Appel, Wolfgang Ph.; Behr, Rainer

Towards the theory of Virtual Organisations:

A description of their formation and figure

Information

Reihe:	Arbeitspapiere WI
Herausgeber:	Univ.-Prof. Dr. Axel C. Schwickert Professur für BWL und Wirtschaftsinformatik Justus-Liebig-Universität Gießen Fachbereich Wirtschaftswissenschaften Licher Straße 70 D – 35394 Gießen Telefon (0 64 1) 99-22611 Telefax (0 64 1) 99-22619 eMail: Axel.Schwickert@wirtschaft.uni-giessen.de http://wi.uni-giessen.de

Bis Ende des Jahres 2000 lag die Herausgeberschaft bei:

Lehrstuhl für Allg. BWL und Wirtschaftsinformatik
Johannes Gutenberg-Universität Mainz
Fachbereich Rechts- und Wirtschaftswissenschaften
Welderweg 9
D - 55099 Mainz

Ziele:	Die Arbeitspapiere dieser Reihe sollen konsistente Überblicke zu den Grundlagen der Wirtschaftsinformatik geben und sich mit speziellen Themenbereichen tiefergehend befassen. Ziel ist die verständliche Vermittlung theoretischer Grundlagen und deren Transfer in praxisorientiertes Wissen.
Zielgruppen:	Als Zielgruppen sehen wir Forschende, Lehrende und Lernende in der Disziplin Wirtschaftsinformatik sowie das IuK-Management und Praktiker in Unternehmen.
Quellen:	Die Arbeitspapiere entstanden aus Forschungsarbeiten, Diplom-, Studien- und Projektarbeiten sowie Begleitmaterialien zu Lehr- und Vortragsveranstaltungen des Lehrstuhls für Allg. Betriebswirtschaftslehre und Wirtschaftsinformatik Univ. Prof. Dr. Herbert Kargl an der Johannes Gutenberg-Universität Mainz.
Hinweise:	Wir nehmen Ihre Anregungen und Kritik zu den Arbeitspapieren aufmerksam zur Kenntnis und werden uns auf Wunsch mit Ihnen in Verbindung setzen. Falls Sie selbst ein Arbeitspapier in der Reihe veröffentlichen möchten, nehmen Sie bitte mit dem Herausgeber (Gießen) unter obiger Adresse Kontakt auf. Informationen über die bisher erschienenen Arbeitspapiere dieser Reihe und deren Bezug erhalten Sie auf dem Schlußblatt eines jeden Arbeitspapiers und auf der Web Site des Lehrstuhls unter der Adresse http://wi.uni-giessen.de

Arbeitspapiere WI Nr. 12/1996

Autoren: **Wolfgang Ph. Appel**

Johannes Gutenberg-University

Department of Economics

Chair of Organisation and Decision Making

Saarstr. 21

D-55124 Mainz

Telefon: +6131/39-2094

Fax: +6131/39-3004

eMail: appel@prod-org.bwl.uni-mainz.de

Rainer Behr

Sparkassen- und Giroverband

Hessen-Thüringen

Alte Rothofstaße 9

D-60313 Frankfurt am Main

Telefon: +69 / 21 75 - 420

Fax: +69 / 21 75 - 595

Titel: Towards the theory of Virtual Organisations:

A description of their formation and figure

Abstract: Recently it has seemed to be more important clarifying the vital prerequisites for the formation of Virtual Organisations than discussing theoretical aspects of their eventual appearance. Great significance has to be attributed to information and communication technologies when examining these conditions. Often, they even have the status as „enablers".

According to the transaction-cost theory organisations come into existence when the coordination of transactions through hierarchies is more advantageous than the coordination through markets. It shall be elucidated why Virtual Organisations are considered inter-median forms of organisation between the two poles of market and hierarchy. The figure of Virtual Organisations will be compared with other similar forms of organisation.

Different forms of transactions shall be developed and, with reference to the key topic, be standardised. Despite the basically empirical limitations of the transaction-cost theory, the distinguishing features are the use of diverse information and communication technologies. A scheme for analysis is developed to evaluate the contributions of existing and future information and communication systems to the formation of Virtual Organisations. Technologies like Internet, multi-media communication systems and Electronic Data Interchange will be discussed in detail.

Contents

1   Introduction

The classical **organisation theory** looks at the information and communication technology (= IT) as an instrument to optimise organisations. According to this point of view, the organisational structure is given and the use of modern IT, like the Internet, e-mail or videoconferencing depends on it. The degree of delegation or formalisation follows management decisions. This indicates that a low degree of delegation is not a result of new possibilities of modern IT. Some authors argue that new margins for organisational design will be created by these technologies (Sydow 1989; Allen/Hauptmann 1987), rather than forming new technologies for an efficient use of new organisation types (Buhl 1996). Characteristics of new forms of organisation shall be mentioned: intensification of teamwork, integration along the value chain, controlling and planning due to the JIT („just in time") concept, process integration and integration of organisational knowledge as well as reduction of redundant proceedings (Griese 1992). The consequent result of these development lines is the creation of a Virtual Organisation.

But there is a great **lack in the theoretical foundation** of the relation between modern IT and organisational development (Huber 1990, Schwarzer/Krcmar 1994). The purpose of this article is to contribute to creating a theory which describes and explains the effects of advanced information technology on organisations. The analysis is based on the transaction-cost approach.

In the beginning a short description of the transaction-cost approach will be expound. Particularly the different types of transaction-costs will be developed and described. Possible coordination forms will be developed and Virtual Organisations will be introduced as one kind of „intermediated" forms of organisation. After that we will analyse three important information technologies with regard to their great impact on the formation of Virtual Organisations. Finally we want to discuss some future research questions in the topic of Virtual Organisations.

2   The transaction-cost approach as an instrument for analysis

There are different theoretical approaches to explain the formation of organisations. Among these theories the **transaction-cost approach** represents the most popular theoretical base because of its strong foundation and the enormous width of interpretations (Williamson 1985; Schmidt, R. H. 1992). Furthermore it puts the information and communication activities in the centre of its theoretical work. Therefore it is useful to analyse the contributions of IT for the formation to Virtual Organisations.

The transaction-cost approach as a part of the New Institutional Economics describes the emergence and the development of institutions and organisations based on several assumptions (Coase 1937). These can be divided into two main areas: first there are assumptions about the acting persons. Here it is assumed that the people involved are determined by bounded rationality. Furthermore they have an optimistic attitude, meaning

that every participant tries to gain his own advantage. In order to reach this goal, existing contracts are ignored. At last they remain neutral to risk (Ebers/Gotsch 1995). The second area of assumptions applies to the situation in which transactions are made. Transactions, i.e. the clarification and agreement of an exchange of properties, have a special degree of specificity and are influenced by uncertainty and complexity of the transaction environment as well as by the frequency of the transaction (Picot/Dietl 1990). Moreover, transactions are caused by the division of labour.

A cooperation producing a certain output (goods, services etc.) has to choose a specific form of coordination from a continuum of various coordination possibilities. Therefore, the transaction-cost approach focuses on explaining and describing the efficient type of coordination for each type of production process. Minimising the transaction-costs is the criteria for choosing between the different coordination forms.

Transaction-costs are caused by transactions running without frictions. Transaction-costs are understood as a lack of frictions which are caused by the assignment of property rights (Picot 1993a). This assignment is necessary to bridge space- and time-differences between the potential parties of a contract. Transaction-costs can emerge in all phases of transactions: preparation, handling and controlling (Brand 1990). Depending on the phases, different forms of transaction-costs can be described (Windsperger 1983; Picot 1993b):

- **Searching costs**
  Searching costs are transaction-costs which are caused by the search for transaction partners or alternative actions (examples are: the amount of time needed for the search at special organisations or institutions, costs which are caused by the use of telecommunication, online services or special publications or management consultants).

