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The Development of Electronic Data Interchange Networks from an Institutional Perspective

1. Introduction

In our paper we will focus on the economic forces that shape the development patterns of computer-based information and communication networks. This, however, requires a shift of perspective. Economic forces are not just limited to the bounds of organizations which interact in a - cultural, national or regional - environment but arise from the interaction processes bewtween companies. Thus it is necessary to include these 'network effects' in the theoretical framework which is to be used for analyzing and understanding the development of technically based networks. Network effects are located on an institutional level as compared with economic effects on the organizational level. We will discuss these topics by referring to several case studies which deal with the establishment of Electronic Data Interchange (EDI) networks.

The development of EDI networks has opened a new branch in the telecommunication industry which is expected to be expanding in the near future considerably. The ECC even expects the telecommunication industry to take over the role of the key industry in Europe. Data communication is considered a major element in this scenario although at the time being it does only cover a small fraction of the total telecommunication market. Thus the development of EDI networks is of major relevance for the future competitive strength of the European industry.

Nevertheless, theoretical understanding of the economic forces behind the development of EDI networks is poorly developed and there has been little empirical knowledge so far. Most analyses of related topics, however, remain on a descriptive level which does not allow for generalization. It seems as if traditional analytical tools in those disciplines that deal with innovation, diffusion, new technologies etc. cannot be employed in the analysis of EDI networks. This in our view is due to the 'network' aspect of the treated topic. Whereas traditional analysis could afford to either focus on single organizations or treat economic subjects as atoms which interact in a macrosystem, the analysis of networks is to take both aspects, i.e. micro and macro level, into account. It is necessary to analyse organizational structures in order to understand the relationships between organizations as well as the organization of the network itself. The startling task is to do two things at the same time: focus on the elements of a network and do not lose analytical grip of the network itself.

If one adopts the the social shaping of technology perspective it should be clear that the development of new technologies cannot be understood by deducing their future prospects from the technical characteristics only. Instead it is necessary to look at the social system, in which the new technology is embedded. Having a glance at recent EDI literature it is revealed that the method of deducing future developments from technological characteristics is still dominant. Phrases such as 'EDI will quicken communication flows and thus lead to reduction in stocks' or give rise to other clearly desirable outcomes are still frequent. The future of EDI is still commonly derived from the potential it has in the eyes of its commentators. This perspective often leads to confusions when new technologies do not disperse and unfold their inherent opportunities as expected including all the social changes that have wishfully been linked with the new technology treated here (e.g. videotex and the decentralization of work)

The structure of the paper is as follows. First a short outline of three case studies in the field of consumer goods industries is presented. Second a concise theoretical framework for understanding the development of EDI networks is introduced. Then this is followed by an interpretation of the case studies in the light of this theoretical framework. Finally some conclusions for further theoretical efforts and possible policy implications are drawn.

2. Case studies

The first case deals with the set-up of a system which eases the exchange of electronic data concerning high value product descriptions. These data are to be used as input in electronic planning systems in the retail of tailored kitchen furniture. The standardization of a dataformat which is at the core of the set-up process was monitored by software companies which supplied retail shops with the planning system. The guiding principle was the idea of a cost-saving potential by centralizing input activities for all vendors of the planning systems (which already incorporate the product data of specific kitchen manufacturers). The bargaining took place between software companies and manufacturers. The latter preferred a dataformat which was able to comprise a great variety of products and hence would be rather voluminous. The former were interested in reducing the size of the dataformat since they were mainly interested in cutting the costs of data transcription. The process took place in a working group having formed a committee for the purpose of standardization. The first attempt having failed it took the participants seven years to make their project a success. (see figure 1)

The second case study concerns an information system for the electronic exchange of market data in the footwear industry. The concept for this information system was designed by a consulting company on behalf of an official authority as part of

an industrial development project. The main result of this analysis was that German shoe manufacturers were poorly informed about what was happening in the consumer market. Therefore the system was to strengthen the manufacturer's market competence. The article numbering standard resembles the European Article Number (EAN), which inspired the consulting company. The dataformat which contains all types of data to be exchanged and also describes their respective relationships was very complex and included a lot of options for compiling statistical data about market developments. The finally accepted standard represents only a small fraction of the initially far-reaching goals due to the neglect of the interest of purchasing companies, which consider the comparison of their member's market performance an essential part of their business policy. For two years the system has remained on a pilot-project level. A development, similar to the formerly described project, seems unlikely. (see figure 2).

A network service for the electronic exchange of business data in the clothing industry is subject of the third case study. The basic idea behind the development of this network service was the concept of 'Quick-Response' in the fashion market, aiming at the ability to react towards changes in consumer preferences within a very short time. The main activities in establishing the VAN were carried out by a textile retailer. Other important players were a software company which promised to provide access to about 2000 users of a stock-management system and a textile manufacturer who developed a CIM-system. These three actors formed a pressure group which tried to put through a proposal for a dataformat as an EDIFACT-subset in order to increase the incentives for participation in the planned VAN. These activities collided with the attempt of the European Article Numbering Association to develop an EDIFACT-Subset on the basis of the European Article Number (EAN). Hence potential users got mixed up about the future situation and preferred to wait until a clear winner appeared. (see figure 3)

3. Theoretical framework

The set up of an EDI-network concerns the way companies exchange information. Thus the question arises whether the process of information exchange is just transferred on a technical medium or will rather be altered by the use of EDI. If only the former is true some improvements in the way information is exchanged can be expected, i.e. faster and/or cheaper delivery of data. In this case organizational and institutional change might be induced on the level of carriers, e.g. National Telecom Services might be substituted by private VANs. We will not deal with these forms of changes further on.

Nevertheless, the common thesis is that EDI will change the structure of the information exchange process. Thus organizational change is assumed a necessity in the course of introduction of EDI. Although we do not want to question this

thesis we contend that organizational factors do not sufficiently explain development patterns of EDI and claim that institutional factors must be taken into account. That in the first place means that there are at least two institutionally distinct actors who have to coordinate their actions (if we leave EDI-links between companies and subsidiaries etc. aside). It is this aspect of coordination that requires special attention since the development of EDI might be hindered by merely institutional factors, which would otherwise have become an EDI success.

In order to come to grips with organizational and institutional factors that are shaping the development of EDI we propose to first analyse both aspects separately. Thus costs and benefits of EDI must be evaluated on an individual and on a collective level respectively. The individual level concerns the internal EDI impact for an organization. At the same time EDI has by definition external effects that also influence cost/benefits of actors within the EDI network. These external effects will shape the collective action that might or might not result in the set up of an EDI network. Thus collective action will change the institutional framework for individual action, thus linking micro and macro level.

On the level of an individual organization the exchange of data via EDI might change the informational relationship between the organization and its business partners. To understand this it is useful to distinguish between general and special information. Both types of information induce some kind of transaction, e.g. the delivery of goods or the transfer of payment. Special information has to be transmitted each time a distinct transaction should be started. General information in contrast only requires part of the information to be transmitted whereas the other part is stored locally. The locally stored part of the information is activated as a function of the transmitted part. The splitting of information is achieved by comprising those parts that are constant in each instance of transaction. It is then only necessary to transmit that part of information which is unique for a specific transaction. The splitting of information in a constant and a unique part is called a transformation (Kosiol). Standardization of dataformats often imply such a transformation on the level of an individual organization.

This is the case if the relationship between the constant and the unique part is changed by the standardization of dataformats. Such a kind of change could be expected if the level of generality is shifted by standardization. E.g. it might be relatively easy to define a dataformat for a given set of users that communicate on the basis of procedures which are already standardized. The definition of the dataformat then just requires the transcription of these procedures. If the level of generality is raised by standardization the relationship between the constant and the unique part of transactional information units will be altered, otherwise the amount of special information must be increased. This can be illustrated by reference to EDIFACT experiences. Recent disputes about the further development of

EDIFACT have focussed on the question, whether the number of segments should be extended (New Principles) or rather the number of segments restricted to the existing set, whereby new flexibility demands would be handled with by extending the number of codes and qualifiers (Quality Control Policy) (Foray 1991). The former would increase the amount of special information necessary for each transaction, the latter the amount of locally stored information.

The transformation of special into general information allows for the rationalization of internal procedures. E.g. payment or delivery procedures could become routine through the use of general information and would be automated via EDI. These rationalization effects are the higher the more data are to be processed for each instance of transaction, i.e. the higher the volume of data to be exchanged with one business partner. Since the volumina of data are normally not equally distributed among business partners it is assumed that there are few business partners with whom the coordinated transition towards common EDI procedures promises high rationalization effects and a bulk of others which offer rather small rationalization effects when joining the EDI network.

On the other hand the increase of business partners normally require additional equipment and competence. E.g. the number of codes for article number etc. will increase with the number of EDI partners, if there has been no prior standardization effort. Also converters which cope with different dataformats, transmitting protocols etc. are becoming increasingly complex. Sometimes it will be necessary to add hardware components in order to electronically communicate with additional business partners. Thus the rationalization effects might be counterbalanced, rendering the EDI participation economically objectionable. In figure 4 the curve NI represents the net internal benefits of EDI in relation to the number of participants, which is composed of internal rationalization effects on the one hand and additional requirements through new participants. We propose that the values of the NI curve could become negative as the number of participants increases.

