Organizing for Competitiveness

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PhD-series in General Management / 17

Eburon

ORGANIZING FOR COMPETITIVENESS

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(Concurreren door organiseren)

PROEFSCHRIFT

TER VERKRIJGING VAN DE GRAAD VAN DOCTOR
AAN DE ERASMUS UNIVERSITEIT ROTTERDAM
OP GEZAG VAN DE RECTOR MAGNIFICUS
PROF.DR P.W.C. AKKERMANS M.A.
EN VOLGENS BESLUIT VAN HET COLLEGE VOOR PROMOTIES

DE OPENBARE VERDEDIGING ZAL PLAATSVINDEN OP
DONDERDAG 25 JANUARI 1996 OM 16.00 UUR

DOOR

ADRIANUS PIETER DE MAN

GEBOREN TE DIRKSLAND

Promotiecommissie

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CIP-GEGEVENS KONINKLIJKE BIBLIOTHEEK, DEN HAAG

Man, A.P. de

Organizing for competitiveness / door A.P. de Man.
- Delft : Eburon
Verschenen als proefschrift Erasmus Universiteit Rotterdam, 1996.
– Met lit. opg. – Met samenvatting in het Nederlands.
NUGI 681
Trefw.: strategie, organisatorische innovatie, Fokker, Europese distributie

Lay-out: Wil Geurtsen

PhD series in General Management nr 17, Rotterdam School of Management

Eburon Publishers
P.O. Box 2867
2611 CW Delft

ISBN 90-5166-489-3

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Introduction: Organizing for competitiveness

"Truly, among man's innovations, the use of organization to accomplish his ends is among both his greatest and his earliest", Arrow (1971, p. 224) observed. Since man first invented it, organization has developed towards an ever increasing complexity and has come to dominate many aspects of human life. In the course of time, ways of organizing have not only become more complex, but also more varied. Different forms of organization have competed and still do compete with each other with alternating degrees of success. The study of organizational forms has however been limited to the analysis of the efficiency of *existing* forms, while the way in which *new* forms emerge has received little attention. Likewise, "organizational design tools...are focused on the comparison and choice between known alternative organizational forms rather than focusing on how to develop these alternatives" (Grandori, 1993, p. 1). Questions like (Grandori, 1993):

- are there common logical features in organizational innovations;
- how do they emerge and do they use existing knowledge;
- how are possible organizational solutions tested;
- can guidelines be developed on how to create new organizational forms (can the process be rationalized);

have not yet received much attention. Insight in the process of development of new forms can eventually contribute to an increased managerial control over organizational innovation. Unilever's former CEO for example, stated that the transnational structure inside Unilever developed by means of trial and error (Maljers, 1992), which may suggest that the managerial control over organizational innovation is limited. The question is whether a new organizational form necessarily develops in this way or whether the process of organizational innovation can be run more effectively. The limited amount of theory dealing with organizational innovation however, prohibits us from answering this question. Quite some fundamental research is required before it can be answered. Therefore this study will be theory-building and give a detailed look into the process of organizational innovation. The core research question is:

What are the determinants of organizational innovation?

In order to answer this question, the process of organizational innovation will be described as being subject to determinants inside the firm ("inside-out") and outside the firm ("outside-in"). It will be shown that organizational innovation is not a clear unidirectional process, but a process of search and trial and error, on which many determinants have different impacts. "Causes of change can be endogenous or exogenous" (Pennings, 1995, p. 11, translation APdM). Bartlett and Ghoshal (1993, p. 43) also describe organizational innovation as arising from "emerging internal and external environmental demands". In figure I.1 this distinction can be traced in the terminology of outside-in (conditions in the business environment influencing firm behavior) and inside-out (firm specific conditions as an influencing factor). Winter (1990) refers to this difference as the genotype-phenotype distinction: variations among organizations are partly a reflection of the different environments they have encountered and partly a reflection of inherited characteristics. Figure I.1 provides a basic analytical schema for research into organizational innovation, which enables research to take place that is both historically contingent (in the inside-out approach) and context dependent (in the outside-in approach). Thereby it begins to make progress in a research direction pointed at by Powell (1990, p. 323), who stated that a combination of these two perspectives is a prerequisite for meaningful research into organizational forms.

Figure I.1 An analytical schema of organizational innovation

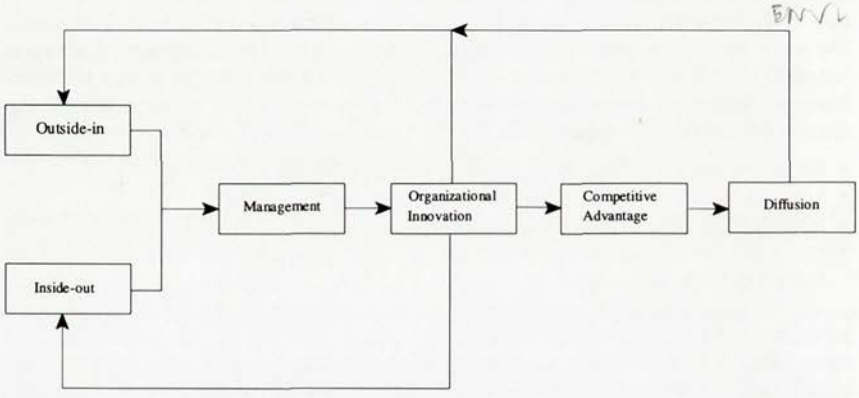


Figure I.1 shows this graphically: elements of the business environment together with firm specific conditions determine the way in which management innovates in the organization structure. The resulting organizational innovation contributes to a competitive advantage. Competitors observing this may want to emulate the innovation so that diffusion of the new organizational form takes place. As to the role of management it is assumed that it initiates and guides organizational innovation. As stated above, little is known about the correct way to manage

organizational innovation and consequently detailed ideas about management cannot yet be presented.

There are different feedback loops. Firstly, the organizational innovation will alter the firm specific conditions, like the organizational structure and the balance of power. Next, the innovation may alter the environment. It can for instance influence the competitive process to a considerable degree, change the innovator's network or create new demands from clients. The third important feedback loop is the one from diffusion to the environment. When more firms adopt the new organizational form this means that the original innovator will gradually lose competitive advantage. As differences between firms are the source of competitiveness (Porter, 1985) and in the process of diffusion these differences diminish, the competitive advantage of the innovating firm will decrease. The change in competitive position of the competitors brought about by the diffusion of the organizational innovation is an integral part of the business environment of the innovator. The diffusion of forms can also change the coalitions against which the innovator has to compete.

The basic analytical schema as presented in figure I.1 is taken as a point of departure in studying organizational innovation. The process of organizational innovation will be described as one in which different determinants shaping organizational form play a role. In Pelikan's words: "While traditional analysis assumes organizational structures to be exogenously given, the main feature of the suggested approach is to recognize them as endogenously formed" (Pelikan, 1987, p. 30).

Point of departure of this study is that new organizational forms can be viewed as innovations. For as far as new organizational forms have been studied, this has normally been done by making use of organization theory. Here, it was assumed that by applying innovation theory to organizational issues, new insights in the development of new organizational forms can be obtained. This choice for innovation theory also serves as a guide in narrowing down the number of determinants of organizational innovation to be looked at. In choosing the relevant variables to be studied in the inside-out and outside-in perspective, innovation theory will be taken as a guide.

The relevance of the research question formulated above, is shown in a discussion of two approaches to competitiveness in chapter 1. The role innovation plays in creating competitive advantage will be analyzed in that chapter. The concept of innovation used in the larger part of current theorizing on competitiveness, is however a limited one in that it normally excludes innovations of a non-technological nature. That is why the first chapter provides the background for an analysis of *organizational* innovation: the emergence of new organizational forms. It will show that organizational innovations can contribute to sustainable competitive advantages on both a firm and a national level. Hence, research into the way new forms of organization come into existence is relevant and can contribute to an increased understanding of shifts in competitiveness.

In order to be able to answer the research question, it needs to be ascertained what exactly organizational innovations are. Chapter 2 provides a definition of

organizational innovation, which includes not only *intra*-organizational innovations but also *inter*organizational innovations. The latter ones are new organizational forms aimed at improving the coordination between organizations (like networks and strategic alliances). The same chapter also proposes to describe organizational innovations in terms of changes in the activities and linkages (coordination mechanisms) of an organization.

Once the key concept is defined, a review of literature in chapter 3 will show which authors have contributed to the inside-out and the outside-in perspective. Several contributions to these two perspectives have been made, but no integrated framework for studying organizational innovation has emerged which takes both these perspectives into account. Above that the pluriformity of organizational forms studied is often limited to either intra- or interorganizational forms, while both should be incorporated in a theory of organizational innovation. Finally, little attention has been given to the role of competitive advantage in organizational innovation. By means of using a combination of innovation and strategy theory these disadvantages can be remedied.

Chapter 4 presents a definition of the inside-out perspective by making use of theories on technological innovation and recent developments in strategy literature, viz. the resource based view of the firm. The proposition will be advanced that organizational innovation is a path dependent process, which next to change exhibits continuity as well: new organizational forms develop out of their precursors by means of routine-like changes. The capabilities, resources and routines in place in individual organizations steer the development of organizational form in a certain direction. The history of the organization matters a great deal in its current way of working. This conclusion matches the ideas on innovation put forth in the first chapter.