- **Information costs**
  Information costs are defined as transaction-costs which are caused by the lack of information in the process of interaction. This covers costs which are caused by the use of different languages (e.g. translation costs) or by technical problems which disturb the exchange of information (costs of technical equipment to overcome this disturbance).

- **Decision costs**
  Decision costs are transaction-costs which arise from the participation of a group in the decision process. Due to different aims and motives of participants of decision groups, coming to a (shared) agreement is a very time-consuming process. Moreover, decision costs are caused by contracts which were not fulfilled in the way they were negotiated or by contracts which were not closed in the intended meaning.

- **Bargaining costs**
  Bargaining costs are defined as transaction-costs which are caused by the process of negotiation (examples: costs of lawyers and consultants, costs of the required resources like costs of travelling and travelling time).

- **Control costs**
  Control costs emerge from the adaptation and supervision of transaction results (examples: costs controlling payments or arranged technical standards or quality).

- **Handling costs**
  Handling costs are transaction-costs which emerge from the management of converging action cooperation (examples: costs involving human resources, costs which are caused by the definition of business processes).

- **Adjustment costs**
  All transaction-costs caused by the change of transaction conditions can be defined as costs of adjustment (examples: costs which are caused by the implementation of new laws or new IT-standards).

- **Disincentive costs**
  Disincentive costs emerge by an opportunistic behaviour of the transaction partners or employees, i.e. every partner tries to interpret the contract to his own advantage (examples: unannounced high increase of prices by a supplier of products which have a very high level of specifity).

- **Execution costs**
  Execution costs are transaction-costs which arise from the collection of overdue performances or payments. So, they naturally only emerge in market coordination forms. A possible example is the collection of proceedings.

Forms of transaction-costs	
Market	**Hierarchy**
Searching costs Information costs	Searching costs Information costs
Decision costs Bargaining costs	Decision costs
Control costs	Control costs
Handling costs	Handling costs
Adjustment costs	Adjustment costs
Disincentive costs	Disincentive costs
Execution costs	

Table 1: Forms of relevant transaction-costs

Transaction-costs appear when certain personal and situational conditions come together in pairs with some collateral assumptions.

Transactions can either be coordinated by **„market"** or **„hierarchy"** (Ouchi 1980; Picot 1982). These forms represent the extreme points of a continuum - which means that between these poles a multitude of different coordination forms, with more or less characteristic features of market or hierarchy, are conceivable (Williamson 1991; Rößl 1996). The opposed forms of coordination can be described in the following manner: a market is characterised by two independent parties. All means of production remain in

the property of the transaction partners. Prices serve as the central instrument for coordination. Furthermore, transactions are based on contracts. The market is suitable for transactions with a low degree of **specificity** which in turn allows a high degree of standardisation (Picot/ Reichwald 1994). In hierarchy, the production of a certain output is coordinated by a system of formalised rules, which have to be negotiated in advance. The coordination by hierarchy is used for transactions with a low standardisation.
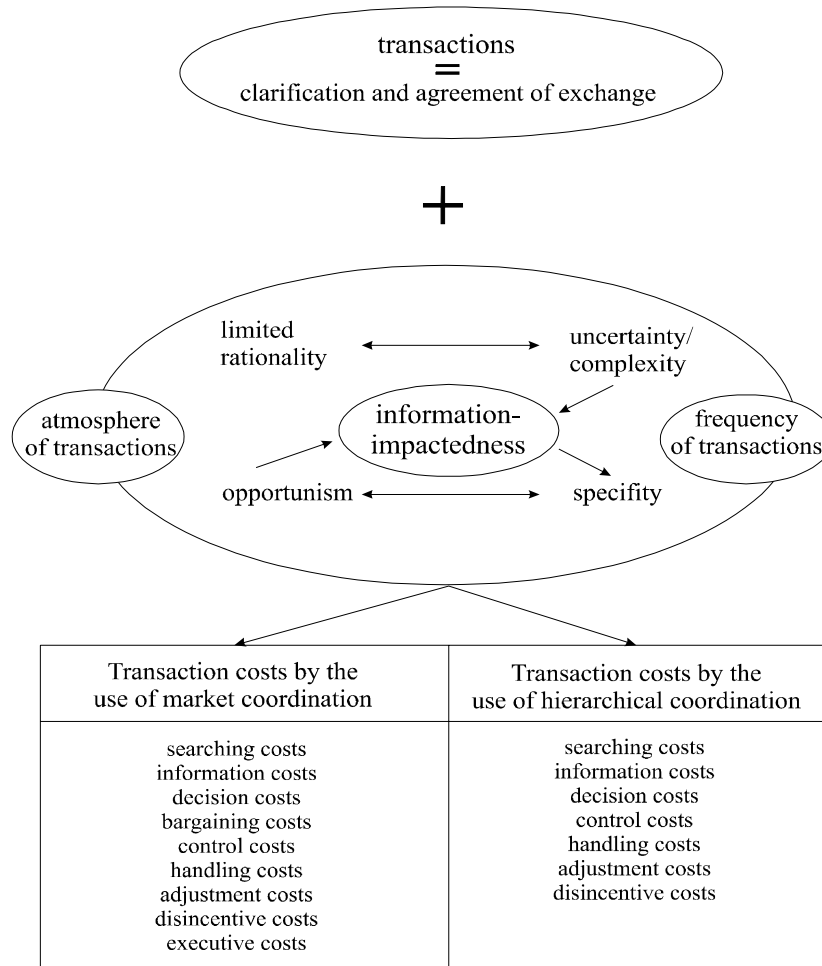
Figure 1: Overview of transaction-cost theory

The two coordination forms market and hierarchy are only efficient, if the particular transaction situation is characterised as mentioned above. In case transactions are ambiguous, very low structured and very variable, they can be organised by the use of market or hierarchy only if transaction-cost disadvantages are accepted. But the forms of organisation between market and hierarchy, called „**hybrid**" forms of organisation, because they hold characteristics of market as well as hierarchy, are able to coordinate the transactions described above in the most efficient way (Powell 1987). For that reason, positions between the polar forms of organisation are also called „**intermediate**".
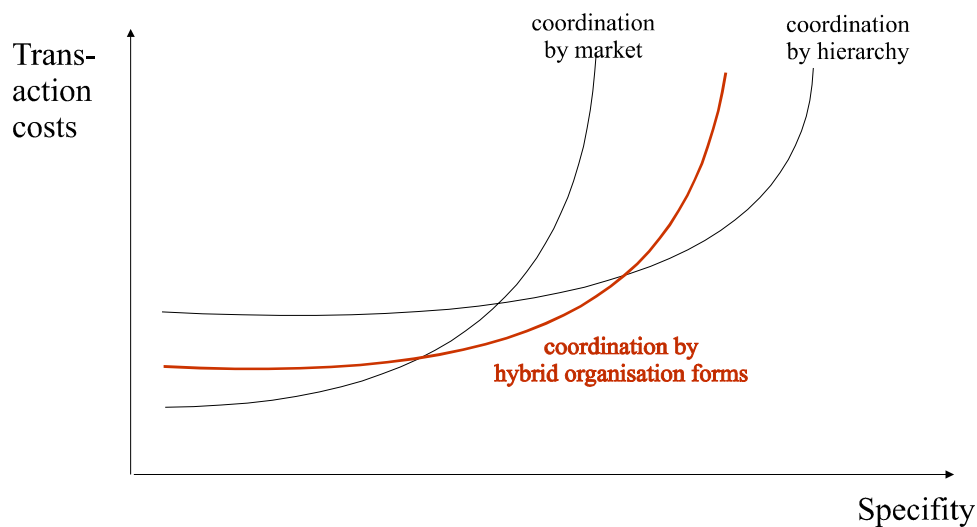
Figure 2: Model of different coordination forms referring to transaction-costs

The **Virtual Organisation** represents one of these hybrid or intermediate forms of organisations. It combines features of the market such as legal independence and self-supporting work of the organisation members, specialisation of functions (contributed resources remain in the property of the corporation members) and orientation by short-range aims with features of the hierarchy like close collaboration, trust between the involved corporations and highly integrated information.

