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Transaction Supporting Systems and Organisational Change

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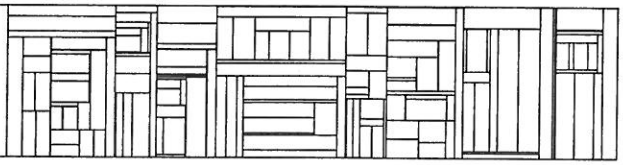

Abstract

Different types of organisations can exploit different kinds of computer systems, although it is hard to identify exactly which characteristics of a computer systems that suit a specific type of organisation. The effects of introducing computer systems are hard to predict. The effects are not deterministic.

The transaction cost theory distinguishes between three types of organisation: the market, the bureaucracy, and the group. Two key factors are uncertainty and the tolerance of opportunistic behaviour. Markets require low uncertainty, but tolerates opportunistic behaviour. Transactions in a group can have a high degree of uncertainty. This causes no problems since the exchange partners can trust each other due to the absence of opportunistic behaviour. Bureaucracies have characteristics between markets and groups. In reality organisations exhibit a mix of these organisational forms.

Computer supported cooperative work currently receives much attention. The group concept from the transaction cost theory can be used as a partial characterisation of cooperative work.

Transaction supporting systems are computer systems which support the constituent transactions of an organisation. There is an ongoing discussion about possible shifts on the scale from market to group induced by transaction supporting systems. Transaction supporting systems supporting market organisation can remove some of the reasons for shifts from market to more complex organisations. The set of transaction supporting systems at the disposal for bureaucracies and groups is, however, much larger than the set available to market organisation. Computer systems supporting cooperative work can only be fully exploited by a group. Therefore any prediction of a shift will depend on the kinds of computer systems taken into consideration.

The conclusion is that although the transaction cost theory is useful in characterising the role of computer systems in organisations, we cannot use the theory to make general assertions about the impact of computer systems on the relative benefits of the different types of organisation.

1 Introduction

It has long been recognised that there is an interplay between the characteristics of computer systems and the organisations where they are used. This interplay is not trivial. The effects of introducing computer technology are many, and they are not deterministic consequences of the characteristics of the computer system. Also there is no general agreement about how to do research in the field or on which theories that should be used to understand the interplay.

A new research field addressing the interplay between computer systems and organisations is computer supported cooperative work. See, for example, the proceedings from the first conference on computer supported cooperative work [5], the special issues on computer supported cooperative work of *ACM Transactions on Office Information Systems* (5(2), April 87), and of *Office: Technology and People* (3(2), August 1987). As a research field computer supported cooperative work brings together issues from informatics and organisation theory as well as many other disciplines.

The *transaction cost* theory has been used to discuss the role of computer systems in organisations, see the papers by Ciborra [1, 2, 3, 4] and by Malone et al. [11]. In this paper the transaction cost theory will be applied to discuss computer supported cooperative work. The transaction cost theory has also been used to make predictions about changes in the relative benefits of different types of organisations incurred by computer technology. Malone et al.'s paper is an example of such predictions. They predict a change towards proportionally more use of markets. This prediction is inconsistent with the results obtained from applying the transaction cost theory in this paper.

The discussion of the paper goes as follows: In section 2 a brief presentation of the most important concepts in the transaction cost theory is made. Section 3 gives a short introduction to the field of computer supported cooperative work and presents a characterisation of cooperative work by the transaction cost theory. Section 4 introduces the notion of transaction supporting systems, i.e. computer systems which support specific kinds of transactions. Section 5 discusses the predictions made by Malone et al. Finally section 6 returns to the issue of the applicability of the transaction cost theory to describe the role of information technology in organisations.

2 The transaction cost theory

This section gives a short presentation of the transaction cost theory as presented by Williamson [15], Ouchi [12], and Ciborra [1, 2, 3].

The transaction cost theory takes its starting point in exchanges or *transactions:* "A transaction occurs when a good or service is transferred across a technologically separable interface" [15, p. 550]. *Transaction cost* is seen as the economic counterpart of friction. The goal with the theory is to understand the different structures within which transactions are organised, and, if possible, to match these governance structures with transaction types in a discriminating (transaction cost economising) way [15, pp. 552–553].