The remaining question is then whether, how and why different determinants in the business environment influence organizational innovation. In chapter 5 two determinants (taken from Porter's (1990a) diamond: related and supporting industries and demand) will be looked at specifically. These determinants are chosen because they have been defined in innovation literature. Regarding interfirm relations the proposition will be advanced that, contrary to the case of technological innovation, long-term interfirm relations do not stimulate organizational innovation, but may be a counteracting force instead. Finally, an analysis of demand changes and their influence on organizational innovation will lead to the proposition that both qualitative and quantitative changes in demand stimulate organizational innovation. Increased volatility of demand has in the past been accommodated by a loosening of organizational principles to the benefit of market-like principles, rather than with attempts to exercise increased control over a larger number of activities in the value chain.

In the chapters 6, 7 and 8 empirical material is presented, which illustrates the propositions. Existing empirical material is reviewed in chapter 6. Chapter 7 and 8 present more detailed cases in which organizational innovations are tracked in the aircraft industry (Fokker Aircraft) and the distribution sector (in the Port of Rotterdam). Interestingly, most of these innovations have interorganizational

consequences thus confirming the relevance of incorporating interorganizational forms in the definition of organizational innovation.

Finally, chapter 9 summarizes, concludes and provides questions for further research. The general picture on the determinants of organizational innovation emerging from this study is the following. New organizational forms develop in the course of time in a process in which existing organizational forms are replaced by strategically superior (but by no means perfect) ones. The process is path dependent because firm specificities on one point in time determine those in the subsequent periods. It also is characterized by trial and error: the right solution to an organizational problem is seldom found at once, but has to be searched for. Sometimes unexpected consequences of a new way of working become evident, which have to be remedied.

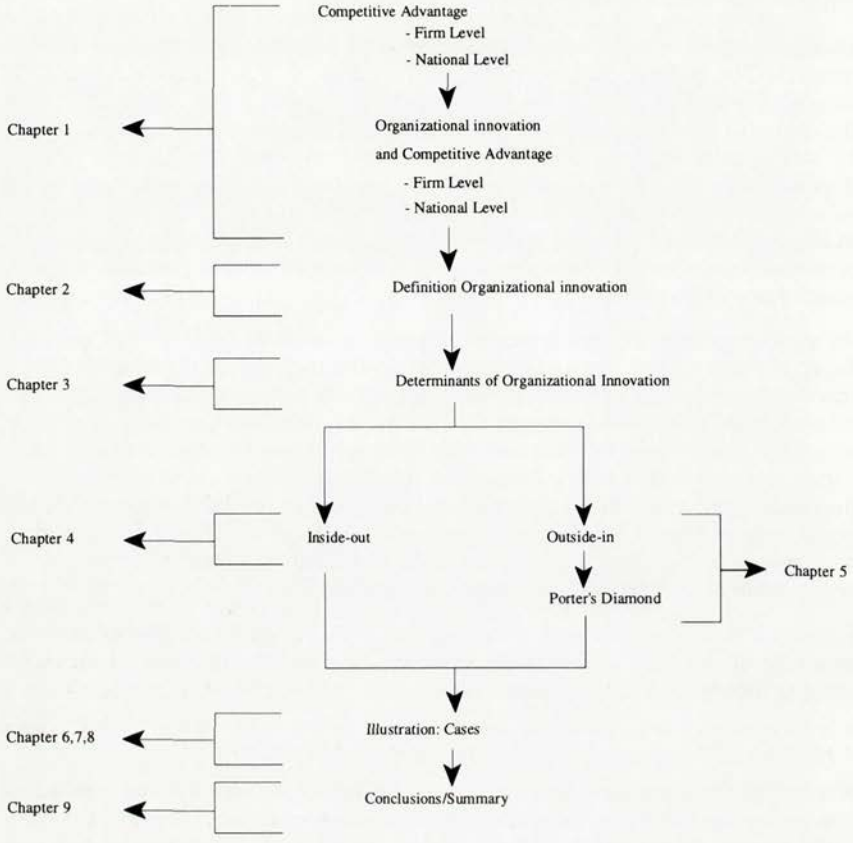
At various points the environment impacts upon this development as well. Especially the role of demand is noteworthy: the majority of the organizational innovations studied can be explained by changes in demand. Interorganizational relationships have some elements in them which limit the possibility for organizational innovation. At the same time however, when an organizational innovation emerges in a network these same forces can enhance its sustainability, as they reduce the possibility for emulation. Briefly, the forces inside and outside the organization guide organizational innovation in a certain direction. Historical contingence and context dependence make it difficult to observe the process of organizational innovation and reduce its imitability.

Figure I.1 is worked through from right till left. Figure I.2 presents the basic structure of the book. This design emanates in the following contributions to existing theory made by this research:

- it focuses on the *dynamics* of organizational forms, whereas existing theories have mainly used comparative static methods;
- it shows the possibility and importance of using *innovation theory* instead of organization theory to describe and analyze new organizational forms. Limiting the concept of innovation to technological innovation neglects the breadth and scope of innovative activity;
- it incorporates both *inter- and intra*-organizational forms, while most research focuses on either one of these. Inter- and intra-organizational forms do not require a different set of tools and analyses, but can be studied by the same set of concepts.

If effective managerial guidelines are to be developed, these conclusions should be taken into account. Likewise, further theoretical research into organizational innovation should include these findings.

Figure I.2 General structure of the book



1

On competitiveness and organizational innovation

1.1 *Introduction*

In the debates on firm and country competitiveness attention has increasingly been directed towards the role of innovation in creating and maintaining superior performance. In this chapter a specific kind of innovation will be studied, namely organizational innovations (new organizational forms). As a basis for discussing this subject, section 1.2 will describe the competitive process as one in which a constant ebb and flow of innovations enhances the dynamics of competition. At the same time this section will prepare the ground for the later chapters in which innovation theory will be used to study new organizational forms. In order to clarify the nature of competition with innovations (Schumpeterian competition) this way of competing is contrasted with competition on cost.

To show that organizational innovation plays a remarkable role in strengthening the dynamics of competition, the sections 1.3 till 1.6 will review the impact of new organizational forms on the competitive success of firms and countries. Not only the competitive advantages grounded in organizational innovations will be analysed (in sections 1.3 and 1.4), but also their sustainability (in sections 1.5 and 1.6).

1.2 *On cost and innovation*

1.2.1 The competitiveness debate: two approaches

The rise and fall of nations can be explained from many different historical perspectives: political, economic and military considerations have figured prominently as explanatory variables in historical studies into changing power balances (e.g. Kennedy, 1987; North and Thomas, 1973; Olson, 1982). Recent research in competitiveness has also incorporated a historical perspective looking at a wide range of variables to explain a nations competitive advantage (e.g. Nelson (ed.), 1993; Porter, 1990a). Behind these studies, lies the central idea that innovation is

more important for competitiveness than the cost of products and the mere availability of production factors. More than competing on cost based on an abundant presence of production factors, competition on innovation is believed to determine the long-run competitiveness of nations.

These ideas run counter to the dominant tradition in the field of economic competitiveness which has largely maintained its focus on competition on cost. This tradition, led by neo-classical economists, usually studies national differences in growth, international trade and development by pointing at differences in factor endowments (see e.g. Denison, 1970; Krugman and Obstfeld, 1988). The keyword in understanding country performance in this line of reasoning is comparative advantage. The relative abundance of production factors determines a countries' comparative cost advantage and thereby, among others, patterns of international trade.

The criticism on this view has been steadily increasing. Porter (1990a, pp. 1-30) brings together some of these critiques and forcefully argues in favour of taking a broader view on competitiveness. Constraining premisses and limited empirical support are two basic critiques of the neo-classical comparative advantage approach. In order to get a more complete picture of shifting national competitiveness qualitative studies seem to be a useful supplement to the mainly quantitative approach of neo-classical economics (Dertouzos, Lester and Solow, 1989). As a reaction to and extension of the dominant neo-classical paradigm, the evolutionary view of economics has emerged, which has the study of innovation as its main topic (Nelson and Winter, 1982; Dosi et al., 1988). The focus of evolutionary economics is no longer exclusively at resource endowments, instead it has shifted towards the emergence and diffusion of innovations and their impact on the competitiveness of nations. Not the static resource endowments are subject of study, but the way superior competitive positions are created and destroyed by means of innovations. In this sense competition is seen as dynamic: innovations follow each other in time, making and breaking competitive positions.

The essential difference with the neo-classical position is that in the evolutionary perspective innovations enable a country to make better use of the existing resource base and thereby strengthen the competitive position of that country. The concept of resources in evolutionary economics then, is considerably larger than that in neo-classical economics: in the former approach resources can be created and upgraded and knowledge has to play an important role in that process. Created (or advanced) production factors (for example an educated workforce) are difficult to imitate and can provide a country with a sustainable competitive advantage. Summarizing (Best, 1990, p. 187-189): the study of *comparative* advantage (in which static resource endowments eventually determine the outcome of the competitive process) is replaced by the study of *competitive* advantage (in which the actions of innovators change the rules of the competitive game). The differences between these two approaches are not merely theoretical, but have important and often contradictory policy implications as well.