As mentioned above, advantages in transaction-costs are the main criterion for such a coordination form during the process of decision making. In the case of Virtual Organisations, such advantages result contrary to the market from the possibility of unlimited communication. It is imaginable that potential partners for creating a Virtual Organisation offer their skills or inquire special services at a „**virtual market**" - this may be in the Internet. This market will bring together available resources using electronic contracts. It is possible to find new partners in a previously unknown way.

In contrast to hierarchy, advantages in transaction-costs of Virtual Organisations basically derive from the avoidance of irreversible costs caused by the foundation of an traditional organisation. In addition to this, Virtual Organisations are more sensitive about the organisational environment than the hierarchy. Further, Virtual Organisations are able to overcome the hierarchy's immanent inertia much easier, because project teams show a better ability to collect organisational knowledge.

3   The figure of Virtual Organisations

3.1 Features of Virtual Organisations

In management literature a lot of different **new forms** of organisations like the „inverted organisation", „spiders web organisation" or „intelligent enterprise" are discussed. But the central theme of the debate during the last two years is the „Virtual Organisation" (Schwarzer/Krcmar 1994). In the discussion of new forms of organisations there is a considerable disagreement regarding the understanding of Virtual Organisations. Many forms of organisation described as Virtual Organisations are only variations of traditional organisational models. Corporations with a high degree of horizontal structuring, meaning flat hierarchies, low formalism and a very strong team orientation, call themselves Virtual Organisations. These corporations are indeed following the trend of a new flexibility, however, they remain in the traditional frame of property rights, the right of ownership and the aspect of a centralised leadership (Szyperski/Klein 1993). These characteristics are not sufficient to define these forms as virtual corporations.

Through an analysis of the relevant literature we get the following features as the most important characteristics of Virtual Organisations. It is important to mention that these characteristics represent only an **ideal picture** of Virtual Organisations. But there are deviations of this ideal figure possible, and it always has to be discussed if each form of organisation can be called „Virtual".

- The Virtual Organisation is an cooperation of enterprises. Members of Virtual Organisations can be great trusts as well as small one-person firms. It is imaginable that a self-employed consultant becomes a member of Virtual Organisation and of a multi-national corporation at the same time (Arnold/Härtling 1995).

- The enterprises involved keep their legal and economic independence. Lawyers have very different opinions of the body corporate of Virtual Organisations. But it is an common rule that Virtual Organisations are no joint ventures in the sense of German labour law. They are may be called corporations of civil society („Gesellschaft bürgerlichen Rechts", §§ 705 etc. BGB). Problems still unsolved are the use of special national laws for international working Virtual Corporations or the legal requirements for the completion of contracts with the help of of technical mediums like EDI (Sommerlad 1996).

- The purpose of Virtual Organisations is the optimal use of opportunities which derive from the market and/or from resources (Weber/Walsh 1994).

- A Virtual Organisation is open for any enterprise. No institutional borders for collaboration, for example special legal or technical standards do exist. According to this purpose the collaborating of the partners is limited.

- This means that Virtual Organisations will be decomposed when the object is accomplished. In most cases Virtual Organisations will only exist for a short time. If there are no other advantageous organisational alternatives to produce a special out-

put, Virtual Organisations are also imaginable for a long-term period (Arnold/Härt-
ling 1995).

- Virtual Organisations can be built between enterprises of the same industrial sector or of different industrial sectors.

- Virtual Organisations hold no hierarchical structure. There is no leading or subordinated enterprise.

- Trust between the involved enterprises is seen as the bonding agent of a Virtual Organisation (Brigham/Corbett 1996). The conflict between the requirement of a high degree of trust and the limited duration of existence makes it necessary to conceptualize a special management of trust. For creating a high level of trust in Virtual Organisations, Sydow recommended three steps for trust management: first, only a few corporations should be selected for participation. This is because building trust with a high number of membership is very difficult. Second, concerning the features the potential candidates for cooperation should be selected very carefully. Furthermore, the corporations involved should be similar and complementary at the same time. Finally rules should be developed - maybe in a written form - which regulate the cooperation and the balance of power in the newly founded Virtual Corporation (Sydow 1996).

- The use of information and communication technologies is a constitutional feature of Virtual Organisations (Mertens 1994). Sometimes IT is called an „enabler" of Virtual Organisations (Suomi/Luukinen et. al. 1996).

The differences to other organisation forms are shown in table 2.[1]

---

1   Scholz is also discussing the different forms of „traditional" and Virtual forms of organisation (Scholz 1994; also Mertens/Faisst 1996).

Form of organisation/ Feature\	Joint Venture	Special partnership	Strategic Network	Cartel	First level Virtual Organisation	Second level Virtual Organisation
Openness	Borders existing	Borders not existing	Borders not existing	Borders existing	Borders existing	Borders not existing
Autonomy	legal and economic independence	legal and economic independence	legal and economic independence	legal and economic independence	no form of cooperation	legal and economic independence
Scope of application	Within and between different industrial sector	Within the same industrial sector	Between different industrial sectors	Within the same industrial sector	Within the same industrial sector	Within and between different industrial sector
Hierarchical structure	no hierarchical structure between involved enterprises	no hierarchical structure between involved enterprises	inferior and superior levels of involved enterprises	no hierarchical structure between involved enterprises	only low degree of hierarchical structure	no hierarchical structure between involved enterprises
Management of trust	constitutional feature	constitutional feature	constitutional feature	no constitutional feature	no specification	constitutional feature
Use of technical equipment	no constitutional feature	no constitutional feature	no constitutional feature	no constitutional feature	besides constitutional feature	constitutional feature
Content of goal-setting	Realisation of advantages in competition	Realisation of large-scale projects	Realisation of advantages in competition	Restraint of competition	Orientation at the goals of the company	Realisation of advantages in competition
Limited in time	Long-period as well as time limited	time limited cooperation	long-term cooperation	long-term cooperation	long term cooperation	time limited cooperation

Table 2: Demarcation of different organisational forms

3.2 Views of Virtual Organisations

Virtual Organisations can be divided into a first and a second level. Using this classification, the traditional forms of cooperation mentioned above can be defined as Virtual Organisations. The differentiation in first and second level depends from the level of organisational analysis. The **intraorganisational** view, i.e. the **first level**, of Virtual Organisations can still be seen as a traditional form of organisation. The coordination is transferred to partly autonomous teams instead to hierarchical structures. The team in a single corporation and the project are working on playing the most important part in or-

ganisational structure. The Virtual Organisation represents a dynamic team system that can easily be restructured (Rockart/Short 1991). Such a Virtual Organisation creates interdisciplinary teams. These teams reintegrate tasks like planning or controlling which were before functionally distributed. The delegation of responsibility is accompanied by the removal of hierarchical borders inside the corporation. Instead of coordination by hierarchy, Virtual Organisations are coordinated by teams that are supported by new forms of IT. The effect of this technical orientation is that the members of a working group can be spatially dispersed. The formal organisation loses its clear outlines (Wicher 1996).