Nevertheless, it is possible to mitigate these effects by collective action, e.g. standardization or joint VAN operation. Otherwise we would expect serious limits to the development of EDI which are illustrated by the intersection of the NI curve with the horizontal axis in figure 4. Thus we have to ask, which economic factors shape the collective action that aims at changing the institutional setting of the network. These external effects consist of positive network effects and of opportunity costs. Positive network effects stem from the saving of transaction costs, that would exist if an EDI system is to be established by a set of bilateral contracts between business partners. The transaction cost savings are thus the larger the more business partners participate in a multilateral contract system. Examples of such kind of systems are closed user groups like EDIFICE, EANCOM, CEFIC etc. as well as the world wide potential user group for EDIFACT.

The participation in a new EDI network system has also opportunity costs. Opportunity costs originate from the fact, that either established patterns of communication or other EDI systems exist, which have to be disposed of resp. whose benefits could not be made effective use of. E.g. a firm might have developed effective routines for delivery procedures with a huge body of local knowledge which will be made useless by the transition to EDI procedures. Similarly there might already exist EDI networks which already confer considerably benefits to their users. A change to a wider network results at least in a partial loss of some of the former network's benefits. The combination of positive network effects and opportunity costs is indicated by the curve NE in figure 4. Opportunity costs of participation in a new network may offset its positive network effects if only a small number of business partners participate. The values of the external effects gradually become positive as the number of participants grows.

Finally only internal and external effects together reveal the true potential of EDI for each organization. It is thus necessary to understand how the NI and the NE curve are related. Of course collective action aims at improving the results of internal rationalization which means an anti-clockwise rotation of the NI curve in point A. The success of the collective action, however, is not guaranteed, since standardization efforts could be counterbalanced by additional requirements through the storage of local information or the extension of dataformats as demonstrated for the EDIFACT example (see above). The collective efforts result in a changed position of the NI curve indicated by the NI* curve. Thus the aggregate of the NE and NI* curves indicates the break even of participation a the collective action which aims at the establishment of a multilateral EDI network system. Beyond this point (CM for critical mass) participation in the network is self enforcing. Up to this point the development of a multilateral network system will not take off unless some other incentives are provided; instead a network system based on bilateral contracts will evolve whose growth is limited to the point MN (maximum number of participants).

The existence of a critical mass for a collective action clearly shows that the development of EDI networks cannot be fully understood from the point of view of a single organization. There is an 'institutional gap' which could not be overcome by collective efforts unless some institutional arrangements are offered. Otherwise economic behavior will result in a bilateral approach which seriously limits the development of the EDI network. Different institutional solutions are possible which will be demonstrated by a discussion of the three case studies in the next section.

4. Interpretation of case studies

In order to understand the differences between the three case studies two aspects should be distinguished. First it is necessary to analyse the costs and benefits of those actors who take a rather passive part in the developing process, i.e. who decide on the basis of the current state of development whether to participate or not. These actors are only interested in an effective use of the system. Second the problem of critical mass has to be examined. According to the above presented analysis it is clear, that network development processes do not start right away but display a considerable inertia in the initial phase due to negative values of the aggregate of internal and external effects. Therefore there must be actors who are interested in the set up of a network because otherwise multilateral network systems would not develop. These actors are of an entrepreneurial type, since they face considerable profits from the set up of a new network.

Analyzing the passive type of actors the above presented analysis is used. Therefore internal and external effects must be examined and their combined effects evaluated. With respect to the problem of critical mass three distinct possibilities of overcoming the initial inertia in the development of networks will be illustrated.

The dataformat for the kitchen industry had to be accepted mainly by the manufacturers. A first attempt failed because of the manufacturers' reluctance to participate in the system. So the question arises which kind of costs and benefits for manufacturers can be derived by participation. The manufacturers' interest in introducing electronic planning systems in the retail of kitchen was to simplify the visualization of a tailored kitchen, to ease the calculation of final prices and to avoid haggling with retailers through inaccurate orders. On introducing electronic planning systems a huge rationalization potential might be realized. On the other hand individual actions of manufacturers were soon limited by the enormous increase in either proprietary systems in retail shops or data volumina handled by software companies. Thus rationalization effects tended to be offset by additional costs through the uncoordinated introduction of planning systems.

The coordination of manufacturers' actions, however, initially had considerable opportunity costs, since some manufacturers had to give up competitive advantages through the introduction of proprietary systems, others had to confine their product descriptions to the limits of the dataformat, if they originally did not use own planning systems but relied upon the services of software companies to supply planning systems. Positive network effects could, nevertheless, be derived from the saved transaction costs that otherwise would originate from the interaction with software companies or retail shops since they could save a lot of duplicate work or duplicate computer systems resp. In that way the coordination of the manufacturers'

actions required that a critical mass of manufacturers participated in it. The question now is how this critical mass could be organized.

The software companies had a major interest in solving the problem which arose from uncoordinated actions since they had to transcribe product descriptions into electronic formats and transfer these costs via the prices for their planning systems to their customers, i.e. retail shops. This way of handling increased costs proved increasingly problematic because small service providers were willing to offer transcription services at low prices. Attaching a data quality guarantee to their products and at the same time reducing the costs of data transcription software companies tried to add value to their products. This required the foundation of a central agency for the data transcription, which also functioned as a quality certification institution. A significant reduction in transcription costs could be achieved by standardization of data material so that any manufacturers' product data could be combined with any software company's planning system. This incentive proved to be sufficient to organize the critical mass of manufacturers that finally agreed on one dataformat. After one year of having gone into operation about 100 manufacturers participated, at the time being about three new manufacturers join the network every month.

The information system in the footwear industry in contrast was set up by a consulting company which was asked to find measures for improving German manufacturers' competitiveness. The main insight of the consultant was that the information flow between retail and manufacturers had to be improved. In order to come to an operational level with this analysis, the consultant presented a concept which had essentially consisted of a technical system of information exchange. Thus the idea was to establish an information flow and at the same time economize on this information flow by using technical means of information exchange. The information flow was originally designed bilaterally, i.e. manufacturers receive market data for their products and return compiled data for each retail shop. Nevertheless, only the information flow from retail to manufacturers should be technically supported. Retail shops and manufacturers were expected to bilaterally contract the terms of informational support through manufacturers, which not only included the transmission of compiled data but also advisory support to the retail shops.

The question arises which benefits the information system might provide to participants. Governmental intervention sheds some light on this question as it has obviously been necessary to force manufacturers into this kind of coordination via monetary incentives (manufacturers would have been cut off subsidies if they refused to participate). Thus the governmental intervention has rather the character of providing merit goods. The larger manufacturers had also their own measures of evaluating their market performance, e.g. panel services or bilateral contracts with

some customers providing them with a sample of market data. These companies could not see any additional benefit in participating in the new information system, although they were aware of structural problems in the German footwear industry. According to their opinion the system would mainly benefit small companies which could not afford to set up information channels on their own.

Drawing a conclusion from this case one can say that the benefits of the information system were small compared with existing systems of market data creation, which caused high opportunity costs for the large shoe manufacturers. A change from bilateral relationships to a system of multilateral contracting would thus have rendered inevitably the participation of a great number of manufacturers to offset the high opportunity costs through positive network effects. Accordingly, the development of the development of the information system did not take off. After one year it still remained on the level of different pilot projects with some of the big manufacturers having adopted a wait and see position.

The set up of a system for the electronic exchange of business data in the clothing industry promised a huge rationalization potential combined with savings in lead time, which is especially important in this fashion oriented industry. It is the classic field of EDI, since it comprises all potential kinds of information flows, initially focussing on orders and invoices. It is normally assumed that a coordinated action might increase the benefits of EDI enormously since a vast amount of converters and bilateral contracts would become superfluous. Because of the medium sized character of this industry there are only few EDI links on a bilateral basis demonstrating that the rationalization potential is not as evident as it is normally assumed.

Nevertheless, the benefits of a coordinated action seemed clear and different solutions were conceived. An important initiative was started by one owner of a retail shop together with a software company which planned to set up a Value Added Service (VAN) network for the clothing industry. In order to increase the incentives of participating in a coordinated action the initiators tried to define a dataformat which they wanted to be accepted as an EDIFACT subset. Since this attempt has not been successful industry and retail are still hesitant to participate. A major factor to be taken into account is that there exists an alternative network for the whole consumer goods industry. The operators of this alternative network tried to have their network accepted by the EDIFACT board. This alternative network seems to be much more successful than the initiative of the clothing industry. This is the well established German branch of the International Article Numbering Association, which runs a EDI system and makes considerable effort in establishing an own EDIFACT subset, called EANCOM.

The interesting aspect about this case study is that we have a profit oriented approach in overcoming the problem of the critical mass. This means that different EDI service providers compete on the market, thus increasing the opportunity costs of users, i.e. the critical mass. Although rationalization effects are considered to be relevant and a multilateral approach is welcome by all participants, the efforts of the initiators did not succeed in organizing the critical mass because of a market mediated development process generating external effects which consist of high opportunity costs through competitive actions.

5. Conclusion

Our conclusion is twofold. On the one hand we refer to the political implications of different set-up patterns. On the other hand we analyze the consequences of our case studies for theoretical approaches towards understanding the development of EDI networks.

