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The political economy of information management

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1 Introduction

1.1 Subject of the study

The history of the use of information technology in organizations shows that information technology has had an enormous impact on the functioning of organizations. The roots of these changes can be found in (1) information technology developments (the supply side) as well as in (2) organizational needs (demand side) (Scott Morton, 1991; Simons & Verheijen, 1991).

1.1.1 Developments in the supply of information

'Information technology' (IT) usually refers to some sort of collection of computer hard- and software and the knowledge about its use, which can *collect, store, process* and *disseminate* information¹.

In the past, *processing* capacity and *storage* capacity of hardware have especially changed, while IT costs dropped simultaneously (Madnick, 1991; Breukel, 1996). Moore's Law indicates that costs associated with comparable units² of information technology are reduced by an order of magnitude every five years (Gazendam, 1997). This means that the capacity that took a million dollars in the 1960s (a mainframe computer) can be realized with a one thousand dollar personal computer (PC) in the 1990s (Cash, McFarlan & McKenney, 1988).

Nowadays, information technology's *storing* and *processing* capabilities are still progressing. But the technology of *collecting* and *disseminating* information (also referred to as information and communication technology [ICT] or telematics³) is changing too. Technological advances have resulted in new communication media (optic cables, satellites), increased capability of input/output devices, et cetera. Because of the efforts of industry associations and groups of organizations, technical standards have been developed and/or accepted. These advancements in technology and standard

¹ A more precise definition is given in chapter two.

² Measured in MIPS, *millions of instructions per second*.

³ Telematics is a compound word, consisting of 'telecommunications' and 'informatics'.

setting have coincided with the liberalization of the now very competitive data communication industry.

Besides changes in hardware, changes in software have occurred. The emergence of, among other things, all kinds of object-oriented programming environments, tools, and standard yet configurable software packages have boosted the productivity of software development. Furthermore, probably due to the increased popularity of the Internet, communication software has improved drastically.

As a result of the changes in hardware as well as in software, information exchange in and across organizations has sunk per cost of unit. "In brief, the development of high-performance, high reliability, comprehensive communication networks, both intraorganizationally and interorganizationally, is occurring at a rapid pace", comments Madnick (1991, p. 31).

According to the literature, these information technology developments have severe consequences. A typical statement that supports this claim is provided by Senn: "Information technology is itself a driver of globalization, enabling virtually any firm to overcome the fundamental business barrier of geographic distance, as long as it deploys and leverages the technology in an effective fashion" (1994, p. 444). Morgan claims that "(...) there can be little doubt that information technology is among the most important forces reshaping the modern organization" (1988, p. 97).

The statements by Senn and Morgan are modest illustrations of sometimes quite bizarre claims in the literature. Some care must be taken to avoid jumping to tendentious conclusions. Holland, Lockett and Blackman respond to the kind of turbulence-reporting claims stated above: "(...) [t]his tends to lead to a series of war stories and apocryphal tales which may miss much of the underlying richness and long-term developments and trends" (1992, p. 540).

Notwithstanding the sometimes quite eccentric claims in the literature, it can be argued that the emergence of new information and telecommunication technology poses new challenges to an organization and especially to its structure, planning and strategy (Levinson, 1994). However, it must be noted that technological impulses only account for a part of all new challenges to an organization's information resource structure, planning and strategy. Furthermore, the history of information technology shows that information technology has had an enormous impact on the functioning of organizations, but also that the results to be accomplished immediately are overestimated and that long term consequences are underestimated (Strassman, 1985, cited in Holland, Lockett and Blackman, 1992).

1.1.2 Developments in the demand for information

Apart from developments in the technology, it is also possible to identify developments in the demand side of information technology. Sometimes the literature is plagued with descriptions of ever decreasing product life cycles and increasing turbulence, which, according to the authors, necessitate more and better information technology. Mintzberg

(1994), however, has demonstrated that this turbulence is not at all a contemporary phenomenon. The organizational literature since the 1950s (that is, before information technology gained momentum) has reported an *ever increasing* turbulence in the environment of organizations. Furthermore, he notes that the turbulence of a past period, previously labeled turbulent, is later on described as moderate.

However, other authors provide different impetuses for applications of information technology. For example, Scott Morton (1991) describes numerous changes in organizational structure, organizational strategy and individual roles/skills⁴. These changes are elaborated in the debate on the relationship between IT and centralization/decentralization (see section 1.2.1), the debate on strategic IT (Breukel, 1996) and the debate on upgrading/degrading of labor as a result of the application of IT (Steijn & de Witte, 1996; Cunningham & Tynan, 1993).

One theme that is pervasive in the literature is the theme of new organizational forms that are emerging (for a brief introduction, refer to Schwarzer, Zerbe and Krcmar, 1997). Here, 'new organizational forms' refers to the use of coordination mechanisms other than the traditional hierarchy (within organizations) and markets (between organizations) (Ring and Van de Ven, 1994). These new organizational forms of coordination are now being described in the literature and are referred to as:

- 'Information partnerships' (Konsynski & McFarlan, 1990)
- 'Interorganizational systems' (Barrett & Konsynski, 1982; Cash & Konsynski, 1985)
- 'Hybrid arrangements' (Borys & Jemison, 1989)
- 'Interorganizational configurations' (Levinson, 1994)
- 'Modular organizations' (Kastelein, 1985; Tully, 1993)
- 'Networked organizations' (Miles & Snow, 1992; Powell, 1987)
- 'Team-based organizations and virtual organizations' (Davidow & Malone, 1992)
- 'Learning organizations' (Drucker, 1987)
- 'Electronic integration' (Venkatraman & Kambil, 1991)
- 'Value added partnerships' (Johnston & Lawrence, 1988; Henderson, 1990)
- 'Organic networks' (Morgan, 1989)⁵

As a result of the emergence of these new organizational forms, interorganizational relationships are highlighted. An interorganizational relationship, according to Van de Ven, occurs when "(...) two or more organizations transact resources (...) among each other" (1976, p. 24). Most authors implicitly speak of interorganizational relationship when resources are transacted recurrently and the relationship lasts for a period of time, although it does not have to be a continual exchange (Oliver, 1990).

⁴ Note that these various impetuses are not independent of each other.

⁵ For a more complete enumeration, refer to Bensaou & Venkatraman (1994), Fredriksson & Vilgon (1996) and Ching, Holsapple & Whinston (1996).

Interorganizational relationships can be governed by a variety of coordination mechanisms: discrete market transactions and hierarchical arrangements being extremes on a continuum (Ring and Van de Ven, 1994). Examples of these intermediate forms are to be found in both the private and public sectors. In the private sector, it is reported that autonomous firms cooperate with respect to joint research and development projects, joint product development, joint manufacturing, shared distribution and service, etc.

Government is sometimes portrayed as a monolithic actor. However, if one rejects this rather radical view of government (see, for example, de Vries, 1992; Kickert, 1993; BIOS-3, 1995; Gazendam, 1997; Kickert, 1997), it is very well possible to discern network structures and interorganizational relationships in public sectors, too.

One explanation for the interest in interorganizational relations is based on Nooteboom's observation that "relations of cooperation are incurred from an expectation of value (...) now and in the future" (1993, p. 13). Often, this premise is interpreted as the possibility of decreasing the costs⁶ of specific products if certain activities are outsourced to other organizations, thus resulting in interorganizational relationships between focal organizations and, for example, component suppliers. This explanation is "(...) consistent with the argument that efficiency is an underlying determinant of interorganizational relations" (Oliver, 1990, p. 245).

However, Van de Ven (1976) contests this interpretation. His basic premise is that resources and expertise needed to cope with problems by organizations are contained within organizations and vested interest groups. Using this line of reasoning, interorganizational relations "(...) occur for the purpose of pursuing common or mutually beneficial goals or interests" (Oliver, 1990, p. 244). By means of exchanging resources in interorganizational relationships, goals of individual organizations that were unachievable for individual organizations are now attained (Van de Ven, 1976). Van de Ven's explanation highlights the role of organizations as vehicles for goal achievement. Relations between organizations can be seen as artifacts for goal achievement, created, adjusted and terminated by stakeholders in order to pursue goal achievement. Alexander notes: "(...) it is common sense to realize that an organization can induce other organizations to bias their actions in a direction it desires if it can offer them incentives in the form of resources, especially if the relevant resource is essential for the other organization's survival" (1995, p. 9).

Summarizing, this explanation assumes that interorganizational relationships can improve the individual organization's goal attainment. This explanation of the occurrence of interorganizational relationships is referred to as the effectiveness or reciprocity explanation (Van de Ven, 1976; Oliver, 1990).