So far the national level has been discussed. But also at lower levels of analysis like the firm level, the attention is increasingly directed at dynamic competition and innovation. As barriers to trade diminish and international competition is

strengthened firms are no longer secure behind artificial barriers to competition. Instead every competitive position can be destroyed by means of an innovation introduced by a competitor. In a world of dynamic competition "input costs are neutralized as a competitive advantage and scale economies are continually vulnerable to new ways of doing things" (Porter, 1994). A competitive advantage which is exclusively based on the low cost of production inputs will therefore not be sustainable anymore. On the contrary, it is the constant renewal of products, processes, markets and organization, which enables companies to stay ahead of competition. The extreme case of this is the case of hypercompetition (D'Aveni, 1994), in which competitive advantages are constantly being challenged. For firms this poses the problem of how to innovate faster and better. The next section will provide an analysis of the theories lying behind the two models of comparative and competitive advantage which aims to provide a background for the analysis of innovation provided in the later chapters.

1.2.2 Comparative meets competitive: limitations in the comparative approach

Some differences between the two approaches of comparative and competitive advantage can be found in table 1.1. Several other models of competition can be defined (like Barney, 1986b; Foss, 1994), yet most of these can be related to the two basic approaches outlined below. It has traditionally been the most severe criticism on theories of comparative advantage that they have not been able to incorporate the phenomenon of innovation. Lately however, Romer (1990) and Grossman and Helpman (1991) have made progress in incorporating knowledge and innovation in neo-classical models. The theoretical resilience of the neo-classical paradigm therefore seems to be impressive, but despite these contributions to the theory of comparative advantage, there are still quite some drawbacks to the theory. Most importantly, the concept of innovation is seriously flawed. The innovative process is not analysed and the fact that innovations are not static blueprints but usually are subject to change in the course of their diffusion (Clark, 1987), is not taken up (compare for example, Grossman and Helpman's (1991) conception of innovation with Dosi, Pavitt and Soete's (1990)). Similarly, the consequences of diffusion of innovation for competitiveness are not analysed.

Instead of the emphasis on the availability of production factors, the competitive advantage approach highlights innovation as the explanatory variable behind competitiveness. Some studies show for instance, that in countries in which most important resources are lacking, a competitive advantage may still emerge. Selective factor disadvantages may provide an impetus for innovations, which may become the foundations of a competitive position. The Dutch flower industry is the quintessential example here (Porter, 1990a). Despite disadvantageous conditions in the climate, the Netherlands holds over 60% of the world market of cut flowers, among others because of innovations in warehouse horticulture (Jacobs, Boekholt, Zegveld, 1990).

Table 1.1 Differences between theories on comparative advantage and competitive advantage

	Comparative Advantage	Competitive Advantage
Theoretical differences	• Relative abundance of production factors	• Innovativeness
	• Firm as a production function	• Firm as a unique bundle of resources
	• (Bounded) rationality	• Search/routines
	• Equilibrium-analysis/Static efficiency	• Non-equilibrium analysis/Dynamic improvement
Intellectual roots	• Heckscher • Ohlin • Ricardo • Samuelson	• Alchian • Penrose • Schumpeter
Recent contributors	• Grossman • Krugman • Romer	• Kogut • Nelson • Porter • Soete

Source: Extension of De Man (1995).

Incorporation of the concept of innovation in theories of comparative advantage is hampered by the fact that these theories do not pay attention to firm differences. In the comparative advantage approach, firms are conceptualized as production functions (Seth and Thomas, 1994) that merely transform the production factors into homogeneous goods. The competitive approach on the other hand conceptualizes the firm as a unique bundle of resources. In this view every firm is different and therefore able to produce different products and to innovate. Firm discretionary behavior is an integral part of the competitive advantage perspective, whereas in the comparative advantage perspective it is notably absent (Nelson, 1992).

Some elements of firm differences have been incorporated in neo-classical theory. In international trade theory, Krugman ed. (1986) loosened the assumptions of perfectly competitive markets and diminishing returns and in doing so, has made an important extension to the neo-classical theory of international trade. Krugman points out that strategic trade policies aimed at protecting industries in which a learning curve and economies of scale are present, may theoretically benefit a country. Even though the beneficial effects of strategic trade policies have been shown to be limited (Helpman and Krugman, 1989), the incorporation of economies of learning and scale does stress some firm differences, albeit not necessarily ones that are unique to the companies possessing them. Moreover, the examples given in Krugman ed. (1986) are more related to industry specificities than firm specificities.

According to the competitive advantage approach, firm differences are embedded in the firm's history. The way in which the firm has searched for solutions to problems in the past, determines the way in which a company now functions.

Nelson and Winter (1982) point to the existence of such routines, that pose cognitive and historical limitations to the process of solving problems. In the comparative advantage approach none of these limits are present. The (bounded) rationality assumption it subscribes to, is largely a-historical. It assumes decision makers are able to act without the historical constraints, set by previous decisions and investments. The theory of the firm lying behind ideas on competitiveness is not irrelevant, as all theories usually stress that country competitiveness as such does not exist, but is rooted in firm behavior. As a result the conception of the firm lying behind ideas on competitiveness, influences the policies prescribed in different theories (see De Man, 1995; Jacobs and De Man (1995a,b) for an overview of governmental policy and strategy guidelines related to the comparative vs. competitive approach).

Finally, the competitive advantage approach is not concerned with the way equilibrium in economies is reached but focusses on the reasons why non-equilibrium occurs. The use of tacit knowledge for instance can enable a company to isolate itself from the forces of competition, thus preventing an equilibrium from establishing itself. Neo-classical theorizing on comparative advantage still uses equilibrium theorizing as a tool. In the latter approach, the attention for dynamic improvement is obscured by the analysis of static efficiency (Schumpeter, 1942; Hayek, 1945; Porter, 1990b). The focus is more on the efficient use of existing production factors within current possibilities, than on the analysis of the development of new products and production methods.

The limitations of the comparative advantage approach, specifically with regard to the conception of innovation, have spawned the different literature on competitive advantage in which innovation is put central next to an emphasis on firm level processes. These studies have dealt with issues like national systems of innovation (Lundvall, 1988; Nelson (ed.), 1993), innovation enhancing governmental policy (Branscomb, 1992), the determinants of innovation (Porter, 1990a) and theoretical analysis of innovation (Nelson and Winter, 1982). There is ample room for further research in this area and that is why this stream of thought is taken as the background against which the current study is conducted.

1.2.3 Competitiveness on the firm and national level

Neither of the two approaches (comparative or competitive) uses the term of national competitive advantage as if it is a separate characteristic of a country. Indeed, Krugman (1994) and Krugman and Lawrence (1994) forcefully and rightly reject such a notion of national competitiveness in the sense of nation competing against nation (e.g. as used by Reich, 1991). Instead national competitiveness should be seen as rooted in firm competitiveness. Briefly stated: firms in a country exhibit similar characteristics, which foreign firms do not posses. When these national characteristics lead to a competitive advantage this can be called a "national" competitive advantage.

For example: innovations can bring a firm a sustainable competitive advantage when competitors are not able to replicate that innovation. In section 1.6, it will be shown that innovations often do spread and that they spread faster within a

country than between countries (Kogut, 1991). Firms in a country may therefore implement similar innovations, which constitute a country specific element as foreign competitors do not possess these innovations. If these innovations lead to an increased competitiveness of the firms of that country in comparison to those of foreign countries, this can be called a "national" competitive advantage (Kogut, 1991; De Man, 1995). This is the sense in which the concept of national competitiveness will be used below.

Hence, national competitive advantage refers to the phenomenon that firms in a country implement similar innovations which increase their competitiveness vis-à-vis their competitors in other countries, because innovations spread faster within country borders than across. It follows that national competitiveness is always rooted in the behavior of firms. These firms compete nationally and internationally with their rivals abroad: "Firms compete in industries, not nations" (Porter, 1990a, p. 619). As a result of the important role played by firms in national competitiveness, the level of analysis in this research is the firm.

1.2.4 Innovation: technological and organizational

The literature on competitiveness and innovation has mainly focussed on technological innovation. Different studies have been conducted into the nature and impact of product and process innovations. The knowledge of technological innovation has accumulated (for an overview see Dosi et al., 1988). Much less emphasis has been put on the process of organizational innovation (new organizational forms) and its impact on country and firm competitiveness, even though this was one of the five kinds of innovation identified by Schumpeter as far back as 1911. Nonetheless, the link between competitiveness and organizational innovation has rarely been researched consistently and explicitly (Kogut ed., 1993, makes a step in that direction) even though the role of new organizational forms has been pointed at in individual studies.

There are reasons why it may be fruitful to extend the focus on technology. First of all the diffusion of technological innovation seems to progress with increasing speed. This means that a competitive advantage built on a technology may not be sustainable. The ability to innovate continuously may be much more important and this is partly determined by organizational aspects. Moreover, organizational structures are hard to change, so that they may have an impact over a long time period. Secondly, as pointed out above, firm differences are important in a competitive advantage perspective. To limit these differences à priori to technological capabilities would be one-sided. A focus on organizational innovation may provide a complementary account of the relation between innovation and competitive advantage, thereby simultaneously doing justice to the breadth and scope of innovative activity. Some differences between technological and organizational innovation will be discussed in section 2.2.

Williamson (1975, p. 193) identifies three reasons for the limited attention new organizational forms have had. Firstly, the economic significance of organizational innovations is difficult to assess. It is usually hard to separate the impact of organizational renewal from other variables contributing to firm success.