The case studies demonstrate that different ways of overcoming the problem of the critical mass could result in different development patterns. In the case of the EDI network in the clothing industry a market oriented approach was started to combine the efforts to organize a critical mass with the commercial activity of setting up a VAN. From this we draw the conclusion that such an approach might cause problems when different systems compete, due to positive network externalities that are expected, if one of the systems will take off. These effects will force potential participants into a wait and look position since they would otherwise take the risk of having put their stakes into the wrong system. (see figure 5)

In the case of the information system in the footwear industry the attempt to externally organize the critical mass was confronted with the problem of proper examination of the costs and benefits of a multilateral approach compared with different bilateral contracts. In this case it seems as if the benefits were not properly calculated and monetary incentives not sufficient to move potential participants into a multilateral system of information exchange.

The example of the dataformat in the kitchen industry reveals an interesting solution because of the combination of market and organizational mechanisms. On the one hand the software companies had a commercial interest in organizing the critical mass of manufacturers, on the other hand they restricted themselves by setting up a non profit organization for the operation of the system. This result could be achieved, because the market for software products is complementary related to the kitchen market, thus enabling software companies to take over the role of a catalyst. They could organize the critical mass without linking this effort with an immediate commercial interest. Instead they were collectively able to neutralize the commercial aspect via a non profit organization. Nevertheless, their effort was

economically motivated by increasing the quality of their products and reducing prices. But these economic effects are not deriving from the operation of the network itself. This is the important difference between the EDI network in the clothing and the kitchen industry.

Finally some conclusions on the more theoretical level should be drawn. The three case studies demonstrate that the logic of networks is different from the logic of markets and hierarchies resp. (Mayntz 1992). Whereas actors in a market setting interact via bargaining procedures which might have some unintended results, e.g. negative internal effects through a strictly bilateral EDI approach, the set up process of the analyzed EDI networks required coordinated action which intentionally aimed at a collective result. In contrast these forms of coordinated actions could not be achieved by a command mechanism as it is used with hierarchies (like companies). Instead a negotiation process had to be used in order to coordinate individual activities. We found, however, that the coordination of individual actors is itself shaped by economic factors which are described by the problem of critical mass. Different institutional settings are possible in overcoming this problem. Among the three presented solutions - market coordination, Government intervention, coordination through complementary markets - the latter proved most successful. Here a third party acts as a catalyst neutralizing economic motives and at the same time being itself driven by commercial interests.

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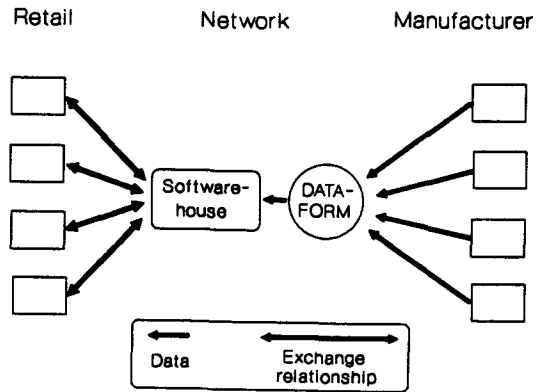


Figure 1: Exchange of electronic product data in the kitchen industry

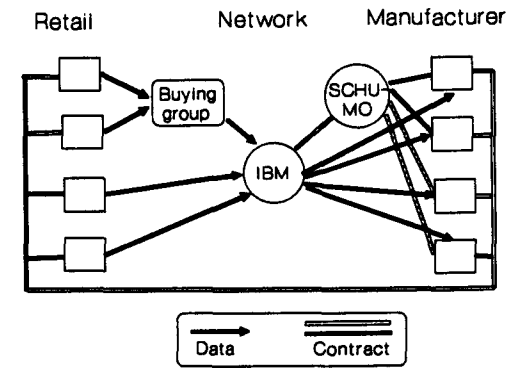


Figure 2: Exchange of market data in the footwear industry

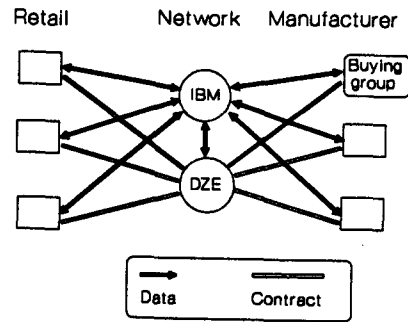


Figure 3: Electronic data interchange in the clothing industry

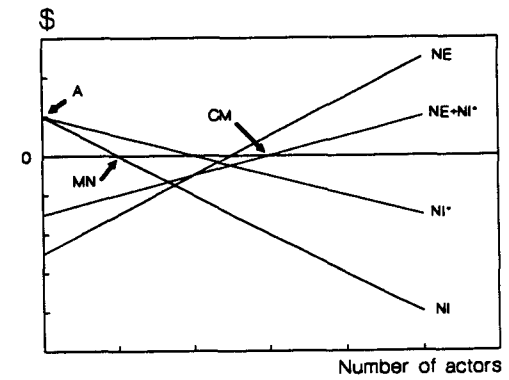


Figure 4: The problems of critical mass and maximum number of participants

Industry	Kitchen	Footware	Clothing
Who solves the problem of the critical mass?	Software Companies	External Management	Network Service Provider
Which kind of institutional solution does this provide?	Complementary Market	Governmental Intervention	Market Solution
Who operates the network?	DATAFORM (non-profit organization)	SCHUMO (Manufacturer's Association)	DZE (Network Service Provider)

Figure 5: Comparison of the three cases

Case Study: EDI in a Buying Group

1. Statistical background of wholesalers and co-operatives in Germany

From an industry policy perspective there are mainly two 'segments' in the trading industry which are interesting: wholesale and co-operatives. The reason is that both kinds of trade constitute a countervailing power to the integrated forms of trade, especially chains and franchise-systems. Both wholesale and co-operatives have quite long a tradition and have to compete with new institutional forms. The case of the co-operatives is specially interesting since they combine the advantages of independence and size. On the one hand independence allows for flexible adaption to local environments, on the other hand size allows for rationalization and economies of scale. The following sections will give a short survey of the situation and development of either kind of trade. New strategies of co-operatives will be pointed out in a case study which also provides the link to the general topic of EDI.

1.1 Wholesalers in general and in the market for consumer goods

To judge the performance of the independent wholesale in Germany properly it is important to stress that it basically serves two functions. (1) It provides the link between manufacturing and retail, (2) it operates on the markets for industrial goods between manufacturers. It is interesting to get an idea about differences of development in these two areas. Figure 1a illustrates the development of total wholesale turnover within the last 12 years, figure 1b the respective development for half-finished articles and raw material and figure 1c for finished articles.¹ It could be assumed that the the largest share of trade with finished articles stems from trade with retailers whereas trade with half-finished articles and raw material definitely only belongs to the latter category (trade between manufacturers).

Focussing on the curves which represent turnovers in constant prices it is obvious that the inter-industry trade operated by wholesalers didn't grow which means a relative set-back compared to the development of total trade (from which follows that either direct trade between companies or vertical integration has increased).² In contrast the trade with finished articles has constantly risen from 1984 to the beginning of the 90ies. It is difficult to explain the abrupt downward development in the first years of the 90ies. There might be some early signs of recession which

¹ 1986=100.

² Statistics not available.

come up for that.³ Anyhow, it is up to date not possible to judge wheter this has structural of cyclical character. If one considers some typical consumer goods the picture is less clear. Whereas the growth of trade with finished goods has risen from 1983 to 1992 by 42,6% the respective rates for selected consumer goods are as follows:⁴

Food, beverage, tobacco:	29%
Clothes:	100%
Shoes:	48%
Furniture:	-3%
Phono/TV:	130%
Toys:	30%

The total amount of turnover was DM 914,831 bill. in 1990, trade with half-finished articles and raw material accounted for 38% of this amount. The shares of different branches in the trade with finished articles in 1990 are as follows:⁵

Food:	36%
Textiles, clothes, shoes, leather articles	6%
Furniture, fittings, phonographic articles etc.	15%
Mashines, vehicles, related articles	22% ⁶
Pharmaceuticals, cosmetics	6%
Papers and others	15%

The institutional structure of the wholesale industry comprises a wide range of different forms. Wholesalers are independent as well as organized within co-operatives. On the other hand co-operative buying groups also fulfil the functions of wholesalers. Finally the wholesale may be part of the activities of manufacturers.

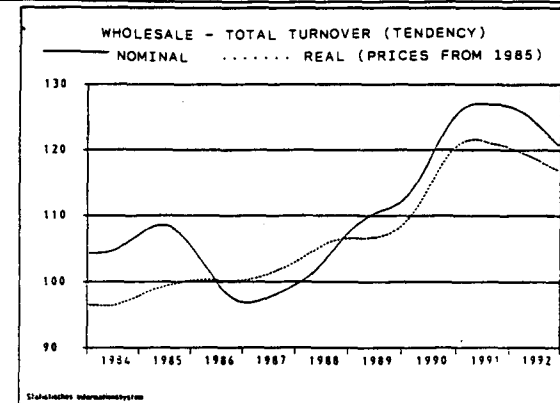
³ The unification has no direct effects since the numbers only refer to the former FRG. The steeper slope of the curve in 1989 and the first half of 1990 might be due to a sudden increase in demand caused by the unification.

⁴ Source: Working material of the Federal Statistical Office.