The above explanations refer to efficiency and effectiveness, respectively, as primary drivers for interorganizational relations. But there are also other hypotheses that have been proposed in order to account for the occurrence of interorganizational

⁶ Here, not only production costs are meant, but also the costs incurred by haggling and learning (so-called transaction costs). See also section 3.3.4.

relationships. For example, a hypothesis that more or less originates in critical organization theory states that, especially in government, hiving-off⁷ is not so much pursued in order to economize on costs⁸, but rather to detach high-risk activities from the focal organization, thereby safeguarding the interests of the focal organization's top management or politicians⁹. This 'risk averse' hypothesis, however, has gained only limited empirical support.

In an attempt to survey and summarize the literature on interorganizational relationships, Oliver (1990) has identified *six* rationales or reasons for organizations to participate in interorganizational relations (Figure 1)¹⁰.

⁷ By means of hiving-off, execution of government activities is changed by attributing or delegating authority to a newly-established or an already-existing organization which has a certain legal status as an independent unit with a relatively high degree of economic independence (Künneke, 1991; Ter Bogt, 1998).

⁸ Economizing on costs as a rationale for interorganizational relationships is a style of reasoning typical to economic organization theory. For details, refer to section 3.3.

⁹ Here, *political efficiency* rather than economic efficiency is the decision criterion. See Ter Bogt (1998) for a more complete discussion.

¹⁰ The theoretical background of this summary includes specific renditions of economic organization theory (see section 3.3) and political organization theory (see section 3.4), but also theories of class hegemony and institutional theories. A complete discussion of these theories goes beyond the scope of this thesis. For more information, refer to Oliver (1990).

Source	Rationale	Description
Internal processes	Efficiency	The formation is prompted by the organizations in order to improve their internal input/output ratio.
	Effectiveness	The formation occurs in order to pursue common, mutually beneficial goals or interests.
Environment	Necessity	The formation is the result of enforceable laws, drafted by a legislator.
	Legitimacy	The formation is the result of an attempt by organizations to increase their legitimacy in order to justify their existence in agreement with prevailing norms, rules, beliefs or experiences.
	Stability	The formation is the result of an attempt by organizations to reduce environmental uncertainty.
	Asymmetry	The formation is the result of the potential of an organization to exercise power and control over another organization or its resources.

Figure 1: Rationales for interorganizational relationships (adapted from Oliver, 1990)

From the figure above, we conclude that there are many rationales for organizations to participate in relationships with other organizations, efficiency and effectiveness being examples of rationales. These interorganizational relationships do not necessarily have to lead to merger of the participating organizations. The literature describes a variety of forms of cooperation between organizations that do not nicely fit the markets/hierarchy dichotomy. However, the rationales for the occurrences of these various forms of interorganizational relationships result in conflicting explanations. Obviously, the literature on the origins of interorganizational relationships in both private and public sectors is rather fragmented (Oliver, 1990; Alexander, 1995).

1.1.3 Synthesis

It has been argued that the above developments (IT-related trends and increased attention to interorganizational relationships) are not independent of each other. The causality between IT trends and the emergence of interorganizational relations has been subject to some discussions. Markus and Robey (1988) distinguish two opposing perspectives:

- The *technological imperative*, in which new technology drives organizational changes. The literature on information technology often takes this stand. It is

argued that technological developments cause or enable changes in or between organizations. Examples of this stream in the literature are the writings on IT-enabled new organizational forms (for example, the statements by Senn and Morgan [see section 1.1.1], or the writings of Schwarzer, Zerbe, Krcmar [1997]). Critics state that this type of logic underestimates the variety in profiles of organizations using information and telecommunication technology (Fredriksson & Vilgon, 1996).

- The *organizational imperative*, in which the use of (new) technology is determined by organizations or changes in organizational parameters. The organizational literature customarily takes this point of view by mentioning the use of telematics as an important factor. This line of reasoning has been criticized for not studying the IT phenomenon in an in-depth way: for example, by not differentiating different types of technology or by not considering other relevant contextual factors (Kubicek, 1995).

Van der Heijden (1995) points out that the discussion about the causal relationship between interorganizational and technological changes bears some resemblance to the discussion about the relationship between structure and strategy (Mintzberg, 1990, 1994) and between strategy and environment ('environmental determinism' versus 'strategic choice' [van den Bosch, 1993]). In these debates, the direction of causality between variables is questioned: does the strategy an organization wishes to pursue affect the organization's structure, or is an organization's strategy determined by its structure? Does an organization's environment determine its strategy, or is an organization able to control its environment by pursuing a different strategy? From the discussions and debates, no clear-cut answer has yet been formulated; obviously, the relationships between these variables are quite complex.

The *initial* motivation for this study stems from the complexity of the relation between IT and interorganizational relations. In section 1.2, research endeavors that have addressed this theme are discussed and the motivation for the current study is elaborated. This leads to the formulation of the main research goal in section 1.3. Then, in section 1.4, the preliminary theoretical orientation and research questions are presented. Section 1.5 presents various alternative research designs and the motivation for the research strategy to be used. The remaining part describes an outline of the rest of the thesis as a whole.

1.2 Motivation of the study

The relationship between IT as a technological variable and interorganizational relationships as an organizational variable has been scrutinized many times in the disciplines of organization studies and information systems. In this section, two

classical controversies and subsequent research in the discipline of information systems¹¹ are presented.

Firstly, research on the relationship between IT and organizational parameters is discussed (section 1.2.1). Secondly, research on the relationship between IT and interorganizational relations is addressed (section 1.2.2). These controversies are discussed and the core of the dispute to which further research activities are to be addressed is summarized. The motivation of the current study stems directly from these controversies.

1.2.1 Research on the relationship between IT and organizational parameters

The relationship between information technology and its context, customarily organizational parameters, has been scrutinized many times. One of the first themes that was investigated was the effect of information technology on centralization as an organizational parameter (Kubicek, 1975; see also Kubicek, 1995). This information systems research theme was an attempt to chart systematically the field of information technology and organizational parameters by using research models and techniques that stretched beyond the scope of very descriptive models.

George and King (1991) have surveyed the literature and identified theories that produce conflicting explanations about the relationship between information technology and centralization. One stream in the literature clearly reported that introduction of IT leads to a centralization of decision-making authority. Drucker (1987) assumed that the introduction of information technology leads to elimination of middle management and that lower hierarchical levels could be increasingly directed and monitored by management using information technology. Crozier analogously assumed that information technology in general threatens the autonomy of workers as opposed to management (Bemelmans, 1987).

For the situation in the Netherlands, Frissen argued that the introduction of information technology in governmental agencies leads to bureaucratization (and thus to increased formalization and centralization): “Complexity and interdependencies in the policy field and political responsibilities imply centralization in relation to informatization” (Frissen, 1989, p. 245).

Schrama (1991) described how, in general, the earliest information system researchers found that the use of computers resulted in centralization in organizations. The rationale for this proposition was found in the increased capabilities of information technology to monitor and control the behavior of organization members (control-by-IT or surveillance explanation). The centralization thesis has also gained support in Lee (1965) and Whisler (1970).

¹¹ Sometimes referred to as ‘management information systems’ (Breukel, 1996). This discipline combines insights from organization science and computer science.

However, there is also a stream in the literature that claims that, in general, information technology leads to decentralization. In this line of reasoning, information technology can be used to perform complicated calculations or simulations¹² so that individual workers are no longer dependent upon higher hierarchical levels or support staff (empowerment-by-IT explanation). Another line of reasoning behind the decentralization thesis is that information technology enables monitoring and control without the need to control and monitor in a direct, tangible way (pseudo-decentralization-by-IT explanation). Surprisingly, the decentralization thesis has gained empirical support too (van der Heijden, 1995; see also Meyer [1968], Klatzky [1970] and Blau, Falbe, McKinley & Tracy [1976]).

For example, Frissen's general observations have been criticized. "I could observe that this [Frissen's bureaucratization thesis] conclusion was mainly based on a specific and rather bureaucratic computerization project, while in the long run a more person-oriented information management approach combined with an equilibrium policy (...) led to a decrease in bureaucracy" (Gazendam, 1993, p. 9). Gazendam (1993) and de Jong (1994) have described the development of information technology in terms of political configurations. They provided well-documented cases in which the application of information technology led to decentralization. Schrama shows that in general, the first empirical results indicating centralization were followed by studies that detected the opposite tendency, towards decentralization (Schrama, 1991).

Various authors have tried to reconcile the above (partial) explanations. Gazendam (1997) states that the centralization tendency was especially vigorous in the 1970s, when relatively high information technology costs (as compared to labor costs) necessitated concentration of information technology, and, with that, centralization of decision making. When the information technology costs dropped in the 1980s and 1990s, concentration of information technology no longer was the only viable option and hence, the accompanying centralization tendency did not occur anymore.