The possible match between governance structures and transaction types depends on a "darwinistic" hypothesis about the population of organisations. It is expected that those organisations which deal with the transactions in the most efficient way will survive. This means that it is assumed that the same kind of transaction is or can be carried out by several competing organisations.

An *organisation* is seen as "any stable pattern of transactions between individuals or aggregations of individuals" [12, p. 140], or "a stable network of contractual arrangements to govern a set of transactions" [1, p. 308]. This definition of organisation is very abstract. It is different from most people's intuition about organisation. The strength of the definition is that it is only concerned with *actual* organisation. Organisations may, according to this definition, coincide with formal organisations, but they may also exist within, among, and across formal organisations.

The behaviour of agents is assumed to be characterised by *bounded rationality*, and, at least for some agents, *opportunistic behaviour* [15, p. 553]. These assumptions imply the occurrence of some transaction costs. Bounded rationality implies that the agents cannot make contracts where all relevant aspects are covered. The future of the exchange is too complex to be entirely foreseen. Therefore the conditions of the contract may need to be renegotiated. Opportunistic behaviour means that agents seek to promote their own interest by disguising attributes or preferences, distorting data, obfuscating issues, and otherwise making transactions confusing [15, p. 554]. Opportunistic behaviour can be dealt with in many different ways. These range from simple control and inspection to the establishment of elaborate organisational relationships between

the parties. Opportunistic behaviour is referred to with different terms. Ciborra uses the term behavioural or strategic uncertainty to cover the joint effect of informatical asymmetries and lack of trust between the parties [3].

Williamson introduces the notion of *asset specificity* as an important dimension for the description of transactions. Asset specificity is defined as the degree to which durable transaction specific investments are required to realise least cost supply. Williamson claims that asset specificity is the most important and also the most neglected dimension of transactions. He identifies three kinds of asset specificity: site specificity, physical asset specificity, and human asset specificity. "The reason asset specificity is critical is that, once an investment has been made, buyer and seller are effectively operating in a bilateral exchange relation for a considerable period thereafter" [15, p. 555]. Obviously, high asset specificity implies high vulnerability to opportunistic behaviour. This is often solved by organising the exchange in a bureaucratic organisation. This situation is referred to as a market failure.

Another factor is *uncertainty*. Ciborra uses the notion of natural uncertainty to denote issues like complexity or uniqueness of products or services, difficulty in evaluation and price setting, and communication barriers during the exchange [3, p. 26]. Ouchi uses the related notion of performance ambiguity as a key factor to the design of organisations [12]. Williamson uses the plain word uncertainty [15, p. 555]. He states, however, that asset specificity is more important than uncertainty.

The concept of uncertainty has also been given much attention by other organisational theorists. Galbraith discusses task uncertainty as a primary design parameter for organisations [6]. High task uncertainty implies a need for coordination efforts, often resulting in an overload of the information processing capacity of the existing organisation. Galbraith identifies four strategies for redesigning the organisation to handle this task uncertainty: increased slack, establishment of independent tasks, investment in vertical information systems, and establishment of horizontal contacts. In this paper task uncertainty will be considered equivalent with the concept of uncertainty in the transaction cost theory.

Three types of *organisation* are defined by Ouchi: the market, the bureaucracy or hierarchy, and the group or clan. The latter corresponds to Williamson's relational team [15, p. 556]. These organisations can be characterised by their constituent contracts. The market handles spot

contracts, contingent claims contracts, and sequential spot contracts. The bureaucracy is characterised by incomplete contracts, typically employment contracts, or employment-like contracts when companies integrate in a hierarchy. The group is characterised by highly unstructured "impossible" contracts, i.e. exchanges based on mutual trust and friendship without any formal contract. The three types of organisation can also be classified by the degree of opportunistic behaviour they can tolerate and the level of uncertainty they can handle. See figure 1 which is adapted from Ciborra [4]. The market, and especially the pure spot market, can