This team structure which is constantly in movement is completed by a stable and long-term corporation centre which can be seen as a service centre for the teams (Byrne 1993a). The corporation centre takes control of the departments, e.g. marketing or human resources, which are usually performed by staff departments and combine the several teams for work on special tasks (Olbrich 1994). This arrangement is supported by the use of modern IT.

The main differences to other, traditional forms of organisation, e.g. the functional or divisional organised corporation or the matrix-organisation, are the increased flexibility, the clear reference to objects, the decentralisation of decisions and the self-controlled coordination by teams.

From the **interorganisational** perspective, i.e. the **second level,** Virtual Organisations can be defined as a special form of cooperation because the corporations involved keep their legal and economical independence (Klein 1994). It is decisive for Virtual Organisations that the collaboration is not determined by institutional borders which is the main reason that Virtual Organisations in the interorganisational view can emerge and wind up very quickly. At the same time the collaboration ends when the specific aim of the cooperation is reached. The participating corporations contribute only such competences to a Virtual Organisation that are absolutely necessary to reach the aim of the cooperation. These competences remain in the member's influence (Olbrich 1994). The support by new IT which enables the collaboration of teams with members of several corporations can be seen as a constitutional feature (Byrne, 1993b).

These Virtual Organisations can be distinguished from other forms of cooperation, e.g. joint ventures or strategic networks, by the lack of entry barriers and the temporal limited collaboration. Furthermore, the use of modern IT to coordinate projects is indispensable and separates the Virtual Organisation from all other existing forms.

Both forms of Virtual Organisations described above do not build a dichotomy, they belong together in an interdependent way. This relationship appears because a first level Virtual Organisation, i.e. in the interorganisational view, only emerges when the potential members have the possibility to send flexible employees or resources extremely flexible and with a short reaction time into new organisations. The best prerequisite to become a Virtual Organisation in the interorganisational way (= second level) is to be a first level Virtual Organisation already (Olbrich 1994). Second level Virtual Organisa-

tions have been very rare recently, however, usually only some parts of the forms described are implemented in practice.[2]
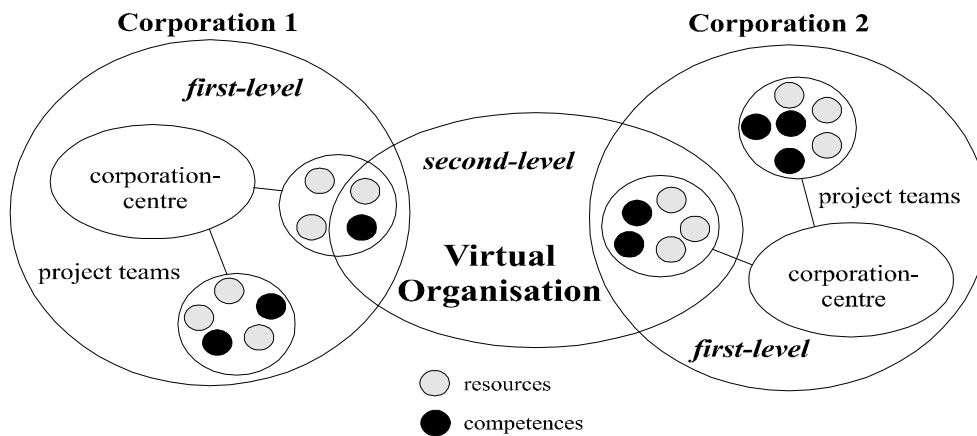
Figure 3: Relation between first and second level Virtual Organisations

3.3   Examples of first and second level Virtual Organisations

First level Virtual Organisations are the most frequent forms of Virtual Organisation in theory and practice. In our point of view, almost all examples used by Davidow/Malone (1992) are considered as „first level Virtual Organisations". One example for a first level Virtual Organisation is **Hewlett Packard Swiss** as described in the following paragraph. After its reorganisation in 1993, the company showed the following structure:

- The management became a coordinator of interfaces between the members of the organisation. Therefore its primary purpose is to coordinate collaboration and arrangement of teams.

- Management understood itself as a service centre for the operating teams which provides resources and management-skills.

- The most important prerequisite was trust in the organisation members. As a consequence attendance at the workplace was not controlled. Furthermore the majority of the employees had the possibility to log themselves into the corporations network from home and felt free to do their work when and wherever they want to.

One purpose of this reorganisation was the creation of the „Hewlett-Packard Village Community" as an idea for a highly integrated enterprise coordinated by a common culture and language (Vogt 1994).

---

2   Griese (1994) also used a differentiation in first and second level. In the first level of a Virtual Organisation only happen business processes with a low complexity. In the second level the whole business process is concentrated on a few places in the background.

One rare example for a second level Virtual Organisation is the German sport-article enterprise **„Puma AG".** After a crisis at the beginning of the nineties „Puma" - with now over 1.2 billion Deutschmark sales - started a successful reorganisation campaign. It followed three key-strategies:

- A consequent outsourcing and concentration at the core competences; for that purpose the value chain was permanently analysed for „make or buy"-decisions.

- Reducing the hierarchy to three levels and domination of teamwork and process organisation.

- Building a network of partnerships, which was controlled by a small headquarter of only 180 employees by using modern information and communication systems.

Today the number of departments is reduced to the following four: design, marketing, management information systems and administration. For all other tasks (e.g. production or distribution) Puma works together with changing suppliers to get the very best conditions for a specific order. These enterprises are highly integrated by use of modern IT (Hirn 1996; Ott 1996). The only distinguishing feature for an ideal form of a second level Virtual Organisation is the hierarchical structure of the corporation with a clear leadership of „Puma".

4   IT requirements for the realisation of advantages in transaction-costs

Sometimes Virtual Organisations are understood to be the result of an extreme outsourcing strategy. But there are more features necessary, like „management of trust" or eventually the use of technical equipment (Table 2). IT is the glue that holds the parts of the Virtual Organisation together (Bleecker 1994). The better IT fulfils the demands of Virtual Organisation to bridge the cut between the several parts, the more advantages in transaction-costs will follow (Benjamin/Wigand 1995).

Creating Virtual Organisations between the most appropriate partners for a special transaction situation could bring together firms and persons from all over the world. This means that IT has to reduce the geographical and social distances between sender and recipient in an almost perfect way. Advantages in handling costs can be realised if IT enables a qualitative and frequent interaction between the team members. Hence, the technology used has to provide a dialogue-orientated and undisturbed communication between two or more persons without time and spatial restrictions.

In order to realise advantages in bargaining costs, IT has to enable the conclusion of electronic contracts. IT enables potential members to be integrated easily into a Virtual Organisation. Virtual Organisations are established only for a short time and potential members have to be able to find a new Virtual Organisation immediately, so IT has to reduce search costs.

Also, advantages in information costs can be realised by a technology which is easy to use. This implies an easy-to-handle technique as well as a redundant free use, i.e. data only need to be transmitted once by using one single communication channel. A redundant free handling enables communication between the team members without any friction. Also, an easy-to-use technology builds the base for the flexibility of Virtual Organisations. Moreover, this type of technology provides the opportunity to minimise the personal adjustment costs of each employee.

The **dynamic character** of the tasks that Virtual Organisations have to solve, i.e. the rapid change of partners and the (relatively) short time that they may exist, asks for a high transmission quality and transmission speed. In order to realise advantages in information costs, it has to be guaranteed that business records, like construction plans, are available in a pictorial form and text format for every project member at the same time. Furthermore, media breaks have to be avoided in order to speed up the transmission.