Breukel (1996) proposes a different explanation, based on an exhaustive literature review. Breukel mentions organizational structure and IT as equal aspects of the organization with no one-way causal relation between these aspects. Breukel argues that "feasible set[s] of equally effective, internally consistent patterns" (Drazin & Van de Ven, 1985, p. 335) can be defined. This means that IT and structure are variables of which some combinations of values are assumed to be consistent and other combinations are assumed to be inconsistent. Note that in this line of reasoning, no explicit preference for either organizational imperative or technological imperative is stated. Rather it is assumed that organizational and technological variables are either consistent or inconsistent and that in order to change a 'non-consistent' situation into a 'consistent' situation, either the technological or the organizational variable can be

¹² The technology that is used for these purposes is the technology of decision support systems and expert systems (Heesen, Homburg & Offereins, 1995; Heesen, Homburg & Offereins, 1997).

changed. This perspective is referred to as the ‘emergent’ perspective (see also van den Bosch, 1993; van der Heijden, 1995). Van der Heijden explicitly supports this view of the relationship between technological and organizational variables. “(...) [T]he emerging perspective seems to be valid for many relationships that concern strategy, structure and environment. These relationships also include the relationship between the use of information technology and organizational design” (Van der Heijden, 1995, p. 20). Note that the technological imperative and the organizational imperative are limited forms of the emergent view.

Finally, Schrama (1991), Delehanty (1967) and Robey (1977) concluded that it is possible to distinguish various IT configurations and various organizational configurations, and that organizations have a certain degree of discretion (freedom of choice) in choosing these configurations: there is no deterministic relationship between IT and structure.

The debate on the relationship between IT and organizational parameters is summarized in Figure 2.

Author	Hypothesis
Lee (1965); Whisler (1970); Drucker (1987); Frissen (1989)	IT leads to centralization in organizations.
Meyer (1968); Klatzky (1970); Blau, Falbe, McKinley & Tracy (1976); Gazendam (1993)	IT leads to decentralization in organizations.
Delehanty (1967); Robey (1977); Schrama (1991)	Organizations have a considerable degree of discretion in designing structure and applying IT.
Danziger, Dutton, Kling & Kraemer (1982); Breukel (1996)	There are various consistent combinations of IT and structure.

Figure 2: Summary of the debate over IT and organizational structure

It can be concluded that the relationship between IT and organizational structure has been scrutinized many times, but that theoretical and empirical research has resulted in contradictory findings.

1.2.2 Research on the relationship between ICT and interorganizational coordination

Analogous to the relationship between IT and organizational parameters, a new research theme has emerged recently and is now being discussed thoroughly. The debate concerns itself with the relationship between information and communication technology (ICT) and the emergence of interorganizational relations, or, more specifically, the coordination mechanisms chosen. It is a theme that is especially

relevant since the application of ICT has boomed (see section 1.1.1) and organizations are considering new configurations for their interorganizational relationships (see section 1.1.2).

In a classic article, Malone, Yates and Benjamin (1987) argue that in general, ICT lowers information and coordination costs. Using transaction cost logic¹³, Malone *et al* claim that by using ICT, markets ('electronic brokerage') are favored over hierarchical coordination mechanisms ('electronic integration'). Davenport, Eccles and Prusak restate this claim by hypothesizing that "(...) as organizations make widespread use of information technology, information will flow freely and quickly eliminate hierarchy" (1992, p. 54). Malone, Yates and Benjamin themselves state that "(...) in the long run, the significant additional benefits to buyers possible from the electronic brokerage effect will drive almost all electronic markets toward being unbiased channels for products from many suppliers" (1987, p. 492).

The nature of the claim shows some resemblance to the early claims in the information system discipline regarding the impact of information technology on structural parameters. And, also analogous to the centralization and decentralization theses, conflicting conclusions are drawn from empirical studies. Studies by Brynjolfsson, Malone, Gurbaxani and Kambil (1993), Malone and Rockart (1992) and Ebers (1992) support the markets-over-hierarchies claim.

On the other hand, Steinfield, Kraut and Plummer conclude that "(...) both the theoretical arguments and the empirical evidence lead us to believe that firms will use [ICT] to build tight relationships with their trading partners, rather than to select suppliers on a transaction by transaction basis from a large pool. (...) Our review of the literature shows that both electronic hierarchies and markets have been observed in practice, but the former are, in fact, more commonly observed in business to business networks" (1996, hypertext quotation). The observations by Steinfield, Kraut and Plummer are supported by research findings by Johnston and Lawrence (1988) and Hart and Estrin (1991), who also suggest that ICT can be used to favor more hierarchically based interorganizational forms¹⁴. Furthermore, Steinfield, Kraut and Plummer quote research by Brousseau, who reviewed 26 situations in which two or more organizations exchanged data electronically, finding that most ICTs served to reinforce already existing hierarchical relationships among organizations.

¹³ Transaction cost economics will be explained in chapter three.

¹⁴ Steinfield, Kraut and Plummer remark that the use of the term 'hierarchical' is probably misleading, as it implies an authority relationship between autonomous organizations (which is a contradiction or at least a paradox). However, in chapter three, it is shown that hierarchy can also be based upon commonly agreed upon procedures. In this context, hierarchy is used to suggest that partner organizations are tightly coupled rather than linked only by ephemeral market-like transactions.

Ribbers, Ekering and van Zutphen (1994) argue that a specific use of ICT, namely EDI¹⁵ systems, leads to more hierarchical coordination mechanisms because organizations commit each other to specific standards and working procedures. Steinfield, Kraut and Plummer, however, claim that the more extensively firms used interorganizational networks, the more hierarchical were their relationships with partner organizations, even when using highly open and ubiquitous public data network infrastructures: “(...) even open networks are typically used to support hierarchical relationships among firms” (1996, hypertext quotation).

In addition to the Malone-Yates-Benjamin claim (markets-over-hierarchies) and the Steinfield-Kraut-Plummer claim (hierarchies-over-markets), Clemons, Reddi and Row (1993) have formulated the ‘move-to-the-middle’ hypothesis. Based on evidence from the automobile industries and banking sector, the authors predict that application of ICT will affect production costs and transaction costs in such a way that longer term interorganizational relationships with a smaller set of organizations will appear predominantly.

In an attempt to reconcile contrasting results from various empirical studies, Holland and Lockett remark that ICTs “(...) do not affect directly the evolution of governance structure such as markets or hierarchies, which are instead determined by asset specificity, market complexity and strategic choice. However, [ICT] can affect all of them in some way enabling a much greater flexibility of outcome both in the short and longer terms. (...) In essence, [ICTs] enable organizations to do what they want much more efficiently and flexible” (Holland & Lockett, 1994, p. 409)¹⁶. This thesis is referred to as the ‘anything goes’ explanation. Note that the markets-over-hierarchies, hierarchies-over-markets and move-to-the-middle hypotheses are competing hypotheses whereas the ‘anything-goes’ explanation can supplement any of the three explanatory schemes mentioned above.

¹⁵ EDI (electronic data interchange) is a specific application of ICT.

¹⁶ Holland and Lockett speak of interorganizational information systems instead of ICT or telematics, the terms that we have used thus far. This is a terminological difference which is addressed in section 2.2. Although many definitions of ICT and interorganizational information systems overlap, interorganizational information systems include a knowledge aspect which is absent in most definitions of ICT. For the moment, however, these terms are assumed to be synonymous.

Author	Hypothesis
Steinfeld, Kraut & Plummer (1996); Johnston & Lawrence (1988); Hart & Estrin (1991); Ribbers, Ekering & van Zutphen (1994)	ICT favors hierarchies over markets.
Malone, Yates & Benjamin (1987); Brynjolfsson, Malone, Gurbaxani & Kambil (1993), Malone & Rockart (1992); Ebers (1992)	ICT favors markets over hierarchies.
Holland & Lockett (1994)	ICT can favor any governance structure.
Clemons, Reddi & Row (1993)	ICT enables intermediate governance structures.

Figure 3: Summary of debate over ICT and interorganizational coordination

In Figure 3, the debate over the relationship between ICT and interorganizational coordination is summarized.

Not surprisingly, the research that has generated these contradictory findings has been criticized for a number of reasons, which will be elaborated below.