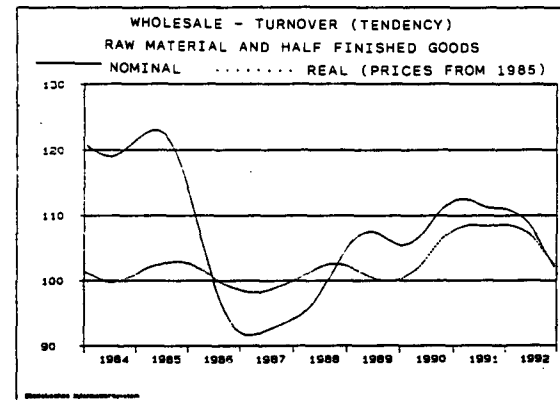
⁵ Source: Working material of the Federal Statistical Office.

⁶ Here non-retail customers might have the largest share.

a)



b)



c)

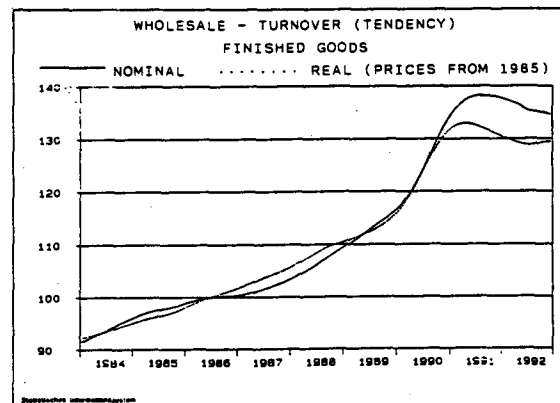


Figure 1: Development of wholesale turnovers for the last 12 years (source: working material of the Federal Statistical Office)

1.2 The situation and development of buying groups⁷

The development in the retail industry is characterized as everywhere else mainly by a decline of the traditional small and medium sized shops measured by their market share (from 55.4% in 1980 to estimated 35.4% in 1995) and an increase in chains with small and mediums sized shops (from 18% to 21.8% respectively), specialized non-food supermarkets (Fachmärkte; from 2% to 14% resp.) and self-service department stores (from 11.9% to 17.5%); the market share of the four big department store chains (plus Woolworth) declined from 7.2% in 1980 to 5.6% in 1992. (see figure 2)

The expansion of the 'Fachmärkte' is due to economies of scale i.e. better productivity. It is clear that traditional small and medium sized shops are exposed to a fierce competition with the 'Fachmärkte' and the chains. Nevertheless, there are successful strategies within the sector of the small and medium sized shops, namely specialization for the highest price segments (to be the leading local shop), franchising and co-operative membership. If one considers the institutional background of the structural change in the retail sector this becomes clear.

The independent trade (i.e. no affiliation with co-operatives) has continuously been decreasing whereas the co-operative trade grew from 29.4% in 1980 to estimated 31.3% in 1995 of market sales. The big chains account for the largest expansion of market shares, they are the real challenge to co-operatives and voluntary chains.⁸ Before describing a case study where a co-operative applies new strategies to match these challenges some more background information on the situation of the co-operatives will be given.

Co-operatives⁹ fulfil a wide range of different functions. Traditionally the main function is the mandate to bargain with suppliers for better conditions and prices. This includes the selection of suppliers which thus also have an interest in being 'listed' by the co-operatives. The co-operatives are also active in the operational phase of the business between suppliers and dealers, mainly by their invoice clearing services (paying each supplier for all deliveries to all members and invoicing each member for all purchases from all suppliers for a given period) and

⁷ All statistical information given in this section is taken from E. Batzer, J. Lachner, W. Meyerhöfer (1991): Der Handel in der Bundesrepublik Deutschland. Strukturelle Entwicklungstrends und Anpassungen an veränderte Markt- und Umweltbedingungen. Ifo-Institut für Wirtschaftsforschung, München. Further on this study will be referred to as the 'Ifo-study'.

⁸ Voluntary chains more and more resemble the co-operatives but their origin is different. Whereas co-operatives have been set up by independent retailers (mainly in the non-food sector) voluntary chains used to be cooperative arrangements between wholesalers (mainly in the food sector). Nevertheless the differences are blurring.

⁹ With this term we also mean the voluntary chains.

their paying suppliers in advance thus taking over the risk resulting from dealers becoming insolvent. For both kinds of businesses they charge a commission which considerably contributes to their earnings. They also provide marketing and promotion services to their members which are most important for the smaller dealers since they would have no opportunity to acquire professional services otherwise.

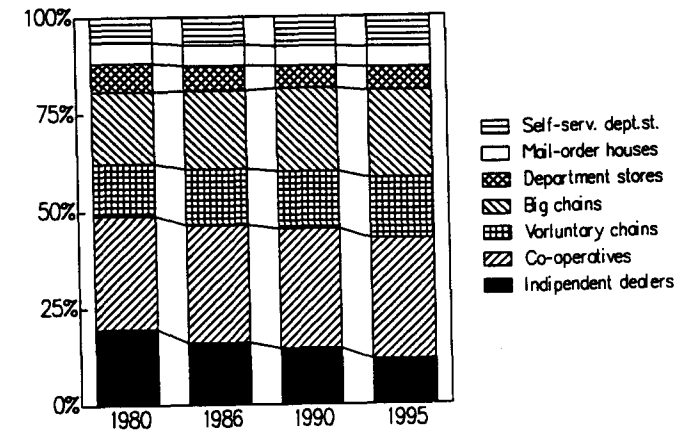


Figure 2: Institutional background of the retail sector (source: Ifo-Study)

The bargaining function is still very important as could be seen by the share of purchasing volumes which is ordered at 'listed' suppliers:

Food:	88%
Toys:	82%
Consumer electronics:	80%
Furniture:	73%
Shoes:	73%
Electrical consumer goods:	72%
Sport articles:	61%
Household articles:	59%
Textiles and clothes:	54%
Photo articles:	50%

These figures contrast with the shares of co-operatives in total retail sales and procurement shares in the domestic supply as figure 3 illustrates. That means the rationalization effects of centralized distribution and procurements are not as important as the more traditional functions of bundeling bargaining power and offering a range of services (clearing, marketing, promotion).

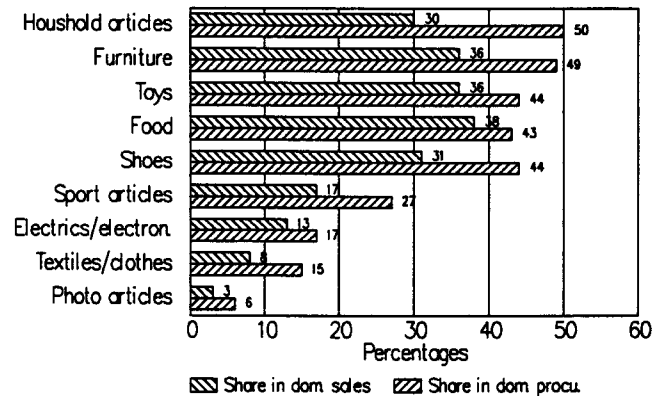


Figure 3: Share of co-operatives in retail sales and procurement on domestic markets (source: Ifo-study)

2. A case in point: The EDI strategy of a large buying group

One of the largest European buying groups in the sector of small and medium sized department stores in the Kaufring AG in Düsseldorf. The total turnover of its members is currently about DM 6 billion, whereby the buying group itself sells goods to its members worth DM 3 billion every year. Clothes and textiles account for about half of its turnover, the remaining covers nearly all areas of daily demand. The group has about 400 member companies with 700 point of sales. It deals with approximately 10,000 suppliers.

In the last few years the company is very active in acquisition and innovation. Its main problem is the continuous decrease in the number of its members. Therefore

they put a high value on the service aspects which include the EDP-support. The general strategy is:

- Extend the assortment
- Secure and extend the number of members
- Extend the service- and consulting business

Part of this new strategy is the change of the legal form from a co-operative to a joint stock company, which means that members become customers on the one hand and share holders on the other. Currently the de-facto situation is nearly as before, nevertheless, this change opens the market for the buying group since now dealers could become customers without being shareholders.

2.1 The strategy: A spider in the cobweb

A central feature of this strategy is a new role for the EDP-department. This new role corresponds with the overall strategy of the group:

- Development and employment of new application software to handle the extended assortment (stock management systems)
- Improve the economic performance of the EDP-department in a way, that customers do not want to set up their own EDP-departments
- Better control over the information-, goods- and capital flow

Especially the latter point seems to be essential. It is a result of an analysis which compares the possibilities of buying groups with those of chains. The central difference is that chains do not only combine the market power of the dealers but also control their behavior and have immediate command over all crucial information: sales, stocks, consumer behavior etc. Buying groups lack control over these information sources and control potentials. The Kaufring AG regards both aspects essential for their survival. Therefore the new role of EDP-department is not only designed to increase the services rendered to customers but to get more information about their performance and some control over their business behavior.

To understand this it is important to keep in mind the functioning of buying groups. There are basically two functions:

- Bundeling of market power in order to improve the conditions under which dealers procure (price, sconti, discounts etc.)
- Clearing of the invoicing procedure

This leads to two different kinds of businesses with which the company earns money. (1) Buying and selling of goods on own account. (2) Charging suppliers and

customers for the clearing activity. With respect to the former the Kaufring AG tries to rationalize routine procedures as any other trading company. In contrast, the latter leads to a new strategy which is being described as "spider in the cobweb". Up to date the Kaufring only controls information concerning the goods flow which goes through its accounts and the money flow from dealers to suppliers (via the invoice clearing). The vision for its future is to control all information flows from suppliers to customers and thus on the one hand improving its own performance (trading with goods) and on the other hand improving the members' performance (by better advising them in their procurement- and stock handling strategies).