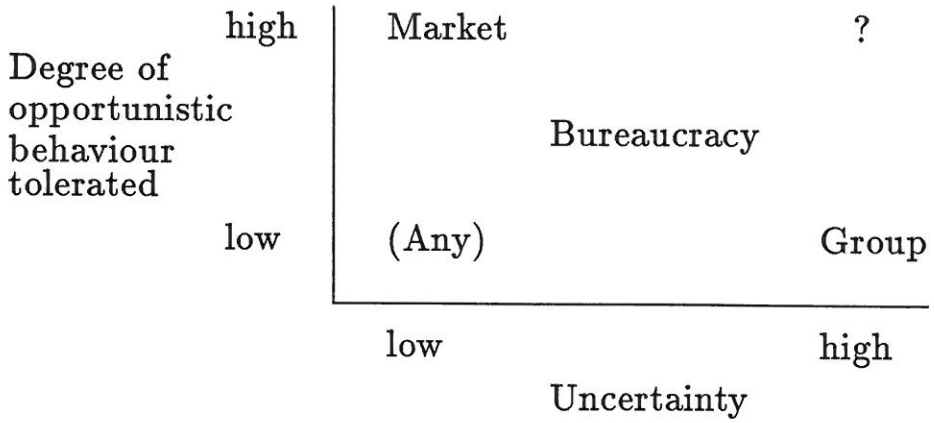

Figure 1: The different types of organisation.

handle a high degree of opportunism, but it relies heavily on the ability to evaluate the exchanged good or service. The bureaucracies can handle intermediate levels of both uncertainty and opportunistic behaviour. The group can handle high uncertainty, but is very vulnerable to opportunistic behaviour. The question mark in figure 1 indicates an area outside any kind of rational control, where exchanges are institutional, and where ceremonies play an important role. Typical examples are school systems and religious institutions [12, p. 140].

The group concept from transaction cost theory has several connotations. Group and clan have been used interchangeably in the transaction cost literature. This is unfortunate since the clan concept has analogies like family clans, mafia, or tribes. The ruling mechanism of these organisations often has very little to do with the almost utopian ideal of harmonious cooperation which Ouchi's clan concept describes. The group concept has more to do with teams, teams in health care, in soccer, or in software development. Therefore the word group is preferred in this

paper.

The types of organisation described here are ideal or prototypical types. Real organisations exhibit a mix of the different types. Group organisation will, for example, typically coexist with a bureaucracy or a market. The different types of organisation may coexist peacefully, but they will often be in conflict with each other. Computer systems may to various degrees support the different types of organisations and may therefore affect the balance between these.

The transaction cost theory is a controversial theory, perhaps because it sometimes has been misused as a general argument in favour of market organisation. It is not stated in the theory, however, that it is a goal in itself to reduce transaction costs or that market organisation always is to be preferred. The statement of the theory is that there is a relationship between the nature of the transaction and the way it is governed.

3 Cooperative work and the TC theory

The new research field of computer supported cooperative work is not based on a general agreement about the nature of cooperative work. In this section it will be argued that the group concept of the transaction cost theory is a suitable characteristic of cooperative work.

The upshot of computer supported cooperative work is an expression of new technical possibilities and an increasing awareness of the negative effects of classical computer systems on cooperative work. The typical "cscw"-application is electronic mail, but meeting support and shared workspaces are also being proposed, see the proceedings of the first conference on computer supported cooperative work [5]. In an earlier paper I stated a number of criteria for a work situation to be cooperative. They were based on my understanding of the kind of work addressed by the "cscw"-applications, but also inspired by the transaction cost theory. The criteria were: people work together due to the nature of the task; they share goals and do not compete; the work is done in an informal, normally flat organisation; and the work is relatively autonomous [13].

The group concept of the transaction cost theory has some properties which are central to cooperative work. A group is a type of organisation where there is no or only negligible opportunistic behaviour. Members of a group have shared goals. In contrast to the bureaucracy, where people

behave according to rules, the group is a type of organisation where people behave according to socialised patterns like solidarity and tradition.

Cooperative work is not a formally defined organisation. It is a kind of work, or in other words, an actual organisation. This is in pure parallel to the focus on actual organisation in the transaction cost theory. Cooperative work need not be recognised or supported by the formal organisation. Computer supported cooperative work will be a kind of subversive technology in strictly hierarchical organisations. This is in clear parallel to the relationship between the different types of organisations as seen in the transaction cost theory.

The transaction cost theory has been used to describe the relationship between the organisation and the computer system. The focus has, however, been on how a computer system may support markets and bureaucracies [3, p. 30]. If we consider computer supported cooperative work as computer support for groups it will fit nicely with a hole in an ongoing discussion of the relationship between organisations and computer systems.