- Firstly, research has been criticized because of empiricism (or, in this case, more precisely theoretical poverty) and ideological prejudice. Zuurmond (1994) states that many researchers have speculated on the existence of trends and have tried to illustrate (rather than validate) these trends by means of case studies. However, Zuurmond does not illustrate his proposition by mentioning specific research projects and does not refer to the key references in the debate mentioned above, which have a clear theoretical orientation and can hardly be accused of having a ubiquitous ideological orientation.
- Secondly, there is criticism of a more or less technical-methodological nature. This type of criticism states that large quantitative studies especially are based on secondary data (i.e., data that was gathered for other purposes). A traditional disadvantage of such an approach is that secondary data often does not contain the variables one requires, or that the data is not gathered at the appropriate level of analysis. For example, analyses conducted at the industry level do not necessarily speak to the way organizations deploy information technology and telematics (Steinfeld, Kraut and Plummer, 1996).
- Thirdly, and somewhat more fundamentally, is the observation that the application of telematics is also likely to be influenced by pre-existing relationships among organizations (a so-called ‘reinforcement’ hypothesis, see, for example, Danziger, Dutton, Kling & Kraemer [1982]). This explanation, in which the direction of causation in the debate on technological and organizational variables is reversed, is not addressed in many empirical studies.

- Fourthly, there is also criticism of the choice of variables in explanatory models. Steinfield, Kraut and Plummer (1996) emphasize the importance of locus of control in interorganizational information systems and, related to this factor, the deployment of interorganizational information systems by partner organizations as a focal point of research. They state furthermore that these aspects are usually lacking in current research on the relationship between information technology and interorganizational relations.

Here it is necessary to elaborate on the more fundamental reasons for criticism: (1) the criticism of doubt as to the direction of causality and (2) the criticism regarding choice of variables.

The criticism of doubt as to the direction of causality is probably addressed best by proposing an emergent perspective for describing the phenomena under scrutiny (see also section 1.2.1). The emergent perspective states that there is a relationship between variables *in a logical sense*¹⁷, although unilateral causal inferences are not stated (see van den Bosch [1993], Mintzberg [1994] and van der Heijden [1995])¹⁸.

The criticism of doubt regarding the choice of variables, and, more specifically, the neglect of ‘locus of control’ is addressed especially in the literature on information management (for a definition and more complete discussion, refer to chapter two). For now, information management is loosely defined as strategic decision making regarding IT in and between organizations¹⁹.

In the studies mentioned above, it is hypothesized that ICT by itself yields effects. However, it has been proposed that the same type of ICT yields different effects whenever it is subject to different control models, whenever it is put to a different aim (e.g. its functionality is changed), or whenever the architecture that determines how various components are related is changed (Gazendam, 1993). In this line of reasoning, ICT is *malleable*. In fact, the term ICT is no longer used and it is customary to replace it with the term *interorganizational information systems*. As will be explained in section 2.2.2, the term interorganizational information system captures better the fact that technology is always used in a specific organizational context.

According to this view, the decision making that surrounds interorganizational information systems in terms of actors involved and their respective tasks in the development process is far more important than the technology itself. This point of view is adhered to by, for example, George and King (1991), who, with reference to the debate mentioned in section 1.2.1, have emphasized the role of managerial action and decision making. With reference to the debate mentioned in section 1.2.2, Webster

¹⁷ That is, it is assumed that there is a subset of the Cartesian product space over operationalized variables.

¹⁸ For a discussion of ‘consistent’ interorganizational coordination forms, see Alexander (1995).

¹⁹ In section 2.2.3, a more elaborate definition is presented.

(1995a, 1995b) claims that by explaining the debate solely in terms of ICT, “(...) [q]uestions still arise as to how much information is shared, how access is controlled, who is excluded from certain information exchanges, and to whose relative advantage. (...) These issues are subject to management choice rather than technological imperative” (Webster, 1995a, p. 40). Kubicek (1995) also explicitly adheres to this point of view. He states that information technology is still treated as one property and criticizes the technological imperative that is often immediate in the literature. “Again, technology (telecommunications, networks, standards) is supposed to have a great impact. The literature rarely differentiates types of EDI systems, or considers other relevant contextual factors, and there is almost no analysis of the actors involved and the organization of the development process” (Kubicek, 1995, p. 76). Kubicek furthermore hints at differentiation that is possible with respect to *managerial action*. However, Kubicek does not state how this differentiation is achieved (what different kinds of roles exist, what different kinds of organization of the development process exist, etc.).

The emphasis on decision making and managerial action in the field of interorganizational information systems has a number of antecedents in theory and practice. The Dutch Ministry of Interior has published a number of policy documents (BIOS documents) in which the role of managerial action is stressed as a means of improving effectiveness and efficiency in the fulfillment of organizational tasks. In these documents, attention is also given to interorganizational information systems: “[f]or effective (electronic) communication between firm and governmental agencies and between various governmental agencies, not only the technology itself is involved, but communicating partners also have to commit each other to certain agreements”²⁰ (BIOS-3, 1995, p. 50). In the BIOS-3 policy document, it is claimed that it is necessary to draw up agreements (regarding content) with respect to the exchange of structured information. Since 1988, information structure outlines²¹ have been introduced in order to structure information technology within various policy fields: “Information structure outlines must provide a sense of the direction in which information systems within a policy field have to be developed”²² (Algemene Rekenkamer, 1997, p. 13). Furthermore, the idea behind information structure outlines is not specific to governments. In general, the explicit direction of information systems has gained a lot of attention, both by scholars as well as by practitioners.

²⁰ “Voor effectieve (electronische) communicatie tussen het bedrijf en de overheid en tussen overheidsinstanties onderling komt meer om de hoek kijken dan techniek alleen, er moeten ook allerlei afspraken gemaakt worden tussen de communicatiepartners”.

²¹ In Dutch: informatiestructuurschetsen.

²² “Structuurschetsen moeten de richting aangeven, waarin de informatievoorziening binnen een deelgebied zich dient te ontwikkelen”.

However, the attention that is given to information management in theory and practice must not be interpreted as unconditional support for information management in all circumstances. Practical experiences and research activities have demonstrated that information management is not at all a trivial activity. Neither information system research nor experience from practice has provided uncontested evidence that structuring of information systems by means of policy pronouncements or bilateral agreement is working well. In the BIOS-3 policy document, it is stated that information management must receive attention in discussions about organizational effectiveness and efficiency, but also warns not to overestimate this role. In 1997, the Netherlands Court of Audit²³ investigated the effects of managerial action (i.e., what happened to twenty policy fields that were designated as targets for information structure outlines). In fact, such an outline was eventually drafted in only nine policy fields. In practice, these nine outlines were often seen as being too abstract, too limited or one-sided. Furthermore, in many of the cases in which an outline existed, it did not direct the information systems development in the organization, partially due to impediments in existing legislation²⁴.

It is possible, of course, possible to characterize the experiences with information structure outlines as symptoms, signs of resistance of a temporary nature. Breukel (1996) provides criticism of a more fundamental nature on managerial action towards information systems. In his research, Breukel assumed that an explicit, formal, centralized form of information management (called SISP: strategic information systems planning) resulted in an organization's strategic performance through established alignment in an organization²⁵. Breukel rejected the hypothesized positive relationship between the presence of this form of managerial action and alignment in organizations.

Summarizing, the relationship between interorganizational information systems and interorganizational relations is a complex one. The debate on the effects of interorganizational information systems on interorganizational relations yielded divergent results, and therefore the original research design with two variables, ICT and interorganizational coordination, should be adjusted. In their discussion of the debate between ICT and interorganizational coordination, Steinfield, Kraut and Plummer (1996) proposed two possible adjustments.

Firstly, shift the focus to managerial action with respect to information systems rather than focus on the underlying technology in order to meet the criticism of lack of

²³ In Dutch: Algemene Rekenkamer

²⁴ The Chamber of Audit did not investigate effectiveness of information structure outlines. It nonetheless reports that profiles are useful for facilitating deliberation and promoting mutual understanding in a policy field.

²⁵ In fact, the relationship between (1) alignment between IT, structure and strategy and (2) strategic performance was corroborated; the hypothesis that the presence of SISP causes alignment, however, was rejected.

attention to 'locus of control'. This provides the opportunity to follow Breukel's recommendations for further research, e.g., investigating "(...) the possibility of further differentiating SISP" (Breukel, 1996, p. 242). By analyzing "(...) the way in which the decision-making processes take place (who are committed, which items are discussed), and the communication flows that can be detected (who triggers the decision-making process?)" (1996, p. 244) and the way the results of the above-mentioned decision-making processes are stated "in terms of policy statements about IT and the organizational configurations required" (1996, p. 244), various approaches to information management can be distinguished, meeting Kubicek's criticism.