Advantages in searching costs can be realised if any potential member of a Virtual Organisation has the opportunity to get relevant data about other corporations looking for cooperation immediately. Because of the different time zones these data need to be available twenty-four hours a day. One restriction for setting up this world-wide availability is that costs caused by the use of IT must not exceed its benefit.

A condition for the realisation of advantages in disincentive costs is the **security** of the used IT. Security in this sense means the exclusion of opportunistic behaviour of partners and other external individuals or corporations. In this context it has to be mentioned that open communication networks can stabilise trust between the members of virtual corporations (Szyperski/Klein 1993). Because of the very sensitive core competences brought in by the members, it has to be ensured that other members of the virtual corporation have only access to data that correspond directly to the Virtual Organisation.

In order to obtain advantages in adjustment costs of Virtual Organisation (in contrast to the hierarchy) a high degree of **flexibility** of the applied IT is needed. This enables Virtual Organisations to react immediately to changes in the organisational environment. A further demand in this area is the supply of links to the environment by the applied IT. This demand results from the necessity to recognise changes very early and to initiate relevant actions.

The demand for a world-wide high degree of **standardisation** of the IT used is of primary importance (Child 1987). Such a level of standardisation enables the realisation of advantages in searching-, information- and handling costs, the reason being that members of Virtual Organisations do not have to create completely new standards or select from a multitude of given standards. For example, before fixing the H.320 standard for video-conferencing systems it was only possible to communicate with systems of the same supplier (chapter 5.3 Multi-media communication). The standards in communication and information technologies are a preliminary condition; if they are not available, the formation of a Virtual Organisation is not possible. But „without underestimating the strategic meaning of developed information and communication technology, we be-

lieve that extensive use of IT (..) does not guarantee virtuality. ... Technology is an enabler, not a driver of virtuality" (Suomi/Luukinen/Pekkola/Zamindar 1996).

The benefit of a special IT depends directly on the number of reachable persons or corporations. This implies that reaching the critical mass is another essential condition. Advantages in transaction-costs can only be realised if every real member or every potential member of a Virtual Organisation is reachable by the same communication technology. Consequently, reaching the critical mass represents the necessary condition for the realisation of advantages in transaction-costs.

5 Selected information technologies to set up Virtual Organisations

5.1 Focus of analysis

The present analysis focuses on the contribution of IT to the formation and management of Virtual Organisations. This approach renounces the description of technical details if they are not necessary for showing the organisational importance of a special IT. Thus, the chapter 5 deals with the possibilities of modern IT at the interface between employees and technology.

The high degree of decentralisation of Virtual Organisations leads to the assumption that especially those activities dominate that occur at different places either synchronously or asynchronously. We exclusively want to illustrate IT in that sense.

Due to the limited space of this paper, we selected the most interesting forms of IT, like Internet, multi-media communication and EDI (Electronic Data Interchange). Apart from these information technologies, further technologies like ISDN or e-mail (electronic mail including voice and multi-media mail), Groupware (Lautenbacher/Walsh 1994) as well as „Intelligent Agents" (Fischer/Heimig et al 1996) need to be mentioned.

5.2 Internet

The Internet is a decentralised compound of local subnetworks which are able to work independently from each other. The „net" offers various possibilities to search in a great number of databases and to transfer a huge amount of information. Some services offered are well known as „WWW", „USENET" or Remote Computing (by Telnet).

The integration of local area networks into the Internet allows other corporations to search actively for potential members of a new Virtual Organisation. Furthermore, the Internet is a very helpful device for searching external experts who could help to solve up-coming problems very quickly. In this context one can think of universities which present their fields of research in the Internet.

The communication protocol TCP/IP is a world-wide used standard, which ensures the world wide availability of every user of the „net" (Gröning/Schwickert 1996). Recently,

the critical mass of commercial users has been reached. The number, especially of the private users, is expected to grow in the next years.

The Internet provides only to some extent an easy and redundant free handling. The front-end WWW with a browser like „Netscape" is easy to handle and supports an redundant free search in several databases due to the use of the hypertext technique.

The world-wide distribution of connected computer networks in different time-zones enables several companies to advertise their services on the net and at the same time the net is the basis for cooperation. In this case, a high degree of availability also means a high degree of accessibility. This accessibility will be improved by the rapid extension of the Internet. Moreover, the decentralised structure of the Internet provides a high flexibility due to the lack of boundaries which may disturb the global extension of the net. Flexibility is indicated by the fact that data interchange can be realised by the use of nearly all available physical transport media (Verity/Hof 1994).

A high standard of security to keep out opportunistic behaviour cannot be provided. The central problems arise when using the WWW without instruments like cryptology and firewalls to protect themselves against hackers, crackers and intruders.

5.3   Multi-media-communication

In this context, multi-media communication is defined as the combination of several different communication channels, both synchronous and asynchronous mode, which can be used interactively. The purpose of such multi-media systems is to support the collaboration of teams by enabling social interaction between the team members.

The central part of multi-media systems is a graphic, object-orientated interface with window-technique which are based on the WYSIWIS-principle (What You See Is What I See). The edited objects of one team member appear exactly at the same moment on the screens of the communication partners. Special "Groupware" allows team members a common view at shared objects (so called "Joint viewing") and also common work on these objects (so called "Joint editing") (Schwarzer/Krcmar 1994).

Additionally, multi-media systems enclose special tools to distribute information („coordination systems"). There are **desktop-videoconferencing** systems which enable audio and video communication between separate members (Pfadler 1994). These integrated communication channels are an optimal solution for all real-time communication demands of Virtual Organisations. An existing workstation can be used if input-instruments like microphones or cameras and output instruments like amplifiers respectively loudspeakers and a screen system are added to improve the presentation of video sequences.

The first important operational area of multi-media systems are negotiations concerning the formation of Virtual Organisations and the handling of projects. This purpose is fulfilled by group support techniques of multi-media systems. Primarily they improve the communication of teams and only secondly the internal events of a corporation (Lewe/

Krcmar 1991). The use of multi-media systems should be limited on task-orientated processes characterised by common communication and editing of shared objects. "Joint Editing", for example, could be used to outline the contract of partnership in an electronic way during the negotiation. Furthermore, multi-media systems should be able to support the foundation phase by allowing flexible and spontaneous connection of organisational knowledge. This can be realised by integrated hypertext systems.

Advantages in handling and bargaining costs can be realised by simulation of **spatial closeness** between sender and recipient. Multi-media enables real-time and dialogue-orientated communication which implies that the demand for a speedy transmission is fulfilled. Particularly multi-media fulfils the demand for multi-point communication. By using a digital net (e.g. ISDN) and special multiplex units, also large groups have the possibility to communicate directly. However, multi-point communication is limited more by human perception capabilities than by technical restrictions. For example it is not possible to observe more than four video-frames at one time. Assuming that each communication partner at a different location uses one frame, only conferences with four partners at the screen can be conducted. At the same time they are independent from the technical conditions. Another point of limitation is the necessity of rules to coordinate the individual time allowed.

The demands for world-wide standardisation are only partly fulfilled because most of the existing multi-media communication systems are not compatible. On the other hand, however, during the last years great efforts have been made by the International Telecommunication Union (ITU) to standardize application-protocols. Especially the H.320 norm for video communication will be accepted by most suppliers of video-conferencing-systems.

The graphical user interface of multi-media systems offers an easy and redundant free handling. In addition, multi-media systems fulfill the demand for "seamlessness" (Bullinger/Fröschle/Hofmann 1992), i.e. you do not have to switch between different media like paper or e-mail during work at one object.