Secondly, it is not easy to separate opportunistic, unimportant changes in organizational structure from fundamental ones. Finally, organizational innovations are conceptually less tractable because good definitions and analytical tools describing new organizational forms, are lacking. Consequently, they have not had much attention in research. There is nevertheless an increasing branch of literature dealing not only with the analysis of new organizational forms, but with their competitive impact as well.

If organizational innovations are important, the question becomes imperative how they come into being. The answer to this question is not just theoretically interesting, but may also provide clues as to what kind of policies (governmental and managerial) may stimulate the emergence and diffusion of new organizational forms. Knowledge of the factors stimulating and inhibiting organizational innovation is still rudimentary, so that further developments in this field are required.

Before addressing this question of the emergence of new organizational forms in detail, the relevance of it will be shown. This will be done in the ensuing sections by reviewing literature on the influence of organizational innovations on sustainable competitiveness of firms and nations.

1.3 *The competitive impact of organizational innovation on a firm level*

1.3.1 Theory

The capability to organize is of great importance for firm performance (Kogut and Zander, 1992; Baden-Fuller and Stopford, 1992). In economic theory, organization has been defined as an important factor in production. Changing the organizational relations may enhance efficiency by making better use of resources. The amount of economic literature dealing with this subject should however not be overestimated. The reasons for the absence in economic theory of work studying organizational structures are that they have been considered unimportant, not separable from the role of the entrepreneur, not measurable, not lasting (unstable, changeable), and varying little from one firm to another (Tomer, 1987). Tomer maintains that these beliefs are not tenable and provides an interesting account of the way organization can enhance a firm's performance. Based on Leibenstein's (1966) work on X-efficiency, Tomer shows how an increase in what he calls "organizational capital" represents an outward movement of the production possibility frontier. This means that organizational changes can enhance a companies' productivity by making better use of available production factors. Organizational capital formation in Tomer's conception could involve:

1. changing the formal and informal social relationships and patterns of activity within the enterprise or
2. changing individual attributes important to organizational functioning, or
3. the accumulation of information useful in matching workers with organization situations.

Tomer's approach is rooted in neo-classical economics and provides a theoretical underpinning for the idea that organization is an input in the production process. Therefore his way of conceptualizing organization is of relevance for management as well. It provides the economical background against which organizational innovations can be judged. Unfortunately, Tomer treats the innovation process as a black box and has not much to say on the competitive dynamics organizational innovations may give rise to. For instance, the observation that not all these organizational innovations have spread to other firms (see par. 1.4), makes it plausible to assume that some firms have developed firm specific capabilities in working with these innovations. These organizing capabilities may constitute an important resource in competition, as they can lead to lower costs, more customer-specific products, shorter time-to-market or other competitive advantages, which competitors may not be able to match.

As Teece, Pisano and Shuen (1992, p. 21) put it: "...organizational or coordinating capabilities appear to vary across firms. It is these differences which allow some firms to earn higher rents than others". They see the superior coordinative (that is organizing) capabilities with regard to a set of activities as central to a firm's ability to differentiate itself from its competitors. "The set of activities that a firm can organize and coordinate better than other firms are its distinctive competences" (Teece, Pisano and Shuen, 1992, p. 22). Thus, as Hennart (1994) remarks, coordination creates rents. Organizing capabilities have an impact on a firm's competitive position. Organizational innovations will alter these capabilities (Baden-Fuller and Stopford, 1992, p. 7), thereby enabling a firm to pursue a new strategy or sustain an existing one.

The relation between strategy and organizational structure was most clearly established by Chandler (1962). His views have been summarized in the slogan "structure follows strategy". His studies show that the strategy of an enterprise determines the way the enterprise is organized. Of course the reverse has also been found true: strategy may follow structure (Burgelman, 1983). The interaction between strategy and structure has become one of the cornerstones of strategy theory.

The competitive advantages built on organizational innovation are pluriform: Sanchez (1993) points for instance to the possibilities for attaining economies of scale and scope, learning, speed improvement and risk reduction in networks. These can all be part of firm strategy. Some authors have claimed that the success of organizational innovations is rooted in transaction cost-savings. Williamson (1975, 1985) explains the success of the multidivisional form by claiming that it economizes on transaction costs. By reducing uncertainty, complexity, and opportunism the multidivisional form is better able to cope with bounded rationality and small numbers bargaining, than the alternative of market transactions. As a result its higher efficiency leads to a competitive advantage.

Different organizational innovations can be hypothesized to coincide with the three generic strategies defined by Porter (1980). These strategies (low cost, differentiation and focus: see figure 1.1 for a recent version of the generic strategies) may have corresponding organizational forms. Van den Bosch, Van der Aa and Elfring (1993, p. 40) provide some examples with regard to characteristics

organizational innovations must possess in order to support one of the three generic strategies. For example: organizational innovations characterized by increasing economies of scale and standardization can be related to the strategy of cost leadership. R&D consortia can be an example of this. Other examples may include the multidivisional form in relation to differentiation and the strategic business unit as an example of the focus strategy.

Figure 1.1 Generic Strategies

		COMPETITIVE ADVANTAGE	
		Lower Cost	**Differentiation**
COMPETITIVE SCOPE	**Broad Target**	Cost Leadership	Differentiation
	Narrow Target	Cost Focus	Focused Differentiation

Source: Porter (1990a, p. 39).

The competitive impact of organizational structures can also run in the direction of a competitive disadvantage. Organizational structures are often hard to change and adapt to changing circumstances. The implementation of new forms can be a costly and difficult process, so that an organization may be stuck with an inadequate structure. Where on the one hand a firm can not exist without a structure, it can also become locked in it. Summarizing, organizational innovations influence a firm's competitive position.

1.3.2 Empirical evidence

Empirical evidence of the strategic importance of organizational innovation can be divided along two lines: large-scale statistical research and case studies. The number of the first kind of studies is limited. Case study based evidence supporting the position that the competitive impact of organizational innovations is considerable, is plentiful.

The large-scale statistical studies are limited to the alleged superior performance of the multidivisional form. There are many pitfalls in studying the subject of the performance of the M-form in this way. The difficulty of ascertaining the right performance measure (the notoriously complicated concept of profitability is usually used, other outcomes of strategy e.g. market share, have been neglected), and the existence of adapted M-forms which may diverge considerably from the original form (Clark, 1987), are only two of the difficulties to be overcome.

The evidence of the studies is mixed. A review of the studies into superior profitability showed that of the nine studies reviewed five found evidence for superior profitability of the firms that had adopted the M-form (Mahajan, Sharma and Bettis, 1988). One of the strongest results was found by Armour and Teece (1978) who found a superior profitability of the M-form in oil and gas companies of 2 percentage points on the return on equity over a period of 20 years compared

to firms with a functional form. Yet, as already mentioned, other studies found no relation. One of the studies reviewed by Mahajan, Sharma and Bettis (1988) even found a negative relation: the adoption of the multidivisional form resulted in a reduction of returns.

Kogut and Parkinson (1993) explain these mixed results by pointing to the fact that these studies were conducted in different countries. They claim that all studies pertaining to the M-form in the United States are unanimous in their finding of increased profitability associated with the implementation of a divisional structure. It were the adaptations made in the divisional structure as it diffused to different countries, that reduced the profitability of the M-form (section 1.6.2 will discuss this in more detail). As a consequence, the studies into the profitability of the M-form in the United Kingdom and Germany provide inconclusive evidence of a superior performance (Kogut and Parkinson, 1993, p. 196).

The case studies in organizational innovation have usually taken a broader and more in-depth look into the competitive advantages resulting from new organizational forms. The quantity and variety of these studies is considerable and here some selection has been made, which is not claimed to be exhaustive but is representative of the findings of many other studies. Chandler (1962) was, as already mentioned, one of the first to point at the relationship between organizational structure and strategy. Since, he has consequently developed this framework. Chandler (1990) for instance, found economies of scale and scope to be of specific importance in the rise of the modern business enterprise. These economies enabled the firms using structures like the multidivisional form to attain and sustain superior market positions. Best (1990) finds similar results and adds to this a number of fine-grained analyses of how flexible structures enabled focus and differentiation strategies to be realized. Organizational aspects of the Just-in-Time system and their relation to firm productivity have been studied by Krafcik (1988).

Miles and Snow (1984, p. 17) "suggest that early fit – the discovery of a new organization form – can lead to a sustained excellence". They related some broadly defined organization forms to different product-market strategies and provide examples of firms using those forms and strategies. Table 1.2 provides part of the overview given by Miles and Snow (1984, p. 19). As Miles and Snow show, the strategic impact of organizational forms is considerable. The fit between an organization form and the environment determines firm success. One of the questions that can be raised is to what extent changes in the market, as described by Miles and Snow, have provided the impetus for organizational innovation. This issue will be taken up in chapter 5.

Concluding, large-scale empirical studies have presented mixed evidence on the superior performance of an organizational innovation, notably the M-form. There is however a plausible explanation for this, as the studies have not taken into account the possibility of corrupted M-forms in different nations. Qualitative studies have been surprisingly uniform in their conclusion that organizational innovations do influence organizational competitiveness. They have linked organizational forms to strategy and have provided insight in the different advantages that are linked up with different forms (e.g. economies of scale, enhanced product differentiation).