A final argument for the applicability of the group concept to characterise cooperative work is the kind of tasks typically focused on in computer supported cooperative work. There is a strong focus on research work and on work with many similarities to research, for example system development. Research work is hard to measure in an objective way. Therefore the performance ambiguity, or uncertainty, of this work is high. According to the transaction cost theory such work is typically organised in groups.

4 Transaction supporting systems

In the perspective of the transaction cost theory a computer system can support an organisation by supporting its constituent transactions or exchanges. Such systems will here be called *transaction supporting systems.* Transaction supporting systems support the organisation by reducing the costs incurred by the constituent transactions. The transaction cost theory provides us with a framework for the analysis of the relationship between transaction costs and different types of organisations. Thus the transaction cost theory can be used to assess the organisational impact of the application of various kinds of computer systems.

There is a difference between a transaction supporting system and the systems traditionally referred to as transaction processing systems. In a transaction processing system a transaction is a unit of service to some user which need not have any relation whatsoever to a transaction in the sense of the transaction cost theory, see also [3, note p. 19]. In some cases, however, there can be a one to one correspondence between the two notions of transactions. This would be the case in a computer system for electronic trade with shares.

An analysis of the effects of transaction supporting systems must distinguish between market supporting systems, bureaucracy supporting systems, and group supporting systems. The ways a transaction supporting system can reduce the transaction costs are different for the different types of organisations. We can, however, get some ideas for this support by using the four kinds of information processing costs related to transacting through negotiations of contracts as identified by Ciborra [1]:

- search costs,
- contracting costs,
- control and regulation costs, and
- maintenance costs.

This set of transaction costs is primarily operational for the characterisation of the transaction costs occurring in markets and bureaucracies, but several "inefficiencies" of a group can be rephrased in this framework. In a group it is possible to let everybody participate in the planning of the organisation's activities. This improves the quality of the plan and it ensures that everybody knows the plan and feels committed by it. Compared to many other ways of performing planning, however, this kind of planning requires more time. This can be rephrased as a control and regulation cost.

This rephrasing illustrates that support for market organisation can be much more directly related to support for the constituent transactions than in support for group organisation. This is because the transactions in a market are highly structured and easy to identify whereas group transactions are highly unstructured. Group supporting systems will therefore be less directly tied to support for specific transactions than market supporting systems. In the following I will make a more specific discussion of the three classes of transaction supporting systems.

Typical examples of *market supporting systems* are systems for electronic fund transfer, most banking systems, the Danish Værdipapircentralen: a computer centre for the trade with bonds and shares, and databases on commodities, products, suppliers, etc. Værdipapircentralen supports a market by making it much cheaper to own and to trade with bonds and shares. This has led to an enormous increase in the volume of this market in Denmark. Databases on commodities, etc., support the market by reducing search costs.

In his papers [1, 2, 3, 4] Ciborra describes information technology as a mediating technology, a technology which can contribute to a reduction of transaction cost. He states that information technology can be an alternative to middlemen or arbitrators, or to vertical integration among agents. In this way he emphasises the role of market supporting systems. One of Ciborra's main messages is, however, that we should not be naive about the role of information. People may use information for their own purposes, justifying already made decisions with selected "objective" data. Further he writes: "The application of information technology, to be effective and efficient, should not contradict the informational nature and characteristic of the transactions supported" [1, p. 322]. Thus Ciborra does not expect that information technology will change inherent characteristics of transactions like uncertainty and opportunistic behaviour. This implies a clear limit to the impact of market supporting systems.

Ciborra focuses on the role information technology may play in standardising information and extending the linkages. Changes which may make market organisation more favourable. An example of this is how efficient radio communication has made it possible to treat all taxis of one city as a pool of cars. This has certainly made company employed chauffeurs less attractive. In Oslo, Norway, a computerised system has been introduced which also controls the drivers' opportunistic behaviour. Earlier information about a trip was distributed to all drivers, and the trip was "given" to a driver near the starting point of the trip. Drivers could cheat by saying they were closer than they actually were, and thus get an extra trip. In the new system the driver has to enter a code saying in which area he or she currently is. The computer in the taxi will only print information on trips in that area, thus effectively blocking cheating. It is not known to this author whether control of opportunistic behaviour was a design goal for this system. There are other good reasons to intro-

duce a mechanism like the one described. We can observe, however, that this is an application of information technology which limits the room for opportunistic behaviour.