Secondly, unilateral causal inferences between variables are not assumed. Rather, based on the theory of information management and interorganizational relations, combinations of information management approaches and interorganizational coordination can be scrutinized and consistent combinations can be identified.

1.3 Preliminary research goal

The elaboration of the controversy over interorganizational information systems and interorganizational coordination by identifying consistent patterns of information management approaches and types of interorganizational relationships is the core of the motivation of the current study. Although the motivation stems quite directly from the wish to sharpen theoretical constructs in order to be able to contribute to the debate on interorganizational information systems and interorganizational relations, there are also numerous practical considerations in addressing this problem. Nowadays, there are many challenges for EDI systems in public and private firms. Despite the technological advances mentioned in section 1.1.1, initiatives to exchange data often face unexpected and mindboggling resistance. Hopefully, the results of this research can contribute to a better understanding of these phenomena.

In this study, the focus is on interorganizational information systems and how they are managed in specific interorganizational relationships. Therefore, the focus is not on individual organizations but on relations between two or more autonomous organizations. The scrutiny of appropriateness of management approaches in interorganizational relations has not been pursued often but is not new either (see, for example, Alexander [1995], Grandori [1997]). For example, Grijpink (1997) assumes that decision making on what he refers to as value chain computerization and interorganizational characteristics has to be aligned²⁶.

Thus, the level of analysis is not so much the individual worker, group, department or organization with principally clear boundaries, limited relations with others, and a focus on internal efficiency and effectiveness (Konsynski, 1993, p. 111; Homburg & Gazendam, 1997), but rather the level of analysis is the relationship between organizations. In this way, the environmental niche of interorganizational arrangements

²⁶ "Keteninformatisering en coördinatiebehoefte moeten goed op elkaar zijn afgestemd" (Grijpink, 1997, p. 42).

can be examined to determine appropriate information management approaches not only within specific participating organizations but also within the configuration of the interorganizational network as a whole (Levinson, 1994). Using this line of reasoning, emphasis on the organization is replaced by emphasis on the partnership of two or more organizations, including matters of how coordination takes place within interorganizational relations (Cunningham & Tynan, 1993).

In section 1.2, the core argument has been summarized and the motivation of the study has been presented. The objective of this study is to contribute to the theory of information management regarding interorganizational information systems and especially *to attain more insight into combinations of various information management approaches and various types of interorganizational relations*. The outcome desired is thus a theory relating characteristics of information management on the one hand and characteristics of interorganizational relations on the other hand. This theoretical framework may be used in the field of information systems to explain the appropriateness of information management practices in various contingencies. In the field of interorganizational relations and networks of organizations, the framework may be used to indicate which coordination mechanisms are congruous with specific information management approaches.

In the following sections, the research objective will be worked out, eventually into a research design that guides the research activities.

1.4 Research questions

Inspired, in particular, by the debate mentioned in section 1.2.2 and subsequent studies (for example, by Holland & Lockett [1994]), it is necessary to elaborate on the initial relationship between ICT and interorganizational relations, albeit by proposing a number of refinements.

Firstly, 'ICT' will be replaced by the variable 'information management' as the important variable in the research next to 'interorganizational relations'. Information management as a variable provides the opportunity of highlighting the fact that information systems can be deployed differently in different settings, and can be subject to different control models and architectures. Hence, it is probably more appropriate to speak of interorganizational information systems instead of ICTs.

Secondly, it is desirable to avoid the universalistic bias that has been frequent in organizational and interorganizational research (Grandori, 1997) by trying to identify consistent combinations of information management approaches and interorganizational coordination mechanisms. This is achieved by providing an explanation for the appropriateness of various information management approaches in various 'contingent' circumstances: that is, characteristics of interorganizational relations.

This line of reasoning is comparable to, for example, the study of Burns and Stalker (1961). In their study, it is asserted that a 'mechanistic' structure which features strong hierarchical control is consistent with control conditions of task certainty, whereas an

organic structure, featuring loose hierarchical controls, mutual adjustment and widespread use of discretion, initiative taking and participation is consistent with conditions of task uncertainty. Related studies are described by Woodward (1965), Perrow (1970) and Lawrence and Lorsch (1967).

The studies mentioned above have been criticized for a number of reasons.

Firstly, Zuurmond (1994) criticizes the prediction that in complex, turbulent environments, so-called professional organization structures must exist. This is, however, an example of a normative theoretical statement, which is inspired by design-oriented versions of systems theory but which is not representative of the vast majority of empirically-oriented studies.

Secondly, another stream of criticism has developed from the point of view of organizational ecology (Hannan & Freeman, 1977; Donaldson, 1995). The core of the criticism is that organizations are not always capable of adapting to consistent patterns but that they 'survive' when consistency between variables exists or 'die' if there is inconsistency. However, the population-ecology perspective in its most pure form shows some internal inconsistencies (Pélli, Bruggeman, Masuch & Nualláin, 1994), it lacks empirical support (Donaldson, 1995) and in a later version of the population-ecology theory, redesign (as a kind of managerial action) became possible (although it was seen as the start of a new organization [Breukel, 1996]).

Using the above line of reasoning, it is possible to rephrase the research objective as the identification of 'fits' or 'gestalts'²⁷ of information management approaches and various types of interorganizational relations. To reach the research goal, a number of research questions are stated.

The first research question relates to information management, or, more specifically, the differentiation that is possible with respect to information management (see section 1.2.2). It has already been mentioned that, customarily, information management denotes an explicit, formalized and centralized management activity. However, Kubicek has argued for a more differentiated concept of information management (i.e., more decentralized), although he did not indicate how such an information management approach differs from the 'traditional' approach.

1. What approaches to information management for interorganizational information systems can be defined?

The second research question refers to the variety that exists in interorganizational relations. As the Malone-Yates-Benjamin thesis, which served to inspire the current

²⁷ 'Fit' and 'gestalt' are often used synonymously. The word 'fit' is often used in quantitative research, whereas the word 'gestalt' is customarily preferred in qualitative research.

study, focuses on the coordination between organizations as the most important attribute of an interorganizational relationship, this study attempts to explain why various types of coordination between organizations exist.

2. What types of coordination between organizations can be defined?

With research questions one and two, the variables of the research framework are identified, but an explanation of ‘appropriateness’ (in terms of ‘internally consistent patterns of variables’) is not available yet. Such an explanation, in terms of propositions and hypotheses, is addressed in the third research question. On the basis of information management theory, to be discussed in order to answer the first research question, and the theory of interorganizational relations, to be discussed in order to answer the second research question, ‘plausible’ combinations of information management approaches and interorganizational coordination forms are identified. Note that these hypotheses together form the theory of information management regarding interorganizational information systems which is the stated objective of this study.

3. Which hypotheses relating interorganizational information management approaches and characteristics of interorganizational relations can be constructed?

Thus far, research questions hint at the construction of a theory on information management of interorganizational information systems. This emphasis on theory construction is consistent with the research objective (see section 1.3). However, confrontation of hypotheses with empirical data is the ultimate test for any theory. The fourth and last research question addresses the empirical validation of the theory developed from the first three research questions. With this research question, it is possible to investigate if, in practice, strategic decision-making processes are taking place in accordance with the motives identified in information management theory and theories of interorganizational relations, or if the hypotheses identified in research question three should be adapted or even rejected.

4. Is there empirical validation for the hypotheses relating information management approaches and characteristics of interorganizational relations?

This framework is in a way rather eclectic. The attribute ‘eclectic’ signifies that the framework draws on various theoretical perspectives without necessarily integrating them into a grand meta theory. By taking various stances and arguing from a number of different, sometimes even contradictory, perspectives, it will be possible to provide much richer insights, compared to simply arguing from one theoretical position. Moreover, as Schwarzer, Zerbe and Krcmar (1997) note, studies that incorporate both information technology aspects as well as organizational aspects not only highlight the complexity of the research area but also show that it is nearly impossible to find one single theoretical approach that can incorporate all different aspects. It therefore seems

reasonable to develop an eclectic framework. In terms used by Bacharach (1989), the theory hinted at in the research objective is connective rather than transformational, where connectivity refers to the ability of a new theory to bridge the gap between two or more theories and transformation refers to the need to reevaluate the preexisting theories.

Of course, there is a danger that this will bring about an ‘eclectic smattering of theories’ (Van de Ven, Emmett & Koenig, 1974). In chapters two, three, four and especially five, however, it will be shown that it is possible to synthesize a framework that consists of multiple perspectives that nonetheless are grounded in a limited number of theoretical schools of thought. Moreover, the unitary interorganizational theory sought by Van de Ven *et al* either does not exist, is not precise enough or simply has not been able to pass the empirical test until now.