Table 1.2 The relation between strategy and organizational innovation: empirical examples

Product-market strategy	Organization structure	Inventor or early user
Single product or service; Local/regional markets	Agency	Numerous small owner-managed firms
Limited, standardized product or service line; Regional/national markets	Functional	Carnegie Steel
Diversified, changing product or service line; National/international markets	Divisional	General Motors, Sears-Roebuck, Hewlett-Packard
Standard and innovative products or services; Stable and changing markets	Matrix	Several aerospace and electronics firms (e.g. NASA, IBM, Texas Instruments)
Product or service design; Global and changing markets	Dynamic network	International construction firms, global consumer goods companies, selected electronics and computer firms (e.g. IBM)

Source: adapted from Miles and Snow (1984).

1.4 *The competitive impact of organizational innovation on a national level*

1.4.1 Theory

The question how firm level processes can contribute to national competitiveness (in the narrow sense defined in section 1.2.3) has not yet received much attention. The focus has been more on how country specific circumstances influence firm behavior (e.g. Porter, 1990a; Nelson (ed.), 1993). The way in which organizational innovations can contribute to shifts in national competitiveness has been studied by Nelson (1991), Kogut (1991) and Kogut ed. (1993). Dosi and Kogut (1993, p. 249) state for instance:

> "The historical record suggests a cycle of divergence in the performance of countries due to the introduction of new organizing heuristics, followed by a gradual convergence due to the diffusion of these heuristics across borders".

And:

> "The implication of these observations is that country cycles in economic leadership are tied to the arrival of innovations in a lagging country and the high costs of the leader country to switch to the new practices. ..... the costs of adopting new innovations should be higher for new organizing principles (e.g., subcontracting systems) than for new technologies. Contrary to the belief that the decline of the United States derives from a fall in the appropriability of American technologies, we would suggest that this decline is linked to the diffusion of American organizing practices to other countries; at the same time, new and

> better practices are being introduced and worked out in other countries" (Dosi and Kogut, 1993, p. 258).

Nelson (1991) puts the fundamental issue most clearly. In his view firm differences have substantial economic significance. The differences between firms reflect different choices made by them. "But almost no attention has been paid to the industry or economy wide implications of such different choices" (Nelson, 1991, p. 61). He describes firm differences along three characteristics: strategy, structure and core capabilities. "Structure", Nelson claims (1991, p. 67) "is far more difficult to change effectively than is strategy". Indeed he believes organization may be more durable than the core capabilities a firm has developed. In relation to the country-level, the wide-ranging influence of organizational structures leads Nelson to claim that organizational innovation is essential for economic development:

> "By organization I mean..., those aspects of a firm that are wider and more durable than the particular technologies and other routines it employs at any moment, or even its extent core capabilities, and which in effect guide the internal evolution of these. It is apparent that change in organization in this broad sense, as well as advance in technology, has been an essential feature of the enormous economic progress that has been experienced over the last century and a half." (p. 70).

Hence, Nelson makes a strong claim for the relevance of organizational innovation for economic development. He does however not identify any mechanism linking these two and does not refer to country competitiveness. Despite this limitation Nelson's article is of interest for the question raised (what is the impact of firm differences on wider economic aggregates?) and for pointing to the role that organizational innovation may play in providing an answer to that question. By doing so, he forcefully refutes the technological determinism, which claims technology to be the major (or even only) engine of progress.

This last idea of Nelson, is supported by Kogut (1991). Kogut tries to answer the question posed by Nelson to the relation between processes on a micro-level and processes on a macro-level, as well as the relation to shifts in competitiveness. To find an answer Kogut focusses on country competitiveness. The core of his argument can be briefly summarized as follows: *national competitiveness comes into being by innovations spreading less quickly across (national or regional) borders, than within borders*. The reasons for this will be discussed in par. 1.6.1. where the sustainability of competitive advantages based on organizational innovation will be analysed. For now this differential rate of diffusion is assumed to be present. As Kogut also seems to claim it to be a stylized fact that organizational innovations diffuse slower than technological innovations (p. 33), the impact of organizational innovation on country competitiveness is the most important.

Kogut's argument runs along the following lines. First of all firms react to stimuli in their home market. "The cumulative capabilities of firms, developed in response to their home markets, provide the competitive basis for expansion overseas, yet at the same time, limit the feasible range of products" (p. 36). As foreign trade and investment are the extension of the home market across borders (Kogut refers to Linder, 1961), trade and investment will reflect the innovations of the individual,

national firms. The most successful innovations will be reinforced by competition in the international market. Products of firms in some countries for instance will be able to benefit in international markets from having more efficient organizational structures in the home base. These firms with competitive products will increase their exports and investments, the flow of resources to these firms will augment, thereby strengthening the existing pattern of innovation (called the trajectory of innovation) in a country. "Thus, the well-known property of international trade tending towards specialization also has the implication of fostering the specialization of a country's capabilities" (p. 36). As innovation can be both technological and organizational "leadership of a country is not driven alone by technological investments, but also by the efficiency of the dominant organizing principles" (p. 38).

In other words, long-term trends in country competitiveness can be understood as differences in innovative capabilities of firms in countries, which can be either technological or organizational. These latter ones are of prime interest because the slow diffusion of organizational innovation makes that "No country can attain leadership in absolute advantage (which Kogut defines as higher productivity, APdM) without innovation in organizing principles of work" (Kogut, 1991, p. 42).

The diffusion of innovations firstly within borders, leads to national competitiveness. Next the diffusion across borders erodes competitive advantage, as does the introduction of a new innovation elsewhere. Because some countries are better imitators than others, some countries will learn the best practice faster than others. After the best practice innovation has diffused the country in which the original innovation was made, will have increased its wealth and claims on foreign assets and investments.

Kogut's reasoning has some vital assumptions. The first one is that in a country similar innovations develop. Kogut explains this by pointing at history dependency and lock-in to current practice which go together with localized learning: firms are most apt to look for solutions to problems that are near to what they have done before (for example near to the technology they currently use). A second important idea is that innovations diffuse more slowly across than within borders. The reasons Kogut gives for this hypothesis will be discussed in section 1.6.1. With regard to the especially important effect of organizational forms, Kogut does not explain why organizational innovations diffuse more slowly than technologies. Reasons for the slow diffusion of organizational innovations however, will be considered in sections 1.5[1].

Summarizing, some countries have a particular advantage with regard to some innovations. Exploiting these internationally, reinforces this trend. As a result a national competitive position arises connected to those innovations. Their diffusion on the other hand will slowly but increasingly limit the benefits of the innovation accruing to the innovating country, signalling a decline in competitiveness.

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[1] Related to this issue, section 2.2 will discuss differences between organizational and technological innovations.

1.4.2 Empirical evidence

Even though the theoretical work on the impact of new organizational structures on country competitiveness is only in its infancy, some studies have touched upon the question from an empirical point of view. Some of them focus narrowly (Reich and Mankin, 1986), others are more encompassing (Chandler, 1990; Dertouzos, Lester and Solow, 1989; Lazonick, 1990). Generally the studies find that "convergence (the process of diffusion of innovations to other countries, APdM) is slow and only approximate" (Dosi and Kogut, 1993, p. 251).

Reich and Mankin (1986) relate the relative decline of American competitiveness and the congruent rise of Japan, to the superior ability of the Japanese to make use of the organizational form of the international joint venture. They claim that new forms of joint ventures emerge, in which the Japanese partner provides production in Japan, while American partners do research and marketing. In this way the Japanese are able to appropriate American innovations while simultaneously developing their manufacturing capability. This reconfiguring of the value chain enhances Japan's ability to compete and undermines America's competitiveness. In terms of Kogut's theory, international joint ventures speed up the diffusion of technological innovations across borders, leading to a deterioration of America's position.

Chandler (1990) provides evidence for many of Kogut's ideas. Chandler finds that there were different systems of organizing the modern business enterprise in the USA, the United Kingdom and Germany in the first half of this century. These differences had a profound influence on the competitive positions of the nations involved. In England for example, business did not organize itself in a modern way (see also Kogut and Parkinson, 1993), but instead remained dominated by the owners of the firms. "This commitment to personal rather than professional management characterized British industrial capitalism. It was also this commitment that made industrial capitalism less dynamic in Britain than in the United States and Germany, in terms of the development of new products and processes and of the growth and competitiveness of enterprises and industries" (p. 592). In short Chandler found that differences on the firm level had an important impact on national competitiveness.

Dertouzos, Lester and Solow (1989) have looked into more recent developments in national competitiveness in manufacturing industries. They relate shifts in international (and more specifically American) productivity amongst others to the inability of American firms to innovate in their organizational structures (p. 38). Especially when cooperative organizational forms would be needed, the American industry fails to adjust accordingly and thereby loses strength (p. 95). Of six key similarities among best-practice firms, all are organizational or have profound organizational implications: simultaneous improvement in cost, quality, and delivery; closer links to customers; closer relationships with suppliers; the effective use of technology for strategic advantage (this does not necessarily have important organizational implications); less hierarchical and less compartmentalized organizations; human resource policies aimed at learning, teamwork, participation, and flexibility. They also mirror Kogut's finding that the limited

diffusion of best-practice can be a key reason for slipping competitiveness (pp. 166/167).

