Satellite	Hughes	The Mall SAT project is the result of RETEX's identification of satellite as a key component for retailers operating from numerous standalone locations. Hughes is the vendor of choice in developing a public satellite network. Initial installation is slated for the 1500 largest malls in the U.S.
Credit	NPC	The credit authorization project is a joint venture with NPC, one of the largest credit processing firms in the United States. The opportunity for all member companies to participate is high.

Table 3: RETEX product offerings

ization undertaken successfully at large national retailers including Wal-Mart, Sears, and J.C. Penney has provided these companies with substantial advantages in inventory management, cost structures and distribution. RETEX provides the technological tools for specialty retailers to capture the same advantages.

Impact

The impact of the consortium buying power has been tremendous. It has brought significant savings for firms with a handful of stores to several thousand stores as they now purchase telecommunications services at the rates of the consortium buying strength of tens of thousands of stores. The immediate impact of the RETEX advantage is in the area of cost reduction. The availability of the supporting information technology, including sophisticated telecommunications, provide an opportunity to support a number of additional organizational strategies including differentiation, growth, and alliances. The enhancements available through RETEX also provide member companies the opportunity to explore outsourcing, reengineering, and organizational learning initiatives. In providing information technology services and products to member companies, RETEX is also enabling these individual members to pursue a networked approach in dealing with suppliers, distributors, financial service providers, and customers (Table 3).

Conclusions

The specialty retailing arena is increasingly influenced by electronic commerce. Inventory management and in-store technologies had significant positive impacts on performance. The results of this study suggest that many specialty retailers are making IT an important part of company strategy. While many firms in specialty retailing have competitive advantages from other sources, the level of IT sophistication is increasing. The opportunities for IT use are also becoming more integrated across retailing operations. Electronic commerce has proven performance advantages and will be an increasingly common element in retailing operations. ∎

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Empirical Survey of EDI Applied in Practice

Although the technology to transfer business information electronically between computers of different trading companies or organizations has existed for a long time, Electronic Commerce (EC) or Electronic Data Interchange (EDI) has not yet found acceptance on a large scale. One reason for this may be seen in the fact that potential EDI users have not had much knowledge of EDI in practice. In order to provide them with relevant information an empirical research to survey different aspects of EDI was conducted.

At the end of 1994 the 'Deutsche Telekom AG' (formerly the German public telecommunication operator 'Deutsche Bundespost Telekom') and the Institutes

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for Business Information Systems at three German universities prolonged their research project on EDI. The main objects of the project are to encourage the development and the use of EDI, especially UN/EDIFACT, to examine the suitability of networks, services, devices and protocols for EDI. The project has been denoted VULCAN which is the German abbreviation for 'virtual enterprises as a teaching, research and training network' [1]. The universities established training firms and the students are transferring simulated business data via EDI to virtual partners for further processing. The composition of these virtual companies is regarded as a lab for scientific research in the field of EDI. In the first phase of the project an empirical study was undertaken in cooperation with 'Siemens Nixdorf Informationssysteme AG' (SNI AG).

Empirical Study

The major objectives of this survey were the economic effects of EDI, the reasons for implementing EDI, the great variety of technical EDI variants and the speed of EDI diffusion. The investigation was based on the method of questionnaires circulated during the period from June to July 1994. Out of 100 German companies addressed 85 answered the questionnaire. This favorable response rate can be attributed to the fact that the employees in charge of the EDI system had been asked before to answer the questionnaire.

The EDI users interviewed were managers of medium and large-sized companies representing the industry sectors of manufacturing, trading, transportation and banks. The following article gives a brief description of the survey results. Most of the companies interviewed (70 %) introduced EDI during the past five years. The majority of the companies (88 %) are

applying EDIFACT as a message standard. EDIFACT has been adopted by as many as 94,1 % of the companies which have been using EDI for less than two years. This result suggests that EDIFACT will become the only message standard in the future. But at the moment, owing to specific industry and nationality requirements there are still 47 % of the companies interviewed that have to use more than two standards.

Most frequently the companies have realized an EDI integration with customers (84,7 %) and suppliers (41,2 %). In the initial steps of EDI implementation, integration with banks, forwarders and public agencies tends to play a minor role. These sectors will normally be integrated in the subsequent steps of developing the EDI system. Accordingly, companies which had been having their EDI system in use for more than two years, are 40 % electronically integrated with their banks and 32 % with their forwarders. An investigation of the integrated sectors for each line of business has shown that forwarders seem to be those most successful in the integration of all sectors. As many as 83,3 % of these companies are exchanging EDI messages with public agencies. The reason for this high proportion can be seen in the fact, that for international forwarding it is necessary to exchange messages, particularly with customs offices.