Multi-media has not reached the necessary mass yet. This might be the result of relatively high transmission costs. But the recent decrease of prices for multi-media hard- and software gives reason to expect that multi-media systems will open a mass-market in the next years (Bronner/Appel 1996).

5.4   Electronic Data Interchange (EDI)

The exchange of business data between computers of different corporations by using standard formats is called Electronic Data Interchange (EDI). This requires the conclusion of an individual agreement between the involved communication partners which contains regulations for the data-format used and questions of data-security. The main purpose of EDI is the direct, electronic communication to enable a direct processing of
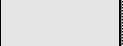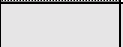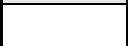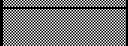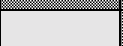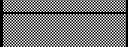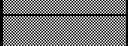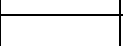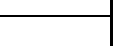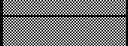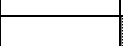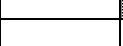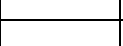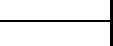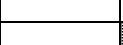
relevant, high structured mass data without media breaks, i.e. without a repeated input of data (Picot/Neuburger/Niggl 1992). It is possible to transfer two different types of data by EDI. At first there are highly structured alpha-numerical data which result from the daily work and normally consist of text modules. These types of data are very invariable over a lapse of time (e.g. invoices or orders). The exchange of individual texts or pictures and technical data is possible.

The most important operation field of EDI is the exchange of structured forms which are marked by an constant composition, like order or invoice forms. For using EDI, some prerequisites have to be fulfilled: the enterprises involved have to agree on standards transferring media and data format. If there are no common standards established for all possible cooperation partners, they have to negotiate every partnership anew and individually. So, the exchange of data by electronic media begins to show its strongest effects mostly by **long-term business relations.** EDI is suitable for transactions which occur regularly and frequently. The problem is that the described transactions are not typical for Virtual Organisations because they are characterised by short-term relations with only few transactions, possibly low structured and a very high specifity. But EDI is able to play a significant role in the foundation of electronic markets. At an electronic stock exchange, cooperation offers and demands are pooled automatically. By using a common EDI standard, the members of a newly founded Virtual Organisation can exchange data in an uncomplicated way.

Currently, a multitude of national and branch specific formats for data exchange exist. But only the EDIFACT-format ("Electronic Data Interchange For Administration, Commerce and Transport") offers a standard which is not bound to different industries and countries. Specified EDI standards like ODETTE for the automobile industry or SWIFT for the bank branch are diverted from this standard. The acceptance and penetration of these systems is limited to greater enterprises.

In contrast to these basic reflections on the possible use in Virtual Organisations problems arise if EDI, as a special form of IT, is confronted with the demands it is expected to meet. Without any doubt, the efforts in standardisation media and transfer protocols progressed in the last decade. Most standard software follows the common formats of EDIFACT and its adherent, so a high degree of standardisation has almost been reached. But whereas a fast transmission is provided, the avoidance of media breaks is given only in principle. The reasons are more of organisational than technical nature. In many enterprises strong resistance exists against rearrangement from traditional working methods to computer based workflows. For that reason, the usability of EDI is not a natural prerequisite for the formation of Virtual Organisations. So, before using EDI the partners have to come to an agreement on the definition of the applied standard. Moreover, critical issues of EDI like data-security and share of responsibility have to be negotiated also. The contract then has the character of a skeleton agreement. Such exchange-profiles are developed by neutral institutions and contain standardised conditions which will be modified into codes. At the beginning of a virtual corporation these codes can be passed directly into an EDI-note.

In conclusion EDI shows very mixed impressions referring to transaction-costs. On one hand, EDI possesses the skills and has reached a state that is able to reduce transaction-costs like handling or execution costs. At the other hand, in many cases special negotiations and agreements about the arranging of used EDI standard and technique are necessary, which causes bargaining costs during the formation of Virtual Organisations. Because of these early costs, the dynamic of Virtual Organisations is reduced. Expense free switching to another partner is a very important feature of Virtual Organisations. But the negotiations mentioned cause very high disincentive costs in dependence from the partner.

	Information technology		
Standards	**Internet**	**Multi-media**	**EDI**
reaching the critical mass	fulfilled	not fulfilled	not fulfilled
world-wide high degree of standardisation	fulfilled	partly fulfilled	fulfilled
simulation of spatial closeness between sender and recipient	no specification	fulfilled	no specification
construction and signing of electronic contracts	partly fulfilled	partly fulfilled	partly fulfilled
Multi-Point-Communication	no specification	fulfilled	no specification
all time possibility to reach	fulfilled	no specification	fulfilled
easy and redundance free handling	fulfilled	fulfilled	fulfilled
high transmission quality and quickness	partly fulfilled	partly fulfilled	fulfilled
avoidance of media breaks	fulfilled	fulfilled	fulfilled
great accessibility of data about corporations which want to cooperate	fulfilled	no specification	no specification
all time availability of data about corporations which want to cooperate	fulfilled	no specification	no specification
provision of links to environment	fulfilled	no specification	fulfilled
flexibility	fulfilled	no specification	no specification
restriction of accessibility to files related to the virtual corporation	fulfilled	no specification	no specification
security in order to keep out opportunistic behaviour	not fulfilled	no specification	fulfilled
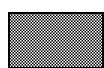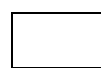
◼ standards fullfilled   ☐ no specification

▥ standards not fullfilled   ▢ standards partly fullfilled

Table 3: Criteria for the assessment of IT

6   Conclusion

Through an exemplary approach we investigated whether modern forms of IT are able to fulfil the requirements of optimal forms coordinating transaction-costs. We limited our study to Internet, multi-media communication and Electronic Data Interchange (EDI).

None of the information technologies mentioned - with exception of the Internet - shows the necessary intensity of penetration. But based on the rapid development of IT, we expect that the critical mass will be reached in the next decade.

The requirement for a high degree of standardisation is only partly fulfilled. Based on the investigated technologies the Internet, especially the 3W, shows a relatively high degree of standardisation. For the other forms it can be said that there are some standards like the H.320 communication protocol for video communication but it will need more time until all suppliers of such technologies will use this standard.

Nearly all of the investigated IT forms are easily and redundantly free to handle. For example, a computer-based video communication system can be used by everyone who is able to work with the windows graphical interface. The handling of Internet is very easy, when using a browser like Netsape (Selz 1996).

7   Discussion

One major disadvantage on the transaction-cost theory is the **limited validity** for practical problems. This lack is basically caused by a missing practicability of transaction-costs. Furthermore, the transaction-cost theory neglects a practical handling of decision problems. Transaction-costs are not the only reason for the decision between market and hierarchy. Besides this, there are other advantages existing which influence the decision. Competition between co-workers connected with collaboration with the same persons exemplifies how the members of an organisation can be led to a more efficient coordination than the market (Ghoshal/Moran 1996). However, the transaction-cost theory is a useful instrument for analysis because it demonstrates the problems of the relation between organisations and their environment.

In this context, some authors argue that every organisation form is a hybrid between hierarchy and market. According to this, the Virtual Organisation does not represent a new organisation form which unites the advantages of both poles of the continuum, but only a new label for existing organisational forms (Roessl 1996). In our point of view, the model of Virtual Organisation is a really **new combination** of organisational elements. This has been proved by the aspects of flexibility and innovation (Chesbrough/ Teece 1996). Real Virtual Organisations are only able to exist on the base of a sophisticated IT-infrastructure yet to be developed. The scheme presented should help decision makers to evaluate the contribution of IT-systems to organisational development.