From an economic historical perspective Lazonick (1991) discusses the impact of organizational innovation on "the wealth of three nations": Great-Britain, the U.S.A. and Japan. Similar to Chandler (1990), Lazonick finds three different systems of organizing which he coins, respectively, proprietary, managerial and collective capitalism. Based on this distinction he shows both on theoretical and empirical grounds that the strategies and structures of private enterprise are "the prime determinants of the levels of employment, productivity, output and income" (p. 24). Consequently, industrial dominance and decline are found to be determined by new firm strategies and structures, enabling firms to produce higher quality products at lower prices. Essentially Lazonick's research supports the thesis that the decline of a country comes from the rise of a more successful combination of strategy and structure elsewhere, that the country is unable to emulate because social institutions prevent change. "In the passing of industrial leadership from Britain to the United States the institutional character of capitalism changed dramatically. In contrast to the small, vertically specialized proprietary firms that had characterized Britain's rise to economic dominance, U.S. competitive advantage came from managerial enterprises that operated a number of geographically dispersed plants and offices and that integrated a number of vertically related activities" (p. 14). Similarly, the passing of leadership to Japan is accompanied by the emergence of new organizational structures.

Inzerilli (1990) relates organizational innovation to the performance of regions. His analysis of the Italian flexible specialization model as it has developed in the central northeast of Italy, shows that the regions in which the model developed, outperformed other regions in productivity and employment growth.

The above mentioned research has supported the thesis that organizational innovation is a cause of shifting national competitiveness. Although the studies differ in their explanation of organizational innovation and some put more emphasis on market competition and others on institutions, some are longitudinal others comparative, they have as a common thread that the role of organizational innovation in explaining shifts in national competitiveness is not to be ignored.

So far, it has become clear that firm level processes are at the basis of wider economic aggregates. Country competitiveness as such does not exist, but firm level processes are dissimilar between nations and thereby influence country wide aggregates. Theoretical and empirical considerations support the thesis that organizational innovation plays an important role in national competitive advantage, even though the picture is not yet complete.

1.5 *Sustainability of competitive advantages rooted in organizational innovation: firm level*

1.5.1 Theory

Having shown the competitive impact of organizational innovation the question of sustainability becomes relevant. From a strategic perspective it would be

interesting to see whether the competitive advantage emanating from organizational innovations is short-lived or lasting. As Hall (1994) shows, durability is one of the key parts of sustainability. A competitive advantage that is sustainable will be of greater influence on the competitive process and the relative position of firms than one that is ephemeral.

Research into the subject of sustainability has been part of the resource-based tradition in strategy research. An interesting starting point for the current subject is Barney's opinion on the sustainability of organizational culture as a source of competitive advantage (Barney, 1986a). Barney states that a sustained competitive advantage based on culture cannot be created purposefully, because if it could be created purposefully this would imply that the culture can be imitated and that therefore the competitive advantage related to it cannot be sustained. It follows that a firm can have a sustained competitive advantage based on organizational culture only when the culture cannot be imitated. By implication this means that it cannot be consciously created; a firm either has such a culture or it has not. Barney also claims that in general cultures are not imitable, because they are causally ambiguous, historically grounded and difficult to change.

Many of the points Barney discussed, are also of interest to organizational innovation but the requirements for sustainability as defined by Barney, are very strict. No imitation at all should be possible and only a Schumpeterian innovation can render the competitive advantage based on the culture redundant. With regard to organizational innovation, it will be shown that imitation is possible, although it will be difficult. Before entering into a more in-depth discussion on the sustainability of organizational forms, three points related to Barney's analysis must be discussed which are of relevance for organizational innovation: the role of time, the role of upgrading and the role of cost of imitation. The role of time is connected to sustainability in that an innovation can be said to be sustainable if it leads to a competitive advantage that is lasting (leads to a superior performance for a long time). The question is what is a long time? Surely, if a firm has a culture that others can imitate but that will take the imitators quite some years to establish, it will be difficult to maintain that the advantage is not sustainable (Ghemawat, 1991). So, if a culture is imitable this does not necessarily mean that it cannot lead to a sustainable competitive advantage: the time needed for imitation may be so long that the advantages a firm reaps from its culture are just as considerable as when the culture was inimitable. This is certainly so when the role of upgrading is taken into account. In the time that it takes imitators to obtain the culture another firm possesses, that firm may already have moved on to an even more advanced culture, that can be equally hard to imitate. In addition, a culture may be imitable in principle, but the costs of imitation may be prohibitive: the disruption it creates may be such that it does not weigh up against the benefits.

Barney's view is of relevance when competition is static. In a dynamic context, there can be no sustainable competitive advantages, if with "sustainable" is meant "ever lasting". In practice, dynamic competition is of greater relevance than static competition, as even in mature industries innovations can have a rejuvenating effect (Baden-Fuller and Stopford, 1992; Jacobs and De Man, 1995 b,c). When competition is dynamic, sustainability is harder to conceptualize, as it means "for

a long period of time". Exactly how long this time should be in order for a competitive advantage to be sustainable, is an unanswerable question. Nevertheless, Ghemawat (1991, p. 82) states that the concept of sustainability for a long time is of sufficient interest for companies, because a competitive advantage lasting 10 years is of more interest than one lasting for only a year.

Relating this to organizational innovation, these points are particularly important. It will be shown later on that the diffusion of organizational forms usually is a long term process and that therefore competitive advantages based on organizational innovations generally are sustainable: they can provide an advantage for a long period of time. Also, it would be a serious misunderstanding to see innovations as static blueprints instead of as evolving processes. Put differently: upgrading is a very important part of organizational innovation. Cusumano (1988) for instance shows that the Just-in-Time system developed in Toyota has been continuously changing and only slowly evolved into the extensive system it is today. Even thirty years after the first plans related to JIT were implemented, the system is still in a process of continuous upgrading. In the time needed by competitors to emulate the system, the original innovator already may have upgraded its system and thereby is able to maintain his competitive position.

Of course there are some important differences between culture and organizational form. As Barney points out, values, beliefs and symbols may be very hard to change. The use of culture as a management instrument is therefore limited. For organizational structure the elements to be changed (activities and the relations between them) are more clearly defined. The managerial implications for a study of organizational innovation may therefore be greater, as the control over the development of organizational forms may be bigger than the control over culture. For the same reason the imitation of organizational forms will probably be less onerous than the imitation of culture. Nevertheless, for organizational innovation Barney's reasoning will have to be extended by the elements of time, upgrading and cost in order for a clear picture of imitability and sustainability to emerge.

Elaborating on the relation between time and sustainability, both the impact of culture and of organizational innovation will only become clear to competitors after a considerable time-lag. Chapter 4 will show that the emergence of organizational innovations often is an incremental process that is not recognized by the outside-world until the accompanying organizational structure has reached a certain magnitude. Culture develops in a similar way, probably over an even longer time-frame. So the first mover advantage of both cultural change and organizational innovation may not be unimportant.

Table 1.3 Characteristics enhancing the sustainability of resources/capabilities

Author	Characteristic
Amit and Schoemaker (1993; p. 39)	• difficult to buy, sell, imitate, substitute • complementarity • firm specificity, durability, scarcity
Barney (1991; pp. 106-107)	• value • rarity • imperfect imitability because of: – unique historical conditions – causal ambiguity – social complexity • limited substitutability
Dierickx and Cool (1989; pp. 1507-1509)	• non-tradeability • non-imitability because of: – time compression economies – asset mass efficiencies – interconnectedness of asset stocks – asset erosion – causal ambiguity • nonsubstitutability
Grant (1991a; p. 124)	imperfections with regard to: • durability • transparency • transferability because of: – geographical immobility – imperfect information – firm-specific resources – immobility of capabilities • replicability

Sources: as indicated in the table.

Recent research into sustainability has come up with various characteristics of sustainable competitive advantages. These have been assembled in table 1.3. Most authors have pointed in the same direction[2] and therefore the main points have been assembled in table 1.4, with for each point added how organizational innovation relates to it. In table 1.4 also some characteristics have been added which have been discussed in relation to organizational innovation specifically. These are lock-in and systemic interdependencies (Kogut, 1991) and set up cost and organizational disruption and feasibility of incremental change (Teece, 1980). In table 1.4 the different characteristics of sustainability are assembled on the left

[2] E.g.: Dierickx and Cool's time compression economies refers to historical conditions; asset mass efficiencies and interconnectedness of asset stocks to systemic interdependencies (Kogut, 1991) in table 1.5. Other authors' conceptions of sustainability can be related to those discussed in this table as well; e.g. Ghemawat's market imperfections are related to tradebility.

and the way in which organizational innovation relates to it on the right. For instance, table 1.4 shows that important characteristics of imitability are unique historical conditions, causal ambiguity and social complexity. The last two factors are high in the case of organizational innovation and thus reduce the imitability of the innovation. Unique historical conditions are moderately high and may limit the imitability as well, although not as much as the other two factors. Below every characteristic of sustainability will be discussed in detail in relation to organizational innovation.

Table 1.4 The sustainability of organizational innovation on a firm level

Characteristics of Sustainability	Score of Organizational Innovation
Imitability	
• unique historical conditions	• moderate
• causal ambiguity	• high
• social complexity	• high
Substitutability	• moderate
Tradeability	
• geographical immobility	• low
• systemic interdependencies	• high
Lock-in of imitators	
• set up cost and organizational disruption	• high
• feasibility of piecemeal change	• low

Source: see text.