The eclectic framework is confronted with empirical data and may be adapted using the fourth research question. This confrontation takes place in a number of stages. Firstly, the theoretical concepts used are validated by means of studying secondary case material and initial interviews and document analysis of original case material. Secondly, the presumed relationship between concepts, operationalized in variables and indicators, is checked with the empirical data.

The enumeration of research questions sums up *what* is studied, not *how* the investigation takes place. The latter is explained in the following section.

1.5 Research design

1.5.1 Introduction

To indicate *how* research questions are answered (with what strategies, using what methods, etc.), research activities are laid down in a method of research (van der Zwaan, 1990, p. 21) or research design (Yin, 1994). Yin defines a research design as “an action plan for getting from here to there, where ‘here’ may be defined as the initial set of questions to be answered and ‘there’ as some set of conclusions (answers) about the questions” (Yin, 1994, p. 28).

In general, there are many research designs available to organizational scientists. In general, the content and form of the research design to be used is dependent on the research goal specified. In this section, firstly, we will present an overview of various research approaches and of criteria that lead to choosing any of these approaches, and we will argue which research approach suits our research goal. Then, secondly, we will give an overview of various research strategies to be chosen after a research approach has been selected as well as of criteria that can be used to select a research strategy, and the selection of the specific research strategy for our purposes will be explained.

A first distinction that is possible is the distinction between problem solving as a research activity and theory developing and testing as a research activity.

1.5.2 Applied research versus fundamental research

In general, it is possible to distinguish two approaches toward research (van Strien, 1986, p. 19; Swanborn, 1984, p. 127). An applied research approach is primarily aimed at solving real, existing problems in a well-defined, step-by-step manner using theoretical frameworks and models to derive a solution for the problem under scrutiny. The steps to be taken are prescribed by the *regulative cycle* (or the diagnosis-intervention-implementation cycle of the applied research approach). Bosman (1977) has applied the regulative cycle to the design of information systems. He has proposed a number of refinements to the research approach, although he has left the core of the regulative cycle intact.

Phase	Description	Results in...
Problem definition	Perceived discrepancy between an actual and normative situation	Description of actual and desired state
Diagnosis	Formulation of the problem in terms of a theoretical framework	Statements indicating how actual state can be transformed into desired state
Plan	Design of solutions	Proposal for timing and localization of intervention
Intervention	Implementation of the solution proposed	Description of state arrived at after intervention has taken place
Evaluation	Test if gap between actual and normative situation has narrowed	Statements indicating to what extent desired state has been reached

Figure 4: Elements of the regulative cycle

The elements (Figure 4) form a cycle because evaluation of the results of the testing can form the basis of other problem-solving research activities (Figure 5).

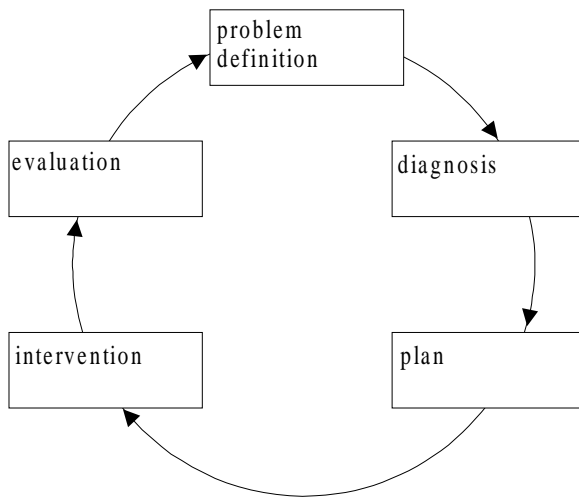


Figure 5: Regulative cycle

However, a fundamentally different cycle is followed when the goal of the research is explaining phenomena by developing a theory. Here, the approach is called the fundamental approach, which is characterized by the *empirical cycle* (Swanborn, 1984, p. 124). The empirical cycle consists of the following elements (Figure 6).

Phase	Description	Results in ...
Observation	Exploration of a phenomenon (previous studies, literature, primary observation)	Indication of relevant concepts, variables
Induction	Design of an exploratory model on the basis of parts of existing theories	Exploratory framework
Deduction	Deduction of testable hypotheses from the explanatory model	Set of hypotheses which together constitute a theory
Testing	Confrontation of hypotheses with empirical data	Statements indicating confirmation / disconfirmation of theory
Evaluation	Rejection, revision or corroboration of the model	Revised theory

Figure 6: Elements of the empirical cycle

Again, the above phases constitute a cycle because rejecting, revising or corroborating an explanatory model can generate new observations and, subsequently, new theory construction and testing (Figure 7). Note that this gradual shaping of theories is very much inspired by the philosophy of science of critical rationalism, in the sense that scientific inquiry is an interplay between knowledge (in the form of theories) and

empirical data. This feature is also adhered to in, for example, Peirce's view on science: in his view, as well as in the critical rationalist view, knowledge in the form of theories is formed in a self-corrective inquiry process, in which the knowledge of previous scholars is inherited and possibly refined. The ultimate source of knowledge, however, is different. In a critical rationalist's view, knowledge is eventually based in theories that explain empirical phenomena. In Peirce's view, this inquiry is at heart a process of free association or creative thinking, or at best the utterance of preference for a hypothesis (out of a set of hypotheses) that explains a phenomenon²⁸. Kuhn and Lakatos have proposed other refinements. Kuhn states that there is no gradual cumulation of knowledge, but that the body of knowledge of science grows by 'scientific revolutions' or paradigm shifts, which makes subsequent theories incommensurable. Lakatos, on the other hand, assumes a sort of 'path dependence' in any scientific community; that is, a theory is rejected only if it has proved to be really untenable (after several refutations of hypotheses) *and* if a better theory is available.

The refinements proposed by Kuhn and Lakatos describe well how science progresses over large periods of time (decades). As the current study does not address such a period of time, these refinements are not taken into account here.

The fundamental approach, guided by the phases of the empirical cycle, tries to contribute to the understanding of phenomena through theory construction. It is the goal of theory construction that distinguishes the empirical cycle from the regulative cycle. In the empirical cycle, by means of improved understanding, knowledge in the form of theories is provided that can be used to analyze problems and to plan actions to improve a problematic situation, *but problem solving is not primary to the fundamental approach.*

In section 1.3, contributing to the theory of information management in interorganizational relations was stated as the research objective of this study. Theory building as an objective indicates a fundamental research question and suggests an empirical cycle to be used in this study.

²⁸ Peirce amends the standard empirical cycle as follows. He discerns abduction, which consists of examining a mass of facts and allowing these facts to suggest a theory; deduction, to deduce from that ideal theory a variety of consequences, and induction, the verification of effects by means of experimentation. Other than redefining some elements of the empirical cycle, however, the addition of an abduction phase does not transcend the induction-deduction-testing phases identified in Figure 6.

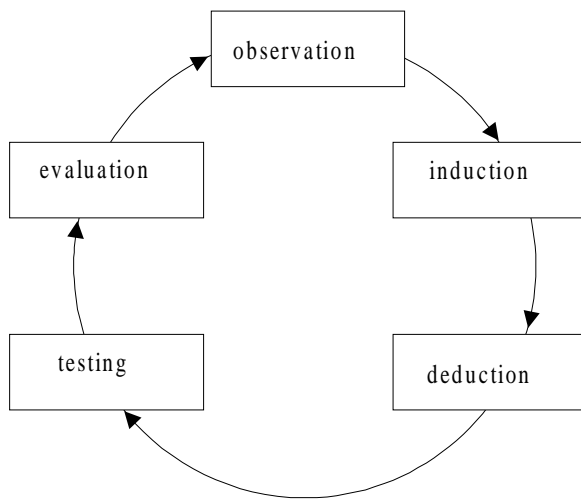


Figure 7: Empirical cycle

1.5.3 Research strategies

Note that the phases identified in Figure 6 and Figure 7 are phases that can be analytically separated but that represent a rather stylized representation of many research endeavors. In practice, the phases of the empirical cycle do not have the same weight in all research activities and they do not always constitute the exact sequence presented in Figure 6 and Figure 7; iterations may frequently occur.