Messages

The companies interviewed primarily exchange the message types 'Purchase Order' (86,9 %) and 'Invoice' (50 %). It can be assumed that, in the initial steps of EDI implementation, companies tend to apply their EDI systems to purchase order processing and in the invoicing department. Accordingly those companies which have had their EDI systems in use for less than two years only exchange the message types 'Purchase Order', 'Invoice' and 'Dispatch Advice'. Another interesting result of the survey is

that 50 % of the companies using the message type 'Dispatch Advice' are not using the message type 'Invoice'. Presumably, these companies have substituted the 'Dispatch Advice' for the 'Invoice' to re-engineer their business processes. Both message types contain nearly identical basic information. With some additional information entered in the 'Dispatch Advice', the separate drawing up of 'Invoices' can thus be omitted.

Message Transfer

For physical transportation of EDI messages, the companies included in this survey most frequently use the digital packet switching network DATEX-P (65 %) and the analog telephone network (43,8 %). Those companies which have been applying EDI for less than one year are preferably using the analog telephone network. In addition to telecommunication networks, 90,6 % of the companies are using Value Added Network Services (VANS) of at least one provider. The VAN Service of General Electric Information Services is being used most frequently (60,7 %) followed by the VAN

Service Telebox-400 of the Deutsche Telekom (39,3 %) and the VAN Service Information Exchange of IBM (28,6 %).

As regards EDI system architectures, a basic distinction can be made between the 'EDI host concept' and the 'EDI server concept'. If the EDI system and the business application are running on the same hardware platform, the architecture is called 'EDI host concept'. On the other hand, the EDI application runs dedicated on an EDI server. To integrate the business application and the EDI system a file transfer has to be established between the EDI server and the application server. In this survey, 55,7 % of the companies are applying the 'EDI server concept' and 44,3 the 'EDI host concept'.
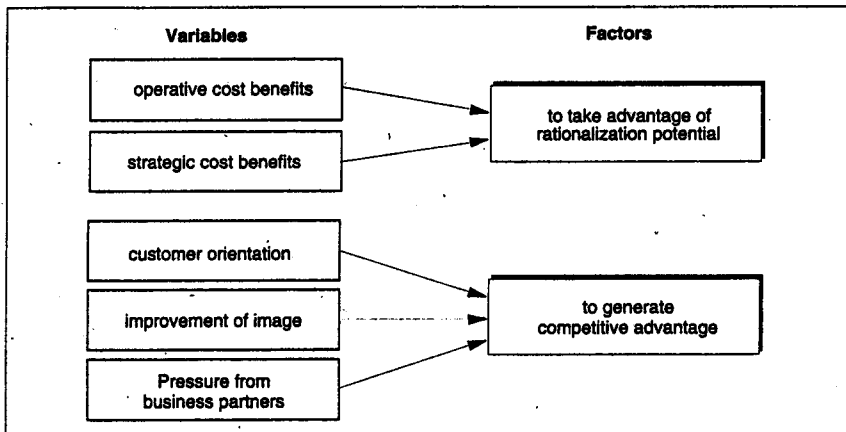
Reasons for Implementation

To find out the reasons for implementing EDI, the companies were asked to assess the importance of several given motives (as seen in Figure 1) on a five-step rating scale. Based on the results of a factor analysis, it could be established that EDI-users' decision in favour of implementing EDI was primarily influenced by two factors:

☐ to take advantage of rationalization potentials,

☐ to generate competitive advantages.

As a result of a cluster analysis of the reasons for introducing EDI, the companies interviewed can be classified into
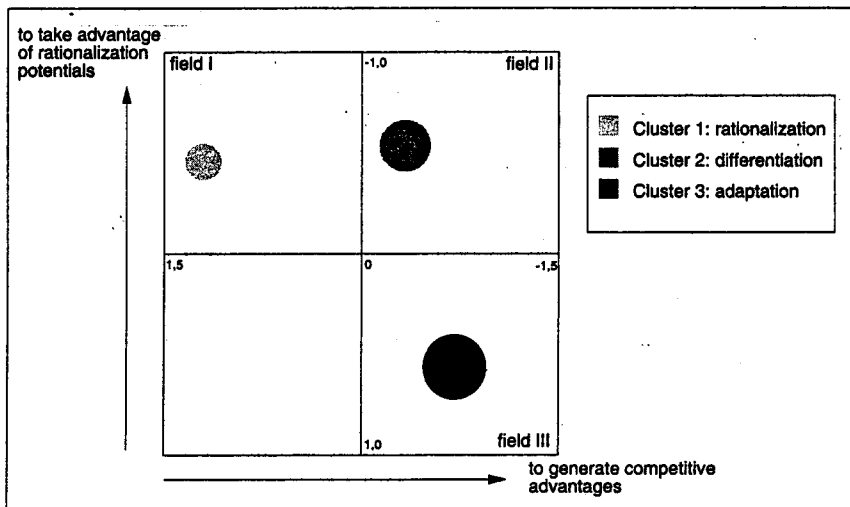

Figure 1: Motives for implementing EDI

Figure 2: Three classes of EDI-Adopters

three groups. By using the above-mentioned factors, the positions of these clusters can be visualized as in Figure 2. The different numbers of companies belonging to a specific cluster are illustrated by the size of the circles. Companies of cluster 3 (adaptation cluster) implemented EDI in consequence of pressure from business partners. Companies of cluster 2 (differentiation cluster) are primarily

in categories of higher turnover and larger personnel. These firms have been applying EDI over a longer period of time and decided in favour of implementing EDI without having been influenced by their business partners. They are following a strategy of differentiation aiming at strategic cost benefits and customer orientation. The cluster 1 (rationalization cluster) represents companies aiming at operative and strategic cost benefits. Also, these firms decided to implement EDI independently without any external pressure.