Imitability

Generally, the imitability of organizational innovations will be low. Casson (1990) sees organizational innovation as the only source of sustainable competitive advantage because of its low imitability: "It is only business strategies devised to improve overall coordination between different functions – upstream and downstream production, production and marketing, marketing and R&D, and so on – which are reasonably sure to lead to permanent benefits, since they are embodied in complex institutional arrangements which it is difficult for outsiders to understand and imitate" (Casson, 1990, p. 87).

Although there may also be organizational innovations that spread rather quickly, generally an element of learning will be present that will constrain the speed with which the innovation diffuses. The existence of tacit knowledge and the limited codifiability of organizational mechanisms play a role in this. More specifically authors have pointed at unique historical conditions, causal ambiguity and social complexity as barriers to imitation. Historical conditions play an important role in innovation. These conditions may be external to the firm (Cusumano (1988) for example points to the end of the second world-war and inflation in Japan as historical conditions that fostered the JIT-system) or internal (again for JIT:

Toyota's lack of capital prevented it from buying American technology). As will be clear from the examples given, historical conditions not by their very nature prevent imitation of organizational forms. This will only be so, when the form is really dependent on those historical conditions. It is hard to see why the Just-in-Time system cannot be implemented in non-inflationary environments, for example. When forms are dependent on historical conditions e.g. when a firm throughout time has learned to deal with that form, or when government forbids the implementation of a certain organizational structure (as was the case in The Netherlands with mergers between banks and insurance companies or the American National Cooperative Act that restricted collaboration between firms (Powell, 1990)) then historical conditions may be a barrier to imitation.

Causal ambiguity refers to the confusion there may be as to what elements of the organizational innovation are the key factors in competitive success. The exact way in which organizational structures work, cannot be completely codified, as tacit knowledge (identified by Reed and DeFillippi (1990) as one of the central characteristics of causal ambiguity) usually plays an important role. Firms aiming at imitating a structure may therefore go through a time-consuming trial and error process, before they have identified the central characteristics of the innovation. The conclusion is that "Since managerial knowledge is tacit, and causal ambiguity is significant, imitation is likely to be difficult" (Hennart, 1994, p. 198). Similar difficulties play a role in the social atmosphere. The social complexity of organizational innovations is usually high: they require a lot of people to cooperate in a new way. Before every individual has adapted to the new circumstances, a lot of time may have passed.

Substitutability

The substitutability of a new organizational form may also be limited. Substitutability is about the question in how far competitors may compete around an organizational innovation. The pluriformity of organizational forms seems to suggest that there are many viable ways to organize a production process. It will however be clear that not every form is viable: some element of JIT seems to be a necessity for every car manufacturer to survive, and a lack of transnational learning cannot quite be compensated for by mere internationality. How far a firm should converge to a certain ideal and how far he can remain distant from it, is a topic that has not yet been definitively addressed and perhaps is highly situationally determined.

Tradeability

The already mentioned absence of codified blueprints and the element of learning limit tradeability. There is however not much difficulty in transferring the innovation geographically, as they are non-physical sources of competitive advantage. However, organizational innovations do have systemic characteristics. They are usually part of a larger system and are not easy to isolate. The fact that many organizational innovations nowadays are of an interfirm nature (networks, regional conglomerations (Best, 1990)) makes this point even more relevant. In these cases competitive advantages are deeply ingrained in the system as a whole. Imitation of such a system is complicated, perhaps even impossible. Nevertheless,

there are some ways in which organizational forms can be "traded". Management consultancy for instance, plays a role in this. For instance, it was McKinsey that was mainly responsible for the diffusion of the multidivisional form to Britain (Chandler, 1990, pp. 618-619). Also business concepts can sometimes be franchised or learned by means of a strategic alliance, as in the NUMMI plant in which General Motors tries to pick up some of Toyota's systems and Florida and Kenney (1991) found that Japanese firms took their interorganizational relations with them to America. Yet, these kinds of "trade" are so complex that they hardly resemble a normal sale.

Lock-in of imitators[3]

Sustainability of competitive advantage has, among others, to do with the difficulty for competitors to imitate the source of competitive advantage. When potential imitators are unable to change their organizational structures the sustainability of an innovation is enhanced. Teece (1980) identified two reasons why competitors may be locked in their old structure. First the set up cost and organizational disruption may be high. The introduction of a major organizational innovation "requires major reassignment of tasks and responsibilities in a fashion which need not leave all personnel unambiguously better off". The disruption ensuing the implementation may be considerable. The expected disruption and associated costs may provide management with a reason not to adopt the innovation. A second element put forth by Teece, is that it is unfeasible to introduce innovations in a piecemeal fashion. Slow adjustment and experimentation on a small scale may not be possible in the diffusion process, because the real benefits of the new organizational form will not be reaped until the form is installed completely (this in contradiction to the original innovation process, which is characterized by search and trial and error; it is true however that experimentation on a small scale is only possible in a limited way). Moreover, the new organizational form will not be easy to contain: other parts of the firm will be effected by it.

Concluding this subject, it can be claimed on theoretical grounds that important organizational innovations generally are sustainable. Limited imitability, limited substitutability, limited tradeability and lock in of possible imitators all work to slow down the process of diffusion of a new organizational form. In the time it takes a form to be adopted by competing firms, the original innovator has had ample time to upgrade his innovation and thereby maintain his competitive position. The testable hypothesis emanating from the preceding discussion is that the

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[3] Dosi and Kogut (1993, p. 257) provide a more formal analysis of lock-in effects. They distinguish three kinds of lock-in: static switching (in which the cost of switching from one way of organizing (A) to another (B) is high enough to prevent switching, even when B is a better way of organizing), Competency Trap (in which the accumulated learning in working with A, is so high that B is not adopted even if A is inferior, because the firm is not willing to let go of its cumulative learning and start-up a new learning process in working with B), Hysteresis (in which the benefits of switching are uncertain; on average method B may be better than A but there may be a chance element, such that B can perform poorer than A).

diffusion time of organizational innovations will be long. Some empirical studies regarding this hypothesis are reviewed in the next section.

1.5.2 Empirical evidence

Empirical research on the diffusion of organizational innovations is scarce. The paucity of material is probably caused by the fact that it is hard to identify which firms use certain organizational innovations. The fact that organizational innovations often must be reinvented by the firms implementing them, gives rise to a vast array of adapted forms, of which it is difficult to say whether these can really be counted as imitations of the original form (see for example Clark (1987, pp. 58 and 340) and Kogut and Parkinson (1993) on the diffusion of innovation in general and the diffusion of the multidivisional form in particular). Consequently, large scale empirical studies into the dissemination of new organizational forms are fraught with difficulties. A data-base solely based on information given by firms as to what form they use, should be interpreted with care. Additional research in each firm would be necessary to see if the main characteristics of the organization form under scrutiny, have indeed been implemented. Given these demands on the data, the observed lack of empirical material is hardly surprising.

Nevertheless the available data provide ample support for the hypothesis of slow diffusion of organizational innovations, even though these data are limited to the diffusion of the multidivisional form (M-form). Armour and Teece (1978) and Teece (1980) provide evidence for this. Depending on which industry is object of study, it took 14 years in the American petroleum industry to 41 years in a sample of principal American firms in 17 industries, before half of the firms in the sample had adopted the M-form (Teece, 1980).

Building on a different data-set, Fligstein (1985) studied the spread of the M-form over a sixty year period. Mahajan, Sharma and Bettis (1988) using a similar data set also found that the diffusion of the M-form was a slow process. Interestingly, they found no support for what they call the imitation-hypothesis. The imitation hypothesis was developed for research into technological innovation and states that a profitable innovation will diffuse relatively fast, because of its profitability, and communication between firms. Mahajan, Sharma and Bettis (1988) tested various models of the diffusion hypothesis including two which incorporated the well-known S-shaped diffusion pattern, but neither of these models was supported by the data. The authors identified three possible reasons for this result. Potential imitators might not have adopted the M-form because of:

- its unclear profitability potential
- imperfect communication between firms because of the complexity and ambiguity pointed at in the previous section
- inertia of organizational structures.

The authors conclude that if the form is profitable than it is likely to be so in the long run, because of the difficulty of imitation.

Fruin and Nishiguchi (1993) discuss the diffusion of the Toyota Production System (TPS) and conclude that the system only really spread to Toyota's first tier

suppliers, but probably has not reached lower tier suppliers and other car manufacturers in Japan. They also point to the fact that the system is constantly being upgraded, so that imitation is rendered even more difficult. Hence, the sustainability of the system appears to be considerable.

Subject to all the qualifications made above, the available empirical material has corroborated the thesis that the diffusion of organizational innovations is a slow process.

1.6 *Sustainability of competitive advantages rooted in organizational innovation: national level*

1.6.1 Theory

Not only can organizational innovations play a role in firm competitiveness, also national competitiveness is influenced by renewal of organizational forms. If this kind of innovation diffuses slowly among firms, the country in which the innovating firm is established may reap benefits from that, when the innovator starts exploiting its innovation in international markets. As firms in other countries will not be able to imitate the form quickly, monopoly-like gains can be reaped by the indigenous firm, thereby benefiting the home country.