The economic details of this 'cobweb' strategy are as follows:

- Control the goods flow: Most of the goods which dealers buy directly from the manufacturers are ordered from the manufacturers' representatives which regularly visit the dealers. Thus the Kaufring AG does not know which amount of and which kinds of goods their members trade with besides those shares which the Kaufring AG itself supplies.¹⁰ Therefore the aim is that members order via EDI irrespective whether from the Kaufring AG directly or not. One side effect is that by means of controlling orders the Kaufring AG could also improve its own performance since it would be better informed about articles which are doing well.
- Control of risks: The invoice clearing activity contains an inherent risk which could not be neglected. This risk stems from the way the clearing is organized: Manufacturers send all bills once to the Kaufring AG on a regular basis which pays them first. Then the Kaufring AG bills its customers. It could well be that customers have become insolvent in the meantime. The Kaufring AG would be better able to estimate this risk if it knew about the amounts ordered. It could then intervene in advance.
- A pure rationalization strategy concerns the use of EDI for the invoicing procedure itself. Up to date the most advanced usage of electronic means in this field is the exchange of disks or magnetic tapes (most of the buying groups employ this technique with their major suppliers). A transition to EDI would reduce the enormous handling costs as well as the error rates which frequently occur, mostly due to handling mistakes.

Thus there are two main problems for the company. (1) Improve their EDP-department's performance in a way that they could sell new products to their customers and make money with this business (until now there is a lot of internal cross-subsidy to the EDP-department). (2) Persuade suppliers to use EDI for ordering and invoicing procedures. It is difficult to say which task is more difficult, nevertheless, the ties to customers are closer due to historical reasons. Therefore it

¹⁰ Within the invoice clearing procedure articles are not explicitly listed by suppliers.

should be easier to extend the idea of electronic networking to its clients (in fact there is a well established routine of electronic communication with customers, see below), although it must be kept in mind that customers are independent companies whose decisions could not be directly influenced through the Kaufring AG (as opposed to the possibilities of chains).

2.2 The reality: Repercussions

2.2.1 Customers

If one considers the degree to which electronic linkages between the Kaufring AG and its members are established it becomes clear that there are very close traditional ties. The services which are offered by the EDP-department to its customers range from payroll accounting, statistical compilations (on the basis of invoice data) to electronic ordering procedures. These services have been developed 20 years ago and nearly stayed unchanged since 1980. The Kaufring AG supplied all customers with identical equipment, trained the personnel and maintains software and hardware.

Most of the customers take advantage of the services offered by the Kaufring AG (82% use one or more services). Only the very large and the very small do not. The charges are among the lowest compared to other offers on the market. They do not exceed 0,1% of the customers turnover. Thus there is a more or less complete coverage of EDP services due to full package service and low prices. Nevertheless, the next step seems to be extremely difficult.

Currently electronic data exchange with customers comprises the ordering procedure including the electronic transmission of master data (description of articles, prices, supplying conditions etc.). The master data are necessary for the ordering procedure. They also include the EAN which is used for the ordering procedure with the manufacturers. Master data are maintained by the Kaufring AG and transmitted on a regular basis to the customers. Every evening the Kaufring AG locks into the customers' computers and retrieves the order data which have been keyed in during the day (manually or with electronic devices). The next step would be to transmit invoices, dispatch advices, labeling data and statistical data. The idea for how to bring this about seems to be a one-to-one copy from the implementation pattern in the 70ies. All these key elements are 'wrapped' into new products that are to be sold to customers. This new package also includes new hardware, thus causing monetary costs but reducing transaction costs. The new equipment and

software could be used in the same way as the old one, whereby new features will be added according to users demands.

There are basically two bottle necks to this strategy: (1) the EDP-department has difficulties in completing the new products, customers have high expectations and are dissatisfied with the progress made by the EDP-department. Nevertheless, they seem hesitant to by the services elsewhere since prices are unmatched. (2) Customers could use old features with the new equipment, but this renders no additional utility. Therefore the users' competence must be increased which the EDP-department is unwilling to do due to a lack of resources. After one year of intensive preparation only four customers switched and these only because of routine exchange of equipment. New features have not been implemented yet.

A continuous threat to the Kaufring AG is not only that members might seek to buy EDP-services on the market but that they might get the idea to totally by-pass the company by directly connecting to their suppliers through e.g. simple mailbox systems. It is not clear yet how the company would react, e.g. if it would deny those customers the conditions that are negotiated with selected suppliers.

2.2.2 Suppliers

2.2.2.1 Orders: Lack of interest

Since ten years the Kaufring AG actively tries to persuade suppliers to participate in the electronic exchange of data. The result of these efforts are 19 companies partly using EDI for their ordering procedures. The case for the electronic invoice data looks slightly more promising. Among the 2275 suppliers using the invoice clearing service of the Kaufring AG 100 send their invoice data on diskets or magnetic tapes. Nevertheless, these 100 companies account for nearly one third of the total volume of invoice data. Two different formats are used for the data exchange: An internally defined format of the Kaufring AG and SEDAS, the German dataformat for the retail sector developed by the CCG, which is the German representative of the International Article Numbering Association (among the 100 companies sending electronic invoice data 42 use SEDAS).

This is the situation to be changed in the course of the new strategy. The aim is to include 70% of all suppliers in the electronic network. The dataformat to be used is SEDAS, i.e. there is an explicit decision not to use EANCOM. Reasons for this

decision are: SEDAS is well established, risks can be controlled, it is concise. Due to the 70%-strategy SEDAS seems to be wide enough a dataformat.

If one looks at the structure of the order data exchanged via EDI it is striking that about 98% of the datavolume are exchanged with one 'quasi-supplier'. This concerns the trade with phonographic articles (CDs etc.). Five years ago there were about 15 suppliers in this sector which have been reduced to five this year. Three quarters of the total turnover in this sector are done with one supplier, who also accounts for the high proportion in the data volumina. Since members place a high value on their organization's credibility the Kaufring AG has set up a joint venture with this supplier. Nevertheless, the operational business is managed by the supplier who also provides the EDI-systems for the retailers (of 220 customers 38 use these systems, the remaining ordering from the suppliers representatives). All data are transmitted via the Kaufring EDP-department without manipulating them. This is due to the 'cobweb' strategy, although the EDP-department conceives of no benefits in this procedure. The dataformat is SEDAS plus a quasi-EAN, i.e. a number with 13 digits but without EAN-structure. The whole system is closed and totally controlled by the supplier the Kaufring AG just 'intermediating' by giving its name.

That clearly shows that there are serious hinderances to EDI for odering procedures. There are basically two elements in this: (1) Manufacturers want to control the ordering procedure. (2) There is much more coordination necessary than just the standardization of the dataformat. To deal with each seperatly the question of suppliers' EDI strategies seems to be relevant. These strategies seem to approach a sort of vertical integration through socalled rack-jobbing (supplier mainting whole shelves in the shops), i.e. the whole process of stock management is being outsourced to the suppliers. Naturally they have no interest in giving up this domain since:

- they get direct information about the dealers assortment policy (products of competitors) and
- could influence the dealers buying behavior.

Most of the companies following this strategy equip their salesmen with laptops to be used for the electronic transmission of order data. As in the above described case here the EDI-systems are effectively closed and controlled by the suppliers. Probably suppliers would be willing to open their proprietary EDI-syestems only if being compensated for the above mentioned benefits. Current opprotunities seem to be far not enough to do that.

2.2.2.2 Invoicing: New possibilities

Exchange of invoice data in electronic format are nothing new. Most buying groups have developed appropriate routines with their suppliers. In contrast to order data invoice data normally are not sensitive to time restrictions, thus there is no immediate necessity to change to EDI-procedures. In fact, high transmission costs of the VANs have effectively hindered such a switch over. This situation has been changed through the working of two factors: (1) The emerging of a public and thus cheap data transmission service (Telebox 400 by the German Telecom). (2) The combined effects of high transmission speed and data compression techniques. Especially the latter reduces costs by up to 80% (if fees are charged proportional to transmitted quantum). High speed data networks are by now available at relatively low costs (ISDN-PC card about DM 2000). The prices for the Telebox lie far below those of established VANs. These factors have encouraged several suppliers and trade companies - among them the Kaufring AG - to start pilot projects for EDI invoicing.¹¹

The benefits of EDI invoicing mainly stem from reduced handling costs and error rates thus triggering rationalization processes. The switch from the exchange of disks to EDI is possible at relatively low costs since most routines have been already developed. The development of these routines has nevertheless been quite costly, one supplier says that it took him half a year with one employee full time working on it. Therefore suppliers also support the old dataformat, that is SEDAS.

Rationalization effects seem to accrue mostly within the Kaufring AG. Suppliers in contrast consider EDI-invoicing rather an additional service to customers. This is clear if one keeps in mind that the largest rationalization potentials stem from the saving of inkeying data. This observation also may contribute to the often discussed question, whether EDI renders rationalization benefits and/or competitive advantage. Suppliers often may be 'forced' to use EDI, even if rationalization effects are low or absent (even negative), i.e. they might consider offering EDI pro-actively or implementing it reactively if asked to do so by their customers.