These deviations from the ‘pure’ empirical cycle may be explained because, in various attempts to explain phenomena by developing theories, researchers are confronted with existing theories that are more or less developed. For some phenomena, there are few theories with testable hypotheses available that explain these phenomena. In these cases, the induction and deduction phases may be given more attention and iteration between induction, deduction, testing and evaluation frequently occurs. For example, in such a situation, considerable effort may be spent on, for example, conceptual analysis, and possibly formalization of various fragments of existing theories, in order to provide a basic comprehension of how empirical particulars are related. Gazendam (1993) proposes the CAST method²⁹ to explore and formalize existing theories or fragments of

²⁹ CAST is an acronym for Conceptual Analysis and Specification of organization Theories. CAST is a method to conceptually analyze and formalize organization theories in order to guide the development of knowledge-based decision-support systems (KB-DSS). Although, in the current study, the focus is on theory development rather than on the development of KB-DSSs, the CAST method is considered valuable because it provides guidance in the analysis of (fragments of) theories. The original CAST method consists of a number of steps: (1) summarizing the theory in terms of key concepts, key performance indicators, main hypotheses and reasoning processes; (2) the

theories. In fact, in taking a view on doing research in which theory development is stressed, the exploration (and possibly formalization) of theories may well take up far more energy and time than the gathering and analysis of data.

It is possible to explain occurrences of some phenomena through a full-blown theory. In this case, less energy and time must be devoted to developing testable hypotheses (because hypotheses are often available and well-described); the gathering and analysis of data in these cases often is more elaborate and demanding.

It must be noted, though, that in all research activities, whether based on the wish to develop theory or having theory testing as the research objective, all phases identified in Figure 6 and Figure 7 require attention. Every research activity has an activity involving theoretic inferencing and an activity in which hypotheses are confronted with empirical data.

In the methodological literature, various research strategies to be used within the framework of the empirical cycle have been described (Yin, 1994; Den Hartog & Van Sluijs, 1995; Swanborn, 1984). Figure 8 provides a summary of these research strategies.

specification of an interpretation frame in an object-oriented grammar notation; (3) rule specification; and (4) dynamics specification. As we will describe later on, we will focus on the first phase of the method (see Gazendam [1993] for a more elaborate description of the CAST method).

Research strategy	Description
Case study	Observation of a phenomenon in a natural context, employing various methods to gather information from relevant people, groups or organizations.
Survey	Measurement of a number of variables in many individuals, groups or organizations.
Action research	Manipulation and observation by participating in a real-life setting, for example by participating as a consultant in a project, because of which the researcher is able to access information which would otherwise have remained inaccessible. Eventually, the objective is to provide an explanation (theory) of phenomena.
Ethnographic study	Participative observation in a specific, real-life setting. Here, the emphasis is on the 'Verstehen' (grasping) of phenomena and on doing justice to the context in which a phenomenon takes place. Theory use or theory development is not central.
Simulation	Manipulation of parameters in a model to observe changes in endogenous variables in the model.
Experiment	Measurement of one or more variables in an experimental group and in a control group before and after the experimental group has been exposed to a stimulus.

Figure 8: Fundamental research strategies

Note that in Figure 8, a distinction is made between case study research, action research and the ethnographic study. In other literature, these different research strategies are sometimes subsumed under the heading of case study. However, as has been shown in Figure 8, there are important differences which may influence the selection of these research strategies and, therefore, the distinction is worth mentioning.

There are criteria that can be used to determine the appropriateness of various research strategies. For example, Benbasat, Goldstein and Mead (1987) state that the selection of a research strategy depends on the nature of the research topic and the goal of the research.

A first criterion for the selection of a research strategy is the possibility of manipulating the phenomenon under scrutiny. If the phenomenon is a historical event or if manipulation of a present event is not possible, this leaves out the possibility of choosing the experiment or action research as a research strategy. Simulation may be an alternative to experiments, but only if the original setting can be modeled in a computer model or in a setting in which human actors play the roles of actors in a real-life setting. A second criterion is the nature of the research, and, related to this point, the state of the theory development. If the research is aimed at theory testing, experiments, explanative

case studies or comparative surveys may be used in order to replicate previous empirical studies. However, if the goal of the research is theory development, explorative cases, surveys and simulation may be used to found theoretical statements on empirical data that is more or less coincidental (Breukel, 1996, p. 174).

These two criteria can be used to form a matrix in which research strategies are positioned (Figure 9)³⁰. Note that the positioning of research strategies in the matrix is only a rough indication of the appropriateness of various research strategies. Yin (1994) stresses that there is no (hierarchical) order in research strategies. He opposes the view in which case studies are portrayed as appropriate only for research activities that stress exploration, surveys and ethnographic studies for research activities that emphasize description and experiments for situations in which providing explanations is important. In practice, Yin claims, there are also experiments with an exploratory character and case studies that provide explanations for historical events. So the criteria cannot be applied in a mechanistic way; although each strategy has its own distinctive characteristics, there are large areas of overlap between them and the boundaries between strategies are not always clear and sharp. “No strategy is more appropriate than all others for all research purposes” (Benbasat, Goldstein & Mead, 1987, p. 369).

		Research aim	
		<i>Theory testing</i>	<i>Theory development</i>
Manipulation	<i>Possible</i>	Experiment, simulation	Action research
	<i>Impossible</i>	Survey	(Exploratory) case study

Figure 9: Appropriateness of research strategies

In the present study, it is impossible for the researcher to manipulate real-life information management approaches or characteristics of interorganizational relations. It is not realistic for any organization scientist or information system researcher to propose to an organization to apply multiple information management approaches or to change interorganizational relations with partner organizations. And even if this was realistic, it surely is impossible to implement each of these interventions in similar circumstances. So experimentation is ruled out as a research strategy.

Furthermore, in sections 1.2.1 and 1.2.2, it was concluded that current research on the relationship between interorganizational information systems and interorganizational relations results in contradictory conclusions, which necessitates further theory construction. Therefore, it was stated in section 1.3, that the research objective was to develop theory. In our tentative matrix, for this combination of circumstances, a case study is suggested.

In the current study, we emphasize theory development and conceptual analysis of existing theories and theory fragments, and we use case studies to enrich and possibly refine the theoretical explanation. For the theory development, conceptual analysis is

³⁰ As neither theory use nor theory development is central to ethnographic studies, ethnographic studies cannot be positioned in the matrix.

used according to the first phase of the CAST method,³¹ which emphasizes identification of key concepts, key performance indicators, main hypotheses and reasoning processes.

The choice of the case study in organization science or information system research in order to illustrate and possibly refine theory is not at all an unprecedented one. Because of the properties of absence of possibilities to manipulate and enmeshment of phenomena with contexts, case studies are frequently encountered in the disciplines of organization studies and information systems. Benbasat, Goldstein and Mead (1987) remark that a distinguishing property of the scientific discipline of information systems is that technological change and innovations (termed 'novelty' by Eisenhardt [1989]) occur frequently and that researchers often find themselves trailing behind practitioners in proposing changes or in evaluating methods for developing new systems. Researchers in this area usually learn from practitioners, rather than providing the initial wisdom for these novel ideas. Benbasat, Goldstein and Mead recommend the case study for capturing the knowledge of practitioners and enriching existing theories with this knowledge.

Johnston and Yetton remark: "Case studies permit rich description, through capturing multiple data sources and perspectives (...) It is not surprising then, that such research frequently reveals emergent patterns and trends which inform theory, and thus facilitate theory development" (1996, p. 193; see also Yin [1994]; Swanborn [1984]).

Summarizing, from the initial scrutiny of the literature on interorganizational information systems and interorganizational relations, conflicting conclusions are drawn and therefore, new theory development and sharpening of constructs is required. It is therefore our aim to develop insights and theory on information management of interorganizational information systems. Furthermore, it is impossible for us to manipulate the variables we are investigating. Using the above arguments, the emphasis on theory development through conceptual analysis of existing fragments of theory, and the tentative matrix (Figure 9), an exploratory case study is chosen as a research strategy in order to enrich and possibly refine theory. Moreover, this strategy provides opportunities to learn the state of the art, and to enrich theories using experiences from practice (Benbasat, Goldstein & Mead, 1987), which is especially relevant because of the rapid change in the field of interorganizational information systems.

1.5.4 Research activities

After having selected the case study as the methodology to be used in this research, bearing in mind the restrictions and accentuations mentioned in section 1.5.3, the question remains how this methodology fits the research design (research goal, research questions).

³¹ See footnote 29.

Some authors state that the case study lends itself to theory development by inducing entirely from empirical data ('inductive logic'). For example, Eisenhardt (1989) states that the case study "(...) relies on continuous comparison of data and theory *beginning with data collection*" (Eisenhardt, 1989, p. 534; italics by VH; see also footnote 28). However, a researcher adhering to such a view of the case study runs the risk of 'death by data asphyxiation'. Therefore, a priori specification of constructs and propositions, and possibly variables and hypotheses (Bacharach, 1989) is a prerequisite, and this is only possible through study of existing theory: coherent with the initial order in phases of the empirical cycle.