The prototypical example of a *bureaucracy supporting system* is the vertical information system as described by Galbraith [6]. The purpose of these systems is to collect and process the information necessary to keep the hierarchical clockwork going. Such systems can contribute to a considerable reduction in control and regulation costs. Inventory, point of sale and automated ordering are examples of facilities often found in such systems. Ciborra claims that the theory on management information systems has focused only on bureaucratic organisation [3, p. 28]. Systems supporting personnel administration, payment of salaries, etc., are directly supporting the constituent transactions of a bureaucracy. These systems reduce contracting and maintenance costs.

Galbraith discusses how an organisation can handle high uncertainty. One solution is to use vertical information systems, another is more use of horizontal contacts. Horizontal contacts can be implemented in many ways, but they all involve a move towards group organisation. Large corporations often use internal markets as a coordinating mechanism. The role of the market is typically described as that of the "invisible hand". The market is seen as a sort of omnipresent information system which handles coordination problems of a higher complexity than what can be handled by a bureaucracy. Increased information processing capacity will certainly increase the level of complexity that can be handled by a bureaucracy. These two examples illustrate that bureaucracy supporting systems may provide an alternative to drift towards market as well as towards group organisation.

Group supporting systems have not received much attention in the transaction cost literature. Ciborra explicitly delimits most of his discussion to market and bureaucracy supporting systems [3, p. 30]. He describes the information system of a group as highly informal and idiosyncratic, and hence not very suited for computerisation. Malone et al. do not mention support for groups at all [11]. If we restrict computer support for groups to information systems that directly support the idiosyncratic and hard-to-identify transactions in a group, we will not be able to invent many other group supporting systems than electronic mail. In this paper it is proposed, however, that we can interpret computer support for cooperative work as computer support for groups. In this field we

find support for explicit communication like electronic mail, but we also find systems which implement shared material or workspaces. Examples of systems implementing shared material are Xerox PARC's Colab [14] and the programming environment described by Kaiser et al. [7]. These systems provide their users with a material or workspace which mediates actions and changes made by one user to the other users when appropriate. This has close similarities to the way people work together in many other situations, think of the close coordination between two persons carrying a heavy piece of furniture. Much of the coordination taking place through shared material is tacit, often based on experience and knowledge of the work process and also based on mutual trust among the workers. Classical development of information systems has not directed much attention to this kind of cooperation.

A group can also be supported by any system the group may use for its own purposes. The typical example is a communication system, but a programmable environment under the control of the group can be used in many unforeseen ways.

Group supporting systems may favour group organisation at the expense of other types of organisation. An example given by Ciborra is that a communication system compatible with the idiosyncracies of a group may make group decision making less costly than otherwise. In this way group supporting systems may contribute to an increased maximal size of the horizontally organised group. Many group supporting systems can only be exploited effectively in an organisation where there is no fear of opportunistic behaviour. The productivity increase these systems may lead to can therefore only be exploited by groups. A similar argument applies in favour of bureaucratic organisation compared to market organisation.

The classification of computer systems given here is not complete nor extremely precise. Many systems, for example electronic mail, can be exploited by most organisations. Computer systems for individual use will often fall outside the classification, but there will also be cases where individual computer support may have a clear impact on the organisation.

5 Organisational change

In their paper "Electronic markets and electronic hierarchies" Malone et al. have discussed the impact of information technology on the relative benefits of markets and hierarchies (bureaucracies) [11]. This section is devoted to a discussion of their statements.

Malone et al. claim that "by reducing the costs of coordination, information technology will lead to an overall shift towards proportionally more use of markets — rather than hierarchies — to coordinate economic activity". Their argument is based on the general assumption that production costs are lower in the market than in the hierarchy, whereas coordination costs are lower in the hierarchy. They write: "The primary disadvantage of the markets is the cost of conducting the market transactions themselves, which, for a number of reasons (including the "opportunistic" ones emphasized by Williamson and the purely "informational" ones emphasized by Malone [8]), are generally higher in markets than in hierarchies" [11, p. 489]. Information technology, they claim, is likely to decrease the "unit cost" of coordination, and "the result of reducing coordination costs without changing anything else should be an increase in the proportion of economic activity coordinated by markets" [11, p. 489]. The assumption that coordination costs are lower in the bureaucracy than in the market is not supported by Ciborra. This can be seen in his discussion of the impact of information technology on the population of organisations where he writes [2, p. 146]:

> "The traditional issue concerning centralization vs. decentralization of power in computer-based organizations is not touched directly. But note that the problem of the most efficient mechanisms to exercise power and control (by setting up markets rather than hierarchies) can be dealt with using the frameworks presented here."