2.2.3 The problem: Master data

Thus it turns out that the switch to invoice-EDI is relatively easy if only transmission costs are within certain limits. The most important aspect is that all data necessary for the electronic transmission could be extracted from the computer. This is also the big difference to the case of EDI for ordering procedures. Here new kinds of data have to be generated before EDI could be operated on a regular basis.

¹¹ Legal constraints seem not to be much of a problem. According to accepted habit it is enough to paper mail a document with the cumulative amount of invoices for a fixed period of time which could be filed (for VAT-control).

To exchange orders electronically it is necessary to store a range of data which are known as master data (Stammdaten). These include a detailed description of the article, price information, supply and payment conditions, packaging information etc. Different kinds of application need different master data. Therefore within the Kaufring AG there are several departments dealing with inkeying and maintenance of master data. EDI ordering requires one specific set of master data which is normally keyed in by the sales departments (according to different branches like textiles, shoes etc.). These data are maintained for all products which are traded with by the Kaufring AG itself. In contrast, it seems too big an effort to do the same for all products which are traded with by its customers. Therefore there seems to be a natural borderline for EDI ordering which counterbalances the original 'cobweb' strategy.

One possible solution to this is a system for efficiently (i.e. with lowest possible costs) maintaining and inkeying master data. This requires a coordinated action of all interested parties, i.e. suppliers and dealers. As it is already very difficult to standardize dataformats for EDI in different sectors it seems much more so in the area of what could be called 'dataware' (Kubicek). Even within the Kaufring AG it is nearly impossible to find a unique procedure for the data maintenance and even more so for the kind of data to be maintained (e.g. the sales unit would like to include data about the size of different packages as well as possibilities to store them).

Nevertheless one such effort has been undertaken by the CCG which set up a system called SINFOS. The basic idea is that suppliers provide the dataware which is stored in a central database which could be retrieved by every one interested in the data who is member of the system. Although much work has been invested the system does not work, because (1) only a very small number of suppliers participates and (2) the quality of the data is insufficient; there is no controlling agency which is not acceptable for distributors since they would be claimed responsible if they used false master data (e.g. wrong price information). How to solve this problem is not evident since it is difficult to believe that standardization provides the solution.

The situation of VANs in Germany

1. Conversion of the ONP directive of the EC Council into German law and implications for value-added service providers.

The adaption of ONP directive into German law was realised with the publication of the "Administrative rule defining the authority transferred to the Deutsche Bundespost Telekom to exercise the federal government's network monopoly ("Verwaltungsvorschrift zur Konkretisierung der auf die Deutsche Bundespost weiterübertragenen Befugnis zur Ausübung des Netzmonopols des Bundes") on Sept. 19, 1991, meeting the council deadline of 13.12.92 with time to spare.

This "administrative rule" includes a range of duties which the DBP Telekom, as holder of the network monopoly, is to fulfill in relation to private users customers.

Some of these duties are:

- Distribution of lines without discrimination
- Rates not dependent upon use, magnitude and structure have to be cost oriented and are subject to approval by the Federal Ministry of Posts and Telecommunications (BMPT).
- Further development of communications services based upon demand.
- Confirmation, publication, and compliance with provision deadlines for communications lines.
- Legally binding termination of line supply.
- Determination of regular interference removal times.
- Equivalence of technical and economic conditions for services which Telekom provides its customers and, on the other hand, uses itself in competition with other TK service providers.
- Internal accounting for services in competing areas, involving claims on other resources (for example, through common use of personal, professional, or business resources) of the monopoly.
- Hindering misuse of customer information yielded to the monopoly.

The private provider as customer of DBP Telekom has the right to use the lines put at his disposal,

- freely (the federal government's voice telephony monopoly remaining untouched).
- by connecting them directly or indirectly

(See Heringer 1992, Chap. 04.91.04)

This early adaptation of the EC directives into German law, however, does not necessarily guarantee their practice by DBP Telekom. Still, there is no clear distinction between areas of competition and the Telekom monopoly. This makes DBP Telekom simultaneous supplier for private providers, as well as their competitor.

(See Deutsche Telecom e.V. 1993, pp.3-10)

Regarding this troublesome circumstance, the DT Telecom eV., a large telecommunications user group, complains of

- the possibility that Telecom could transact barely detectable cross subsidies,
- impose lengthy waiting periods and poor service,
- now as before high, non-cost oriented tariffs

(See Ibid. pp. 4-10)

Corresponding allegations come from the "Verband der Telekommunikationsnetz- und Mehrwertdienste - Anbieter VTM," whose goal it is to guarantee equal opportunity to compete. A VTM policy paper has outlined the various strains and challenged DBP Telekom on several counts.

As an example of such competitive strains, VTM asserts that the customers of private providers must always lease two connections in order to communicate over the private network. In contrast, the DBP Telekom, having access directly to customers, can offer customer to customer connections and bill directly. This circumstance affects hook-up/ initial connection fees in that, while for DBP two connections must be paid, private providers must bill for four.

According to VTM, the BMPT, in its role as regulator, has also confirmed the allegations brought forth in their policy paper. Consequently, a round-table discussion meeting at regular intervals was established, with both Federal Ministry of Posts and Telecommunications (BMPT) and Federal Ministry of Economics (BMWi) taking part. Cases of unjustified billing (three, to date) will be reported to

the BMPT by members of the VTM, BMPT forwards the complaints to DBP Telekom for explanation. In these cases, "an ombudsman will be named, agreed upon by both parties, who will deal with the entire issue of competition and billing politics involved." (Schrader 1993b, p.89) In addition, the DBP is considering the construction of separate concessions (sales marketing tracks) for value-added service providers.

(See Schrader 1993a, p.69 and following pages, and Schrader 1993b, p.80 and following pages.)

On June 5, 1992, the EC Council enacted the "Council Directive on the application of open network provision to leased lines," as well as the "Council Recommendation on the harmonized provision of a minimum set of packet-switched data services (PSDS) in accordance with ONP-principles" and the "Council Recommendation on the provision of harmonized integrated services digital network (ISDN) access arrangements and a minimum set of ISDN offerings in accordance with ONP-principles".

In addition, they adopted recommendations to introduce harmonized ISDN access regulations and an ISDN lowest bid, also according to ONP directives.

The BMPT has developed an ONP strategy to clarify salient ONP directives from a German point of view. BMPT delivered this ONP strategy paper to the EC Council in December, 1992. BMPT points out, among other things, that the ONP directives of June 5, 1992, were conceived in part to regulate the services of telecommunications firms. Especially in relation to securing a minimum supply, BMPT finds it advisable to check whether there might not be other regulatory instruments besides the ONP directives and recommendations. For, according to BMPT, regulation through ONP directives and recommendations conflicts with the ONP principle of separating the regulation of competition from the obligations for infrastructure.

(Heringer 1992, Chap. 09.93.01)

According to BMPT, they are now checking areas of German telecommunications which require regulation to conform with the EC directive and recommendations of June 5, 1992, or where these are already adapted into existing rules. (Olschewsky / BMPT, per telephone on 17 and 18 August, 1993.)

Annex one of the ONP directive names several individual areas in which ONP conditions are to be worked:

1. leased lines
2. packet- and circuit-switched data services
3. Integrated Services Digital Network (ISDN)
4. Voice telephony service
5. telex service
6. mobile services, as applicable

And, subject to further study,

7. new types of access to the network
8. access to the broadband network

As of June 5, 1992, directives and recommendations for points 1-3 have already been set by the EC Council. (See p. 3.) Subject to the provisions of these extended directives, Annex 2 defines a frame of reference for proposals regarding ONP conditions.

The following table compares the necessary and feasible clauses of this frame of reference with their corresponding adaptation into the "administrative rule on network monopoly".

Frame of reference	Administrative rule
<u>1. Common principles</u>	- not converted
<u>2. Harmonized technical interfaces and/or service features</u>	<p>I. 8 und II. 10</p> <p>I. 8. Transmission lines covered by the network monopoly must be made available to the user via non-service-specific, spatially freely accessible interfaces between the network terminations of the transmission lines and the equipment for attachment to these (§ 19 Telecommunications Ordinance). The interface conditions must be limited to the electrical and physical properties of signal transmission.</p> <p>II. 10 Terminal equipment and switches for connection to monopoly transmission lines require prior approval by the Central Approvals Office for the Telecommunications (ZZF). This approval relates to compliance of the equipment with the electrical and physical conditions of the interfaces referred to in item I.8. Following implementation into national law of the Council Directive of April 29, 1991 on the approximation of the laws of the Member States concerning Telecommunications terminal equipment, including the mutual recognition of their conformity (91/263/EEC), approval will be in conformity with the provisions then in force. Reference is made to the § 28 of the Telecommunications Ordinance regarding the need for a connection licence for approved telecommunications terminal equipment.</p>
<u>3. a) Supply conditions such as:</u>	II. 7 und II. 8
<ul style="list-style-type: none"> - maximum provision time (delivery period) - quality of service in particular the quality of transmission 	<p>II. 7 In the provision of monopoly transmission lines DBP Telekom must offer a transmission quality that is in line with state of the art technology. Its service specifications must indicate the quality characteristics generally achieved, especially the bit error rate and availability. There will be various classes of transmission quality, depending on the demand of the market (§ 21 para (1) Telecommunications Ordinance). The basic service will be transmission lines without alternative routing (§ 20 sentence 2 Telecommunications Ordinance).</p> <p>II. 8. DBP Telekom is obliged to provide transmission lines immediately after the customer's application, ie without any culpable delay (§ 21 para (2) Telecommunications Ordinance). To do so DBP Telekom is obliged to take the following measures:</p> <p>a.) Until December 31, 1992 it must provide monopoly transmission lines as a general rule - ie 80% of all the transmission lines specified in item II. 3 - within a period of four months.</p> <p>b) Regarding monopoly transmission lines, it is also obliged to establish by December, 31 1992 at the latest the provision periods within which it will guarantee, as from January 1, 1993, to instal 80 % of all these transmission lines of the same type.</p>