In this study, the development of these 'prerequisites' is done through conceptual analysis of theories from the disciplines of information systems, economic organization theory and political organization theory, and basic mechanisms are formalized in a mathematical representation. In fact, the larger part of this thesis consists of theory construction through conceptual analysis.

The development of theory is *facilitated* by case-evidence. As the typical case study progresses, some distance is taken from the original empirical cycle: iterations between deduction, induction and testing occur. "[R]esearchers constantly compare theory and data - iterating toward a theory which closely fits the data" (Eisenhardt, 1989, p. 541). This process of theory building through iteration is "(...) the heart of building theory from case studies, but it is both the most difficult and the least codified part of the process" (Eisenhardt, 1989, p. 539). It nevertheless is essential, because "it is the intimate connection [of theory, VH] with empirical reality that permits the development of a testable, relevant, and valid theory" (Eisenhardt, 1989, p. 532).

The iteration of induction and deduction takes place using within-case data as well as cross-case data. Doing this, hypotheses gradually take shape by (1) sharpening of constructs and (2) verifying that the emergent relationships fit with the data (Eisenhardt, 1989). This type of reasoning (termed 'replication' by Yin [1994]³²) especially facilitates theory development because "(...) it forces investigators to go beyond initial impressions" (Eisenhardt, 1989, p. 541). In the literature on case study methodology (Yin, 1994; Patton, 1990; Eisenhardt, 1989; Benbasat, Goldstein & Mead, 1987; van Strien, 1986; Swanborn, 1984), various ways to strengthen the case study design are presented. Firstly, Eisenhardt comments: "The research team must judge the strength and consistency of relationships within and across cases and also fully display the evidence and procedures when the findings are published, so that readers may apply their own standards" (1989, p. 544). This is, of course, in some ways rather trivial and applies to all scientific inquiry. Secondly and more importantly, Denzin (1978, in:

³² This logic of *replication* (Yin, 1994) differs from the logic in theory testing research because in theory testing research, each hypothesis is examined for aggregate cases, not individual cases as in theory building research. An advantage is that the latter provides the opportunity to refine and extend the theory. A disadvantage is that theory building using this kind of logic is more or less judgmental.

Patton, 1990) mentions that an important way to strengthen a study design is through triangulation. He has identified four basic types of triangulation.

- Data triangulation: the utilization of various sources of data, either documents via document analysis, human informants through interviews, etc.;
- Investigator triangulation: the utilization of various researchers;
- Theory triangulation: the utilization of various theoretical perspectives in the research;
- Methodology triangulation: the utilization of various methodologies (experiments, surveys, case studies) in the research.

In general, the investigation of the alignment between information management approaches and interorganizational characteristics takes place according to two lines of reasoning.

- There are multiple cases included in the study, so there are more combinations of *information management approach* and *types of interorganizational relations* to be analyzed, which enables *replication* of findings between cases.
- If possible, individual cases are studied retrospectively for their history, i.e. how information management approaches and interorganizational characteristics have evolved over time. This also provides opportunities to replicate findings within cases (over time).

Unfortunately, it proved not to be possible to employ investigator triangulation or methodology triangulation. Investigator triangulation was impossible because of the fact that this research, like many research projects, is a doctoral dissertation research project for one researcher. It was therefore impossible to safeguard ‘concurrent’ investigator triangulation. Possibly follow-up research activities may, over time, safeguard investigator triangulation.

Methodology triangulation proved to be impossible because, in reference to section 1.5.3, it has been argued that the research strategy to be used is dependent on the possibility of manipulation of the subject under scrutiny and the research objective (theory development versus theory testing). As was argued in section 1.5.3, in this research project it turned out to be impossible to create an experimental setting and the research objective was to develop rather than to test theory. This combination of characteristics suggests the use of a research strategy out of the bottom right cell of Figure 9 and this cell contains only one research strategy. Therefore, pursuing methodology triangulation proved not to be possible in the current study.

However, considerable effort has been spent on stressing theory triangulation and data triangulation. Employing the eclectic framework has safeguarded theory triangulation (see section 1.4). Data triangulation has been safeguarded by explicitly interviewing various stakeholders who had been selected on theoretical grounds, and by studying existing documents. The latter proved to be especially important in pursuing the second line of reasoning in the research (the historical analysis of cases).

Overall, the empirical study can be accused of abiding to a relatively positivist point of view, as distinct from ethnographic or interpretivist (Eisenhardt, 1989). The latter typically focuses on describing and interpreting the meaning of behavior within particular contexts. In our research, the focus is on developing theory, which eventually can be tested and potentially generalized across organizations that use interorganizational information systems.

1.6 Thesis outline

In the preceding sections, the variables of interest were indicated and the research goal and research questions were formulated. Moreover, in section 1.5, a research design was chosen. The remainder of the dissertation will answer the research questions according to the strategy that was explained in section 1.4. The structure of the dissertation is depicted in Figure 10.

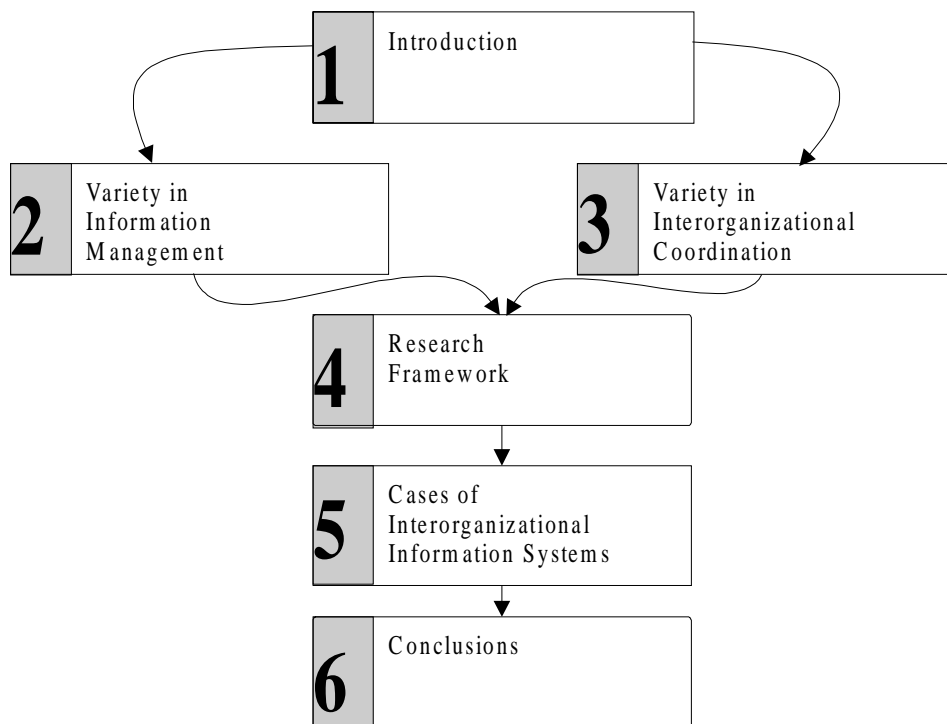


Figure 10: Structure of the thesis

The thesis has two parts: a theoretical part and an empirical part. In chapters two and three, elements of the theoretical framework are documented from two different angles: from the point of view of information management (research question one) and from the perspective of interorganizational relations (research question two). Chapters two and three consist of reviews of existing literature on information management and interorganizational relations, respectively, including development of theory, comments,

criticism and illustrations that have been mentioned. Combination of insights from these angles is postponed until chapter four. Here, elements are synthesized into a theoretical framework and the research objective is reformulated (research question three). Chapter five provides results that illustrate the proposed mechanisms in an empirical setting (research question four). In chapter six, the conclusions with regard to the theoretical framework are summarized and recommendations for practice and further research are provided.

In addition to the graphical depiction of the structure of the thesis (Figure 10), the contributions of the various chapters are summarized below (Figure 11).

Chapter	Title	Research question addressed	Purpose	Output
1	Introduction	-	Introduction of the subject	Preliminary research goal
2	Variety in Information Management	1	Explore IS&IM concepts and constructs	Description and definition of information management
3	Variety in Interorganizational Coordination	2	Explore interorganizational concepts and constructs	Description and definition of interorganizational relations
4	The Research Model	3	Synthesize research framework	Research framework, research goal, propositions and hypotheses
5	Cases of Interorganizational Information Systems	4	Provide empirical material to test and develop framework	Application of framework to real world situations
6	Conclusions	[all]	Draw conclusions based on framework and empirical test and possibly revise framework	Conclusions, recommendations, suggestions for further research

Figure 11: Contents of chapters (summary)