Malone et al. can, however, find support from Williamson, who writes [15, p. 559]:

> "The advantages of firms over markets in harmonizing bilateral exchange are three. First, common ownership reduces the incentive to suboptimize. Second, and related, internal organization is able to invoke fiat to resolve differences, whereas

> costly adjudication is needed when an impasse develops between autonomous traders. Third, internal organization has easier and more complete access to the relevant information when dispute settling is needed. The incentive to shift bilateral transactions from markets to firms increases as uncertainty is greater, since the costs of harmonizing the interface vary directly with the need to adjust to changing circumstances."

The apparent disagreement between Ciborra and Williamson can probably be explained by differences in the purposes of the two statements. Ciborra wants to state that in general the market is a cheaper type of organisation than the bureaucracy, whereas Williamson states that the same transaction, hypothetically being performed in both types of organisation, can be coordinated more cheaply in a bureaucracy.

Malone et al. also make a more specific argument. They present a model which uses asset specificity and complexity of product descriptions as the two main factors influencing the choice between market and hierarchical organisation. They argue that information technology will contribute to a reduction of the cost involved in handling complex product descriptions. They also claim that the asset specificity often will be reduced. This may, they argue, take place when flexible manufacturing technology allows rapid switches of production lines from one product to another. Therefore, in situations where earlier only one supplier could deliver a product due to appropriate specific investments, several suppliers will now be able to switch their equipment to produce the product in question.

There are several reasons to doubt the conclusions drawn by Malone et al. Some counterarguments will be presented in the following.

(1) I accept the basic premises of Malone et al.'s general argument, i.e. that under otherwise comparable circumstances production costs are lower in the market and coordination costs are lower in the bureaucracy. It is true that coordination costs can be reduced by information technology, but *it is not obvious that the reduction in coordination costs will be the same in the market as in the bureaucracy.* In the previous section different types of technology with different impacts on the relative benefits of different types of organisation were discussed. The kinds of computer systems selected for consideration will clearly influence an analysis of the consequences of applying computer technology. The selection of computer

systems made by Malone et al. is biased towards their conclusion.

(2) Seen from a transaction cost point of view the specific argument made by Malone et al. is of an ad hoc nature. The use of complexity of product descriptions as a main factor is not based on direct references to the transaction cost theory. Instead Malone at al. justify its use by empirical studies showing, for example, that the commodities futures market in the USA only emerged after a uniform grading scheme was adopted. The introduction of flexible manufacturing techniques represents a giant jump in the kind of technology being considered. This implies that any possible use of computers may be used as a potential counterargument to their analysis.

(3) Malone et al. have a very small selection of factors they take into consideration in their analysis. One important factor missing is uncertainty. Uncertainty is a factor which, when present, make bureaucracies and groups more preferable. It is true that improved handling of complex product descriptions *may* reduce uncertainty. Likewise the reduced asset specificity caused by flexible manufacturing technology also may reduce uncertainty, since the presence of more companies being capable of producing the same product reduces performance ambiguity. But uncertainty is much more than what is caused by these minor changes. The inherent uncertainty in the performance of many tasks and the characteristics of transactions are not simply changed by more information processing.

(4) More generally we need to investigate whether it is only economy (lower coordination costs), or whether it is the nature of the coordination needed, that in many cases only can take place in a bureaucracy or group, which is the determining factor. Where Williamson emphasises protection against the effects of opportunistic behaviour, Malone et al. almost only pay attention to the information processing aspects of the question.

(5) Malone et al. only use the transaction cost theory to discuss the relative advantage of markets and bureaucracies. They do not consider groups. This is surprising considering the similarities between groups and cooperative work. Malone has also been working with issues related to computer supported cooperative work [9, 10]. When discussing the effects of information technology on organisation we need to look at the whole spectrum of possible organisations. One hypothesis could be that we will see a movement away from bureaucracies towards groups *and* markets.