<p>- maintenance - network malfunction reporting facilities</p>	<p>c) DBP Telekom must include in its general terms and conditions the provision periods referred to in a) and b) above.</p> <p>d) DBP Telekom ist obliged to publish at half-yearly intervals, on June 30 and December 31 of each year, the percentage of provision periods it was actually able to keep.</p> <p>e) If the figures published in accordance with d) above show that it was not possible to carry out 80 % of all orders within the provision periods referred to in a) and b) above, DBP Telekom is obliged to submit to the Federal Minister of Posts and Telecommunications the reasons justifying the delays.</p> <p>f) Pending further ruling DBP Telekom is obliged to inform the Federal Minister of Posts and Telecommunications twice yearly, on June 30 and December 31 of each year, of the percentage of monopoly transmission lines that were installed within one, two, three or four months of the period under review. It is also obliged, pending a further ruling, to inform the Minister twice yearly, on the above dates, of the percentage of transmission lines to be provided in the period under review by a specific date, that were indeed provided to schedule.</p> <p>g) DBP Telekom is obliged, immediately after receipt of an order for a monopoly transmission line, to notify the customer, with legally binding effect, of the date on which this will be done.</p> <p>h) DBP Telekom is obliged, as from January 1, 1993 at the latest, to offer the customer security in respect of the provision periods contractually guaranteed in g) above, by including in its general terms and conditions suitable regulations for the event of non-observance.</p> <p>II. 9 At the customer's request, DBP Telekom must investigate a fault immediately, also at night and on Sundays and public holidays (§ 10 sentence 1 Telecommunications Ordinance). Beyond this, it is obliged to take following action:</p> <p>a. Following the issue of this administration rule, DBP Telekom must establish the basic fault repair period(s) - ie the period within 80 % of all transmission lines will be repaired.</p> <p>b. DBP Telekom is furthermore obliged to establish, by December 31, 1992 at the latest, the fault repair periods within which it will repair 80 % of all transmission lines of the same type and which will agree with the customer by contract, as from January 1, 1993, for monopoly transmission lines.</p> <p>c. DBP Telekom is obliged to publish in its general terms and conditions the fault repair periods for transmission lines referred to in a) and b) above and the contractual conditions of the fault repair service.</p> <p>d. DBP Telekom is obliged to publish twice yearly, on June 30 and December 31 each year, beginning with the period under review from January 1, 1992, the percentage of repair times promised that it has in fact met.</p>
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<p><u>3. b) Usage conditions such as:</u></p> <p>- conditions for resale of capacity</p> <p>- conditions for shared use</p> <p>- conditions for interconnection with public and private networks</p>	<p>- not converted</p> <p>V. 1 und V. 2 V. 1 The customer is entitled to freely use the transmission lines covered by the federal government's network monopoly. This is without prejudice to the federal government's exclusive right to switch voice for third parties (§ 1 para (4) sentence 2 FAG). V.2. The user of monopoly transmission lines has the right to connect the respective network termination directly or indirectly to the terminal equipment or switches of others on the same premises, provided there is agreement on this between the user and the other party concerned. Premises are considered as being: a) Part of the earth's surface, due to the way it is commercially used or to its outward appearance, forms a unit, even if this unit consists of several premises under real property law. b. Always part of the earth's surface entered in the Land Register (Grundbuch) as an independant property. Road and rail networks are not deemed to be <i>one</i> single set of premises.</p> <p>V. 3 The following applies with the regard to interconnection: a. Monopoly transmission lines may be interconnected directly or indirectly. b. They may also be connected directly or indirectly to fixed or switched connections made available by DBP Telekom or other providers on the technical conditions and terms of business of the providers concerned. This also applies to the telephone network/ISDN. c. Monopoly transmission lines may also be connected directly or indirectly to telecommunications installations that may be set up and operated without a licence within the limits of a customer's premises under § 3 para (1) no 3a FAG. d. They may also be connected to telecommunications installations that may be set up and operated without a licence under § 3 para (1) nos 1, 2, and 3b FAG, provided that the legal requirements allowing such do not cease to be met as a result of this interconnection. e. Monopoly transmission lines may also be connected directly or indirectly to telecommunications installations for whose setting up and operation licence is required under § 2 FAG, if such interconnection is permissible under the licence. f. Interconnection pursuant to a) to d) above may not be used for the purpose of switching voice for third parties (Telephone service monopoly).</p>
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<p>3. c Conditions, which may be required:</p> <ul style="list-style-type: none"> - conditions regarding access to frequencies - measures concerning protection of personal data and confidentiality of communication 	<p>- not converted</p>
<p>4. Harmonized tariff principles</p> <p>Tariffs must be:</p> <ul style="list-style-type: none"> - based on objective criteria - cost-oriented - transparent - properly published - sufficiently unbundled in accordance with the competition rules of the Treaty - non-discriminating and guaranteeing equality of treatment 	<p>IV. Fixing the rates for monopoly transmission lines</p> <p>1. und 2.</p> <p>1. Services DBP Telekom provides in exercising the federal government's network monopoly (item II.2) must be offered on the basis of uniform tariffs across the country (nationwide application of uniform tariffs). Rates may be graded, especially in view of cost aspects, according to transmission distance, transfer rate, quality, time of day used and volume of services required.</p> <p>2. Tariffs for the use of monopoly transmission lines must, the criteria set out under items II.6 and IV. 1 above being observed, comply with the basic principles of the ONP Council Directive of June 28, 1990 (90/387/EEC). In particular, they should be usage independent, also in terms of time, and cost-based in their amount and structure. Also to be taken into account are degressive costs in relation to the greater bandwidth and bit rate of a given transmission line, volume-based cost savings for DBP Telekom and cost savings deriving from front-end investments made by the user.</p>

2. Providers of Telecommunication-services in Germany

Number and Growth of Service Providers Since Liberalisation

Date of coming out	providers altogether	increment absolute
31.01.91	66	53
21.08.91	103	37
22.01.92	144	41
29.07.92	168	24
28.01.93	228	60
21.07.93	329	101

(See Heringer 1992, Chap. 04.91.04 and Chap. 09.90.01, p.14 and beyond; as well as in English, the Official Journal of the European Communities of 24.07.90, No L 192/7)

List of providers (as of 21.7.93) according to specific services offered:

- transmission services	185
- compatibility services	17
- processing services	83
- information services	65
- transaction services	21
- telemetry exchange services	65
- network management services	42

(source: BMPT 1993, p.355 and following pages)

Since liberalisation in 1990, private providers of value-added services have had unlimited access to the market, a fact which is reflected in their high growth rate.

(See Elixmann and Schnöring 1993, p.13 and following pages)

Permission is no longer required, rather, only a registration (s. Tab. above). The large number of private providers comes from the fact that even small and very small providers are subject to this registration. Thus, for example, 100 out of 185 transmission services are only mailboxes, some of them reaching only a small number of customers. Of the 83 registered processing services, a little less than half (39) are only used internally within one company.

The opportunities available to individual private providers are influenced by various criteria (see also p.1). At the present, only a limited number of providers have a portion of the market worth mentioning. The prognosis is that "only a handful of these services will survive to the year 2000" (Gruber and Meyer-Sheel 1993, p.16).

At this point, the most important providers of value-added services including EDI on the German market, besides DBP telecom, are:

- GE Information Services - Hürth Efferen (42% Marktanteil, see Röcker et. al., 1992, p.35.)
- IBM, USA, Stuttgart (19% market share, Ibid.)
- BT Tymnet, Frankfurt
- Info AG Hamburg (since Jan. 1993, 75% majority participation through France Telecom subsidiary, Transpac)
- INAS, Frankfurt/M
- Infonet Network Services Dtl. GmbH/Ffm
- debis Network Services, Eschborn
- MCi/USA - MCi International Germany GmbH, Hanau
- Meganet, Köln
- Sprint International, USA - Telemail Datenservice GmbH, Ffm.

The new providers in the area of value-added services recruit from the following sources:

- established, classical telecommunication-service providers which have widened their range of services.
- new, young companies which, as subsidiaries, often have access to the financial and network resources of the parent company.
- companies in marginal areas which have expanded into telecommunications-services.

(See Steinbach 1992, p.24 and following pages)

Especially with providers of EDI, insofar as they do not limit themselves to purely internal communications, there is a clear trend toward internationalisation. Results of an inquiry by the "Wissenschaftliches Institut für Kommunikationsdienste" (WIK) show that 50% of private MHS providers in Germany expect to find their largest future market share outside of Germany and, therefore, have already formed cooperative partnerships with foreign firms.