Future research questions should be the operationalisation of transaction-costs generally in the special case of virtual organisations (Simon 1991). Furthermore, our statical view to the formation of Virtual Organisations has to be transfered into a dynamic proc-

ess which integrates the different phases of coordinating transactions (Bleicher 1996). The transaction-cost scheme should also be tested empirically to investigate our thesis of the relation between IT and Virtual Organisation (Scholz 1996). This could be done especially in the publishing sector where the features of Virtual Organisations have already been existent for a long time ago, without this term being used. In this industrial-sector, authors, photographers, lay-outers, publishing-houses and printing-houses are very often independent enterprises or persons which are highly integrated by information-technology working together to produce a magazine or a book (Sandkuhl, Guthmann, Steinberger 1993). In such existing Virtual Organisations we will probably find some very exiting experiences about the relation of IT and new organisational structures.

Acknowledgements

References

Allen, T. J./Hauptmann, O. (1987): The influence of communication technologies on organizational structure: A conceptual model for future research. In: Communication Research, Vol. 14, pp. 575-587.

Arnold, O./Härtling, M. (1996): Virtuelle Unternehmen: Begriffsbildung und -diskussion. *Virtual Corporations: creation and discussion of a concept*. Arbeitsbericht Nr. 9 of the „Institut für Wirtschaftsinformatik der Wirtschaftswissenschaftlichen Fakultät der Universität Leipzig", ed. by D. Ehrenberg, Oktober 1995.

Benjamin, R./Wigand, R. (1995): Electronic markets and virtual value chains on the information superhighway. In: Strategic Management Review, Vol. 16, No. 1, pp. 62-72.

Bleecker, S. E. (1994): The virtual organization. In: Futurist, Vol. 28, Nr. 2, March 1994, pp. 9-14.

Bleicher, K. (1996): Der Weg zum virtuellen Unternehmen. *The way to Virtual Corporation*. In: Office Management, Nr. 1-2, pp. 10-15.

Brand, D. (1990): Der Transaktionskostenansatz in der betriebswirtschaftlichen Organisationstheorie. *The transaction-cost approach as a subject of the organisation theory*, Frankfurt/Main.

Brigham, M./Corbett, M. (1996): Trust and the virtual organisation: Handy cyberias. In: Proceedings of the workshop „New international perspectives on Telework: From Telecommuting to the Virtual Organisation" at Brunel University, West Lonon U.K., July 31 - August 2, ed. by P. Jackson and J. v.d. Wielen, Vol. 1, pp. 45-59.

Bronner, R./Appel, W. (1996): Telekommunikation: so nah und doch so fern. *Telecommunication: so closed but also faraway*. In: Personalwirtschaft , Nr. 9, pp. 20-23

Buhl, H. U. (1996): Neue Organisationsformen und ihre Unterstützung durch IV. *New forms of organisation and their support by information technologie*. In: Wirtschaftsinformatik, Vol. 38, Nr. 3, pp. 269-271.

Bullinger, H.-J./Fröschle, H.-P./Hofmann, J. (1992): Multi-media. In: Office Management, Vol. 40., No. 6, pp. 6-13.

Byrne, J. A. (1993b): The virtual corporation. In: Business Week, 8.2.1993, pp. 98-103.

Byrne, J. A. (1993a): The horizontal corporation. In: Business Week, 20.12.1993, pp. 76-81.

Chesbrough, H. W./Teece D. J. (1996): When is virtual virtous? Organizing for innovation. In: Havard Business Review, pp. 65-73.

Coase, R. H. (1937): The nature of the firm. In: Economica, Vol. 4, pp. 386-405.

Child, J. (1987): Information technology, organization and response to strategic challenges. In: California Management Review, Vol. 30, No. 3 (Fall), pp. 33-50.

Davidow, W. H.; Malone M. S. (1992): The Virtual Corporation. New York.

Davidow, W. H.; Malone, M. S. (1993): Das virtuelle Unternehmen: der Kunde als Co-Produzent. *The Virtual Corporation*. Frankfurt/M., New York.

Ebers, M./Gotsch, W. (1995): Institutionenökonomische Theorien der Organisation. *New Insitutional Economics of Organisation*. In: Organisationstheorien, 2. Ed., ed. by A. Kieser, Stuttgart, pp. 185-235.

Fischer, K./Heimig, I. et al (1996): Intelligente Agenten für das Management Virtueller Unternehmen. Intelligent agents for the management of Virtual Corporations. In: IM Information Management, Nr. 1, pp. 38-45.

Ghoshal, S./Moran, P. (1996): Bad for practice: A critique of the transaction-cost theory. In: Academy of Management Review, Vol. 21, No. 1, pp. 13-47.

Griese, J. (1992): Auswirkungen globaler Informations- und Kommunikationssysteme auf die Organisation weltweit tätiger Unternehmen. *Consequences of global information and communication systems on the organisation of worldwide acting corporations*. In: Managementforschung, ed. by Staehle, W. H. and Conrad, P., Berlin, pp. 163-175.

Griese, J. (1994): Das virtuelle Unternehmen. The virtual corporation. In: Management Office, Nr. 7 - 8, pp. 10-12.

Gröning, W./Schwickert, A. C. (1996): HTML und Java im World Wide Web. *HTML and Java in the 3W*. In: Arbeitspapiere WI, Nr. 7/1996, ed. by Lehrstuhl für ABWL und Wirtschaftsinformatik, Joh. Gutenberg-Universität Mainz.

Hirn, W. (1996): Der große Sprung. *The great jump*. In: Manager Magazin, Nr. 2, pp. 78-83.

Huber, G. (1990): A theory of the effects of advanced information technology on organizational design, intelligence and decision making. In: Academy of Management Review, Vol. 15, No. 1, pp. 47-71.

Klein, S. (1994): Virtuelle Organisation. Virtual Organisation. In: Wirtschaftswissenschaftliches Studium, Vol. 23, pp. 309-311.

Lautenbacher, S./Walsh, I. (1994): Neue Technologien für virtuelle Organisationen. *New Technologies for Virtual Organisations*. In: Gablers Magazin, Nr. 6-7, pp. 28-30.

Lewe, H./Krcmar, H (1991): Groupware. In: Informatik Spektrum, Vol. 14, pp. 345-348.

Mertens, P. (1994): Virtuelle Unternehmen. *Virtual corporations*. In: Wirtschaftsinformatik, Vol. 36, Nr. 2, pp. 169-172.

Mertens, P./Faisst, W. (1996): Virtuelle Unternehmen - Eine Organisationsstruktur für die Zukunft? *Virtual Corporations - Structur of organisations for the future?* In: WiSt Wirtschaftswissenschaftliches Studium, Nr. 6, pp. 280-285.

Olbrich, T. (1994): Das Modell der "Virtuellen Unternehmen". *The model of the „virtual corporation".* In: Information Management, Vol. 9, No. 4, pp. 28-36.

Ott, M. C. (1996): Zukunftsweisender Ansatz im Wettlauf um künftige Markterfolge. *A forelooking approach in competition of market shares*. In: Office Management, Nr. 7-8, pp. 14-17.

Ouchi, W. G. (1980): Markets, Bureaucracies, and Clans. In: Administrative Science Quarterly, Vol. 25, pp. 129-141.

Pfadler, W. (1994): Multimediakommunikation. *Multi-media communication*. In: Office Management, Vol. 42, No. 4, pp. 50-55.

Picot, A. (1982): Transaktionskostenansatz in der Organisationstheorie: Stand der Diskussion und Aussagewert. *Transaction-cost approach in the organisation theory*. In: DBW Die Betriebswirtschaft, Vol. 42., pp. 267-284.