Costs

41,6 % of the firms using EDI had to spend total costs of less than DM 50'000.- for planning and implementing their EDI system. Using the above-mentioned classification into clusters, total costs of less than DM 50'000.- were incurred by:

□ 62,5 % of companies belonging to the rationalization cluster,

□ 45,2 % of companies belonging to the adaptation cluster,

□ 25,0 % of companies belonging to the differentiation cluster.

The relative proportions of cost items incurred for planning and implementing EDI are illustrated in Figure 3. It can be seen that the highest shares relate to 'the modification of the business application' and to 'the necessary software'. Message transfer costs EDI users are faced with may be categorized as follows:

□ One third of the EDI-users interviewed recorded costs up to DM 0,50 for one EDI-message transferred.

□ Another third of EDI users have their message transfer costs in a range between DM 0,50 and DM 2,00.

□ For the last third of EDI users, the costs are above DM 2,00 (this mark being significantly exceeded in some cases).

A major portion of transfer costs are incurred as fixed costs, i.e. independently from the message transfer volume. This means that companies with high message transfer volumes are able to realize lower transfer costs per message.

Message Volume

An investigation of EDI messages exchanged on a monthly basis revealed that 36,7 % of the EDI users are already receiving more than 1'000 EDI messages and 29,1 % are already sending more than 1'000 messages monthly. It was found that EDI users tend to be able to increase significantly the message transfer volume in the course of time. Accord-

ingly, the transfer costs per message exchanged can be reduced through the continuous use of EDI.

Most of the EDI users (58,8 %) are employing less than one employee for the coordination of their EDI systems. Accordingly, most of the EDI coordinators are in a position to perform this function on a parttime basis besides other job activities. It was found that the number of EDI coordinators is primarily a function of the 'number of integrated sectors', the 'number of EDI partners' and the 'number of EDI messages received monthly'.

By implementing EDI, most of the companies (54,9 %) were able to avoid recruiting new employees. 45,1 % of the companies transferred employees to other departments, because the EDI implementation made their old jobs redundant. 15,5 % of the companies retired staff as a result of EDI-implementation. 28,2 % have not (yet) been able to realize saving effects in the personnel sector.
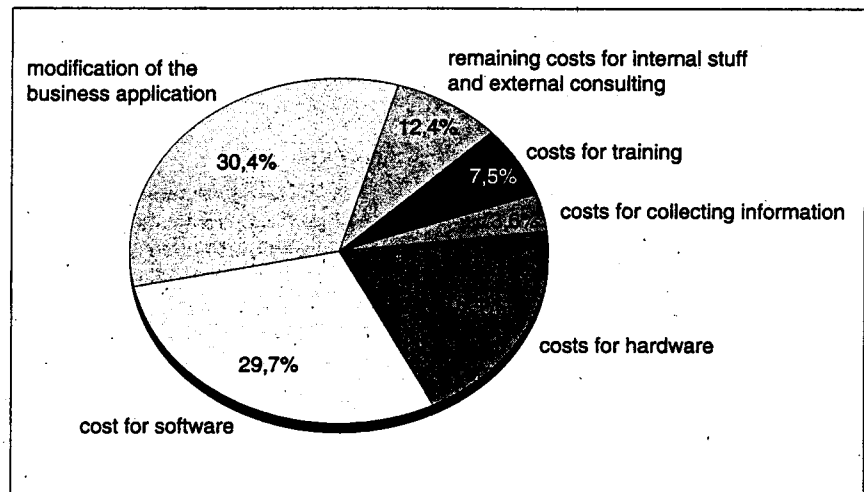
enhanced. 57 % of the companies interviewed are processing less than 10 % of their total message volume through their EDI system. This relation demonstrates the immense potential available for further rationalization by means of EDI.

On the other hand, it may be expected that the potential benefits from EDI for a potential EDI user will gradually diminish as more competitors are making use of EDI. Therefore, prospective users are recommended to plan and implement EDI in good time. ■

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Figure 3: Percentage shares of cost types relative to total costs during planning and implementing the EDI-systems

Effects

In respect of customer orders, the implementation of EDI has had the following effects:

□ Loss of customer orders has been by 61 % of the companies interviewed,

□ An increase in orders has been realized by 24,7 % of the companies and

□ 31,1 % reported no effects on orders.

The average pay-off time of EDI investment costs is 2,27 years and the benefits of an EDI investment tend to increase progressively with time. From an economic point of view, it can be stated that EDI implementation is a profitable investment. Benefits of an EDI implementation tend to increase progressively because EDI users are, as a rule, able to integrate with further EDI partners and thus the message transfer volume is

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