(See Elixmann and Schnöring 1993, p.16)

3. The services of the most important operative German VANS providers relating to EDI

a. GEIS:

1992	9,000 active participants in Mark III-Network (Steinbach, 1992 p.159)
1993	12,000 participants (Gerd Eikers of GEIS, statement at Telekom-Kongress 1993, Munich)

- worldwide, more than 700 network nodes (Netzknoten)
- 750 cities in 30 countries accessible at local rates
- Gateways to various public and private network services
- exchange of formatted business news among various computer systems, using the mailbox principle.
- conversion of application data to EDIFACT news through various customer-specific application systems.
- clearing services (for example, for the pharmacological industries and wholesale businesses)

Supported standards: UN/EDIFACT, ODETTE, ANSI X.12, SEDAS, VDA

(See Steinbach, p.110 and following pages, and Eikers 1993)

One user example from GEIS is Nedlloyd Unitrans GmbH., "Unfortunately, it is not yet practicable to assume that all partners can be connected by one network. Thus, several connections at once must be managed." (Reichwein 1993, p.33)

b. IBM:

- more than 200 network nodes in Europe, 24 nodes in Australia, Hong Kong, and Japan; more than 300 nodes in the USA and Canada.
- 88 countries, furthermore, can have access to the IBM network through packet switching networks of a CCITT X.25 type.
- for EDI uses: IBM Information Exchange Service: intra- and inter- company exchange of formatted data among computers or, respectively, applications.

Supported standards: ANSI X.12, UN/TDi, UN/EDIFACT, ODETTE

(See Steinbach 1992, p.11 and following pages)

c. BT Tymnet:

- EDI-Network of over 5,500 nodes (connections)
- Data management with end-to-end service
- Automatic conversion of protocols
- Central supervision
- 24-hour service
- Customer-specific EDI arrangements

Supported standards: ANSI X.12, UN/TDi

(See Steinbach 1992, p.106 and Schrader 1993b, p.81)

d. Infonet:

- 350 customers in Germany
- 6 network nodes in HH, B,D,Ffm,S,M; and, over these, access to international networks in 48 countries worldwide.
- Estimated 37% share of the worldwide market for data networking services as of 1991
- 24-hour service on 365 days per year in 45 countries
- via Enterprise Communication Service all-inclusive package to handle customers' entire international communications needs.

Supported Standards: EDIFACT, ANSI X.12

(See Steinbach 1992, p.117 and Schrader 1993b, p.82)

e. Meganet:

National alignment of Germany, connecting 35 German cities over 100 network nodes, with 120 customers in Germany; worldwide communication possible through cooperation with GEIS.

- point-to-point connections
- Network outsourcing
- trade-specific applications

- high degree of security regarding availability, structural redundancy in network (Redundanz im Netzaufbau) and in data transmission by coding of all transmitted data in the network and, on request of customer, also in the connective lines (Anschlussleitungen)

(See Steinbach 1992, p. 120 and following pages, and Schrader 1993c, p.67f)

For the future, private providers are working toward new and better services such as:

- Interactive network applications
- Instead of volume-based rates, rates based upon duration of connection or daily rates covering transmission of unlimited amounts of data over constant lines between as many points as desired.
- Improved administration of the network (customer service accessibility, etc.)
- More customer-specific arrangements
- Syntax and code testing
- Conversion from EDI-News through Clearing Center
- Formatting of EDI-News for smaller firms which are forced by competition to take part in EDI, yet have too few transactions themselves to acquire their own EDI computer.

(See Steinbach 1992, p.163 and following pages, and Crockett 1990, p.34)

For VANS providers, the volume that the German market represents is not of primary interest. Their interest lies, rather in a global market of which Germany is only a part.

(See Schrader 1993a, p.69)

Hence, most internationally oriented providers have the goal of reaching a worldwide clientele. After the opening of the EC market (EG-Binnenmarkt), border-crossing EDI applications will be even more desirable than ever.

One disadvantage for customers, however, is that not all VANS are connected, making it difficult for the customers of one provider to communicate with the customers of another.

(See Röcker, et al, 1992, p.35 and Steinbach 1992, p.164)

4. Performance features of the Telebox 400 in relation to EDI

The Telebox 400 is the new Message Handling System of the DBP Telekom. Since 1991, when the CCIT Standard X.400 was introduced for Telebox 400, the number of connections has increased sharply.

1991: 3,335

1992: 5,362

(Source: DBP Telekom-Pressestelle 1992)

This represents a growth of more than 60%.

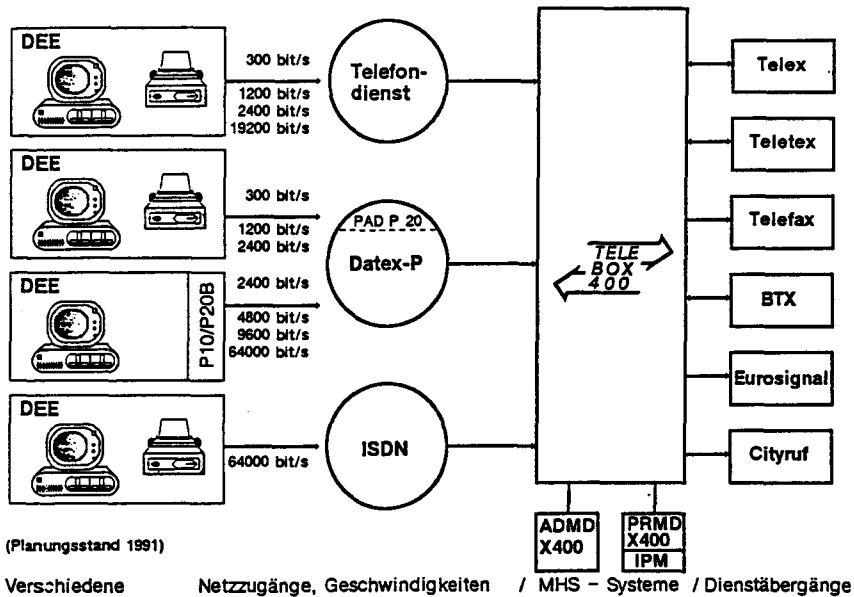


Illustration 1: Information exchange over various access points and speeds, between various MHS Systems and telecommunications services (Source: DBP Telekom 1990, p.15)

The DBP Telekom telebox 400 covers an Administration Management Domain (ADMD) and can, from this position, make international exchange with other ADMDs possible. Conversely, private management domains can be connected with the ADMD.

(See Steinbach 1992, p.41)

Table 1 gives an overview of ADMDs in other countries which are accessible over Telebox 400.

Betreiber	Land	ADMD-Name
ACE Telemail	Japan	ATI
AT&T	Großbritannien	ATTMAIL
AT&T USA	USA	ATTMAIL
British Telecom	Großbritannien	GOLD400
Dacom Korea	Korea	DACOMMHS
DCS Belgien	Belgien	RTT
Embratel Brasil	Brasilien	EMBRATEL.INTL
GE-Telecom	Großbritannien	MARK400
HTC Finnland	Finnland	ELISA
Inet Hong Kong	Hong Kong	INET.HK
Italcable	Italien	OMEGA400
KDM Japan	Japan	KDM
MCI USA	USA	MCI
PTT Dänemark	Dänemark	TELDK
PTT Holland	Niederlande	400NET
Tele Norway	Norwegen	TELEMAX
PTT Finnland	Finnland	MAILNET
Radio Austria	Österreich	ADA
Schweizerische PTT	Schweiz	ARCOM
Singapore Telecom	Singapur	STMHS
Sprintnet USA	USA	TELEMAIL
Teledata Schweden	Schweden	TEDE
Teledata Schweden	Schweden	TBXSPA
Telefonica Serv.	Spanien	MENSATEX
Teleo S.P.A.	Italien	MASTER400
Transpac-France	Frankreich	ATLAS
Testsysteme		
Telecom Plus	Australien	TEXTFILE
INFONET	USA	INFODEV
DACOM Korea	Korea	DACOM400
Australien	Australien	OTC
Singapore Telecom	Singapur	SGMHS
MCI	USA	MCITEST
Sprint International	Großbritannien	TMAILUK
Comink	Dänemark	BUSINESS-MAIL
USSR	Sowjetunion	SOVMAIL

Table 1 (Source: Ibid., p.40)

Access to Telebox 400 is possible over

- Telephone network with modem,
- Datex-P,
- ISDN

Performance features are:

- Modem steering for automatic making of connections
- Observance of syntax rules for EDI as well as for X.400 addresses. The customer himself must install an EDI converter, for Telebox does not provide this service (Joachim Matz per telephone 17.8.93, DBP Telekom Spezialvertrieb Bremen)
- Protection against data loss in case of interference or broken connection

In addition, DBP Telekom offers protocols and record-keeping services at customer's request, as well as clearing functions, whether mutual or in relation to a third party. (See DBP Telekom 1990, p.16)

DBP Telekom realises its own EDI usage over Telekom 400: ELFE, an electronic telephone bill. This offer for customers with more than 100 bills monthly should, in the interest of DBP Telekom, lower the entry level into the entire EDI area. "Those who take part in ELFE will have, simultaneously, both technical and organisational space to increase exchange of EDI-News with other business partners. (DBP Telekom 1990, p.13)

Influence of DBP Telekom on competition could be supposed if users receiving telephone bills from the area of Telekom monopoly over ELFE in the Telebox 400 are also sent suggestions to use Telebox for other EDI applications.

EDI applications over Telebox 400 are realised by

- Fa. Glunz AG - wood and woodwork
- PCI Augsburg - building and do-it-yourself material

(See Hoberg 1993, P.31 f. and Deutsch 1993, p. 32)

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