Picot, A. (1993a): Organisationsstrukturen der Wirtschaft und ihre Anforderungen an die Informations- und Kommunikationstechnik. *Organisation structures of the economy and its demands to the information and communication technology*. In: Handbuch Information Management, ed. by A.-W. Scheer, Wiesbaden, pp. 51-68.

Picot, A. (1993b): Organisation. In: Vahlens Kompendium der Betriebswirtschaftslehre - Teilband 2, ed. by M. Bitz, third edition, München, pp. 101-174.

Picot, A./Dietl, H. (1990): Transaktionskostentheorie. *Transaction-cost theory*. In: Wirtschaftswissenschaftliches Studium, Vol. 19, pp. 178-184.

Picot, A./Neuburger, R./Niggl, J. (1992): Erfolgsdeterminanten von EDI: Strategie und Organisation. *Determinants of success of EDI: strategy and organisation*. In: Office Management, Nr. 7-8, pp. 50-54.

Picot, A./Reichwald, R. (1994): Auflösung der Unternehmung? *Elemination of the corporation?* In: Zeitschrift für Betriebswirtschaft, Vol. 64, pp. 547-570.

Powell, W. W. (1987): Hybrid organizational arrangements: new form or transitional development? In: California Management Review, Vol. 30, No. 3 (Fall), pp. 67-87.

Rockart, J. F./Short, J. E. (1991): The networked organization and the management of interdependence. In: The Corporation of the 1990´s, ed. by M. S. Morton, New York, pp. 189-219.

Rößl, D. (1996): Selbstverpflichtung als alternative Koordinationsform von komplexen Austauschbeziehungen. *Self obligation as an alternative coordination form of complex exchange relationships*. In: Zeitschrift für Betriebswirtschaft, Vol. 48, pp. 311-338.

Sandkuhl, K./Guthmann, K./Steinberger, C. (1993): Kooperatives Arbeiten im Computergestützten Publizieren - ein Erfahrungsbericht. *Cooperative Work in Computer Supported Publishing - a report of experiences.* In: Groupware-Einsatz in Organisationen, GI-FG 2.0.1 „Personal Computing" Symposium Marburg 14./15.101993 , hrsg. v. K. Klöckner, GMD-Studien Nr. 220.

Schmidt, R. H. (1992): Transaktionskostenorientierte Organisationstheorie. *Transaction-cost oriented organisational theory.* In: Handwörterbuch der Organisation, ed. by E. Frese, Stuttgart, pp. 1854-1865.

Scholz, C. (1994): Die virtuelle Organisation als Strukturkonzept der Zukunft? *The virtual Organisation as a concept of structure of the future?* Arbeitspapier Nr. 30, Universtität des Saarlandes, Lehrstuhl für Betriebswirtschaftslehre, insbesondere Organisation, Personal- und Informationsmanagement, Saarbrücken.

Scholz, C. (1996): Virtuelle Organisation: Konzeption und Realisation. *Virtual Organisation: concept and realisation.* In: Zeitschrift Führung + Organisation, Vol. 65, Nr. 4, pp. 204-210.

Schwarzer, B./Krcmar, H. (1994): Neue Organisationsformen. *New organisation models.* In: Information Management, Vol. 9, pp. 20-27.

Selz, A. (1996): Die Rolle der Informations- und Kommunikationstechnologie in Virtuellen Unternehmen. *The role of information- and communication*-technology in Virtual Corporations. In: WiSt Wirtschaftswissenschaftliches Studium, Nr. 6, pp. 309-311.

Simon, H. A. (1991): Organization and Markets. In: Journal of Economic Perspectives, Vol. 5, No. 2, pp. 25-44.

Sommerlad, K. W. (1996): Virtuelles Unternehmen - juristisches Niemandsland? *Virtual Corporations - legal no-man′s-land?* In: Office Management, Nr. 7-8, pp. 22-23.

Suomi, R./Luukinen, A./Pekkola, J./Zamindar, M. (1996): Narrowing the gap beetween virtual and actual organizations through management communication-oriented telework adaption. In: Proceedings of the workshop „New international perspectives on Telework: From Telecommuting to the Virtual Organisation" at Brunel University, West London U.K., July 31 - August 2, ed. by P. Jackson and J. v.d. Wielen, Vol. 2, pp. 413-432.

Sydow, J. (1989): Zur Wahrnehmung organisatorischer Gestaltungsspielräume beim Einsatz neuer Bürotechnologien. *The perception of organisational margins by use of new information technologies.* In: Beteiligungsorientierte Systementwicklung, ed. by Jansen, K.-D., Opladen, pp. 17-42.

Sydow, J. (1996): Erfolg als Vertrauensorganisation? *Successful as a organisation of trust?* In: Office Management, Nr. 7-8, pp. 10-13.

Szyperski, N./Klein, S. (1993): Informationslogistik und virtuelle Organisation. *Information logistics and Virtual Organisation.* In: Die Betriebswirtschaft, Vol. 53, pp. 187-209.

Verity, J. W./Hof, R. D. (1994): The internet. In: Business Week, pp. 38-46.

Vogt, G- G. (1994): Das virtuelle Unternehmen. *The virtual corporation.* In: Der Organisator, Vol. 76, Nr. 1-2, pp. 6-9.

Weber, G. F./Walsh, I. (1994): Die virtuelle Organisation. *The Virtual Organisation.* In: Gablers Magazin, Nr. 6-7, pp. 24-27.

Wicher, H. (1996): Virtuelle Organisation. *Virtual Organisation.* In: WISU, Nr. 6, pp. 541-542.

Williamson, O. E. (1985): The economic institutions of capitalism, New York.

Williamson, O. E. (1991): Comparative economic organization: The analysis of discrete structural alternatives. In: Administrative Science Quarterly, Vol. 36, pp. 269-296.

Windsperger, J. (1983): Transaktionskosten in der Theorie der Firma. *The role of transactions costs in the theory of the firm.* In: Zeitschrift für Betriebswirtschaft, Vol. 53, pp. 889-903.

Bisher erschienen

Bestellung (bitte kopieren, ausfüllen, zusenden/zufaxen)

Adressat: Professur für BWL und Wirtschaftsinformatik
Fachbereich Wirtschaftswissenschaften
Licher Straße 70
D – 35394 Gießen
Telefax: (0 641) 99-22619

Hiermit bestelle ich gegen Rechnung die angegebenen Arbeitspapiere zu einem Kostenbeitrag von DM 10,- pro Exemplar (MwSt. entfällt) zzgl. DM 5,- Versandkosten pro Sendung.

Nr.	An		Nr.	An		Nr.	Anz		Nr.	Anz		Nr.	Anz
1/1996			1/1997			1/1998			1/1999			1/2000	
2/1996			2/1997			2/1998			2/1999			2/2000	
3/1996			3/1997			3/1998			3/1999			3/2000	
4/1996			4/1997			4/1998			4/1999			4/2000	
5/1996			5/1997			5/1998			5/1999			5/2000	
6/1996			6/1997			6/1998			6/1999			6/2000	
7/1996			7/1997			7/1998			7/1999			7/2000	
8/1996			8/1997			8/1998			8/1999			8/2000	
9/1996			9/1997			9/1998			9/1999			9/2000	
10/1996			10/1997			10/1998			10/1999				
11/1996			11/1997			11/1998			11/1999				
12/1996			12/1997			12/1998			12/1999				

Absender:

Organisation

Abteilung

Nachname, Vorname

Straße

Plz/Ort

Telefon   Telefax   eMail

Ort, Datum   Unterschrift