(6) As mentioned above the set of computer systems considered by

Malone et al. is a small selection on a very large scale of potential uses of computer technology. It was observed in the previous section that the bureaucracy, and to an even larger extent the group, have a much larger set of computer systems at their disposal. This is because these organisations can exploit computer systems which require limits to the opportunistic behaviour exercised by the different users. An interesting hypothesis is that the potential gain from such systems more than outweighs the effect referred to in Malone et al.'s general argument.

(7) It appears that Malone et al.'s discussion may depend on the set of transactions being stable. Or in other words: Their analysis applies to a constant set and nature of goods and services being exchanged. It is only natural that a certain good or service, as it becomes more and more common, will be handled with more and more certainty. These exchanges may therefore drift to the market. Using this hypothesis we can consistently observe that many new markets come into being while at the same time the proportion of all exchanges handled by markets does not increase. I conjecture that this is the case. Many new kinds of services are invented in bureaucracies and groups, and these organisations more than maintain their share of the total volume of transactions.

(8) A simple illustration of the previous argument is that flexible manufacturing technology may also be used to increase the complexity of the product. The products can to a larger extent be tailored to the needs of the "buyer". The effect is increased asset specificity.

(9) The discussion by Malone et al. is very specific to capitalist economies, perhaps only to the United States. This is not, however, stated explicitly. It is therefore hard to figure out to which extent their analysis applies to economies slightly different from the United States. This emphasises that the discussion of the effect of information technology on society also is a political discussion. Statements about these issues will often rely on some political assumptions. When these assumptions are implicit it is hard to judge the actual content of the statements put forward.

In the points above it has been argued against the prediction that information technology will lead to a shift towards *proportionally more* use of markets. It is recognised, however, that information technology may reduce the costs of coordinating transactions, and that this in some cases may make the market more preferable than it otherwise would have been.

The main counterargument to the analysis of Malone et al. is that the potential for computer support for non-market organisations is larger than it is for the market. This leads to the conclusion that one cannot make general statements about the impact of information technology. Such statements need to be more specific with respect to the kind of technology taken into consideration and with respect to the impact on organisations, for example by making it clear which transaction costs that are changed.

It must be recognised that information technology can be used to support various sorts of organisation. It is therefore not a question of inevitable effects of a new technology. It is a technology which can be shaped the way we want it, and it is a matter of political and organisational choice whether we will let more or less transactions be governed by the market.

6 Can transaction cost be used?

This paper has briefly presented and discussed some uses of the transaction cost theory to characterise the role of information technology in organisations, primarily focussing on the use of the theory to predict future developments.

The transaction cost theory is clearly useful for the characterisation of cooperative work. The group concept is intuitively very close to the idea of cooperative work, and the use of the group concept can contribute to a necessary discussion of the nature of cooperative work. It also appears that the possible coexistence of group organisation and other types of organisation has a parallel to the relationship between cooperative work and its surrounding organisation.

The concept of transaction supporting systems gives some ideas about the role information technology may play. It does not, however, cover the whole set of possible uses of computers. It is therefore only useful as one of several perspectives. The discussion of transaction supporting systems illustrates that direct support to the performance of transactions is most obvious in the market and least obvious in the group. This suggests that the term "transaction supporting system" is more appropriate for market supporting systems than for group supporting systems. This implies that if we use the transaction as our unit of analysis as proposed by Ciborra [3, p. 19], we will tend to have a bias towards market supporting systems. We

must conclude that the characterisation of cooperative work by the group concept from the transaction cost theory only is a partial characterisation.

In the discussion of organisational change it is apparent that different applications of the transaction cost theory can lead to quite different conclusions. This can be explained in a number of ways, but it is clearly to stretch the theory to make general predictions about the future of organisations. Care should be taken when a useful descriptive theory is used prescriptively. In this case it is also a question of the different authors' different choices of factors to be used in the analysis. In my opinion it is not reasonable to use the transaction cost theory to derive predictions about the future population of organisations. The theory can be used, however, to realise that different developments are possible, and that information technology may play an important role in several of these developments.

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