Above that, it is likely that innovations diffuse faster within a country than between countries (Kogut, 1991). If this is true then a group of high performing firms in an industry may develop inside a country, thereby strengthening its international competitive position. The basis of a countries' competitive advantage is then no longer limited to the innovating firm, but has a much wider range (e.g. a cluster of competitive industries may develop). The implication of this idea is that organizational innovation can lead to a sustainable competitive advantage of a nation, as long as foreign firms are at a disadvantage in comparison to national firms when they attempt to emulate the organizational innovation. This disadvantage will generally lie in the slow diffusion of organizing principles; more specifically authors have pointed at the difficulty of transplanting organizational forms from one society to another, because of the existence of differences of a systemic (often institutional) nature. These latter differences inhibit perfect imitation of an organizational form. Or as Dunning (1993, p. 206) puts it: "The ability of an importing country to absorb and disseminate new resources, technology, organizational methods, and entrepreneurship rests mainly on the availability of indigenous complementary resources and the ease with which these resources can be efficiently coordinated with the imported resources".

Kogut (1991) has identified four reasons why diffusion of innovation may be easier within a country than between countries, or as he states it, why national or regional borders are less permeable than firm boundaries. These are:

1. *Technological opportunities.* Firms embedded in networks usually have a higher chance of technology spillover. That is, as among others also Porter (1990a) has pointed out, related and supporting industries play an important role in the diffusion of technologies and in generating new ones. Related firms are often geographically concentrated in regions or nations. National industrial

networks, according to Kogut, have a higher density than international networks. Firms in the same nation interact with each other more frequently and intensively than with firms based in different nations. The spillover of technology is therefore heavily biased towards firms in the same country. Consequently, diffusion of innovation (whether technological or organizational) is easier within a country than among countries.

Of course ongoing internationalization may lessen the impact of nationality. Multinational activity and cooperative agreements among firms of different nationalities may contribute to increased international spillover. The many benefits of geographical proximity will however not easily be outweighed (see e.g. Bartmess and Cerny (1993) for a discussion of the advantages of geographical proximity).

2. *Selection forces.* "As national markets have, historically, been domestic in orientation, the competitive pressures behind selection forces have been largely other national firms" (Kogut, 1991, p. 41). National competition will force firms to adopt innovations. It is in the home market of the innovator that the effects of the innovation are felt stronger and earlier than abroad. Consequently, the pressure on national firms to adopt the innovation is higher. As a result, the innovation will spread faster within the boundaries of the country in which the innovating firm is located than across borders.

3. *Identifiability.* The knowledge a firm has of his competitors determines the speed with which it is able to identify the key characteristics that make a competitor more successful. National firms have an advantage over foreign firms in searching for the relevant characteristics of an innovation, as they start with a more extensive and in-depth knowledge of the innovator. Kogut calls this "signal to noise". "Because of their similarity in organizing principles, firms are more sensitive to incremental differences among their domestic competitors. Since there are fewer differences it is easier to identify the factors responsible for differential performance" (Kogut, 1991, p. 42). Hennart (1994, p. 202) provides an example of this concerning Japanese automobile plants. The success of Japanese car makers was attributed firstly to cultural factors and higher automation. It was not until Japanese car manufacturers became successful with American transplants, that the impact of superior design of both internal and external relationships got noticed by the American producers.

   The advantage of domestic firms is further enhanced by "systemic interdependencies". Usually in an innovation different elements must be changed at the same time. The system in which the innovation is embedded may comprise intra- and extra-firm institutions that are more similar within a country than between countries (a related idea can be found in the notion of business systems (Whitley, ed., 1992)). Also, "the causality between action and outcome is highly dependent on the institutional context" (Dosi and Kogut, 1993). It goes without saying that domestic firms' knowledge of these interdependencies and causalities is superior to that of foreign firms.

4. *Institutional lock-in.* Especially the mentioned systemic interdependencies, make that implementation of innovations can have wider societal implications. Institutions may have to be changed in order to provide the right

> context for implementation of the innovation. This may not be legally, politically or socially feasible. Some innovations demand levels of commitment, productivity and labour mobility that are not acceptable in some countries (Kogut, 1991, p. 42). Hence, social institutions play a role in determining the speed of diffusion of innovations (Jacobs, 1990, p. 64).

Many of these factors have also been identified by Clark (1987). Clark's central tenet is that Great-Britain and the United States have followed different trajectories in the development of what he calls national systems of organizing. These differences on a national level thwart the diffusion of innovation between countries. In the long run the structuration of these national systems is influenced by existing practices and institutions, the geo-political context (e.g. natural resources), economic variables (market structures) and culture. Short run events have a discernable impact as well (Clark, 1987, p. 198). Clark's analysis emphasizes the role of systemic interdependencies as defined by Kogut. The role of institutions is put in the foreground and is analysed extensively. Clark not only claims that organizational innovations will diffuse slowly, but also that they will undergo considerable transformation when transplanted from one country to another.

This last point is not necessarily disadvantageous. Some changes may very well be needed, as different forms may flourish in different environments. An adapted innovation may therefore in theory be more competitive than the original innovation. On the other hand the question is how far the original form can be changed without undermining the advantages connected to it. Moreover, it must be observed that the way the innovation must be adapted will not always be clear in advance. A painstaking quest for the right change will be inevitable. So even when the innovation is not emulated exactly the diffusion process will be a slow one.

The above discussion points in the direction of sustainability on a national level of competitive advantages rooted in organizational innovation. It seems to be possible that countries attain superior performance based on organizational innovation. There are theoretical considerations underpinning the proposition that the diffusion of organization forms across borders is subject to severe constraints. Especially because innovations require adaptation to country differences.

1.6.2 Empirical evidence

In the previous section sustainability has been related to differences in national systems of organizing and slow diffusion of organizational innovations across borders. A number of researchers have investigated country differences and rates of diffusion. Some are discussed below.

Empirical research in this field will of necessity be predominantly longitudinal, qualitative and comprehensive. Longitudinal because the time-frame needed to study cycles in country competitiveness is expected to be long. The slow adaptation of institutions and the slow diffusion of innovations lie at the root of this slowness. So, historical research is of prime interest. Qualitative research is

necessary because the amount and subtlety of influencing factors cannot be caught in figures. A numerical approach will obfuscate most of the processes at work. Some economic aggregates (like growth and trade figures) may provide support for a hypothesis on shifting competitiveness, but they can only be seen as the outcome of an innovative process underlying them. As the variety of issues discussed in the previous section will have made clear, the historical studies will also have to be comprehensive. It will be quite impossible to identify beforehand all the factors and processes influencing country competitiveness over the years. Only a comprehensive study will contribute to our understanding of the developments of interest.

The disadvantages of this approach will be clear. First of all the impact of organizational innovation on national competitiveness cannot be completely isolated from other developments at work. Secondly, evidence will sometimes have an anecdotal character. Nevertheless, the conclusions of empirical research are rather unanimous as far as the long term aspects of organizational innovation in relation to country competitiveness are concerned.

Clark (1987) concentrates his historical studies on differences between American and English ways of organizing. He finds support for the hypothesis that there are sharp and significant differences in the contexts and processes by which problems are dealt with in the USA and Great-Britain. A fine-grained analysis shows that innovations that were transferred from one country to the other underwent considerable change, in order to fit into different national contexts. Each country has a distinct historically developed system of organizing, that provides the contextual constraints in which organizational forms develop. Some forms may be unsuited for application in a different context and therefore require modification as was pointed out in the previous section.

Clark provides cases on the spread of such diverse systems as Taylorism, the multidivisional form, the assembly line and rugby. Clark's case studies clearly show that a simple imitation of forms is not likely to occur for the reasons given in the previous section. As a result it can be concluded that different countries can have different sustainable ways of organizing. Clark does however not relate this to cycles in country competitiveness. The rise of the USA and the relative decline of Britain do seem to match the historical periods discussed, but Clark draws no conclusion as to the relation between organizational developments and country competitiveness.

Another scholar with a historical interest also found different ways of organizing on a national level. Chandler (1990) provides an account of the rise of the modern industrial enterprise in the United States, Great-Britain and Germany, mainly focussing on the first half of the twentieth century. Although he does not find differences as marked as Clark's, he still found three clearly separate developments in these nations. The USA developed a system called competitive managerial capitalism, in which companies, led by managers instead of owners, compete to obtain superior profitability. The British system did not separate management from ownership, leading to a system Chandler calls personal capitalism. Germany provides a third way of organizing called cooperative managerial capitalism, characterized by close interfirm cooperation. Whereas the

Americans competed vigorously for markets and profits, the Germans had the proclivity to negotiate rather than to compete.

The general picture that emerges from Chandler's work is one of different systems of organizing in different countries existing for long times with different rates of success. Where in the USA and Germany managerial capitalism had replaced personal capitalism by the 1930s, it wasn't until after World War II that British enterprises slowly started changing their structures towards the managerial model (Chandler, 1990, p. 592).

The scarcity of empirical material prevents general conclusions to be drawn. The studies by Chandler and Clark seem at different points to corroborate the theoretical prediction, that different countries will have different systems of organizing in which not every organizational innovation will fit. This may imply that the diffusion of organizational innovations across borders is a slow and painstaking process and that therefore the firms in the country in which the innovation emerged may create a sustainable competitive position based on that innovation.

A larger scale empirical investigation into Kogut's hypothesis on the lesser permeability of borders has been conducted by Kogut and Parkinson (1993), focussing on the spread of the multidivisional form across borders. They find clear evidence for the proposition that organizational innovations spread slowly into other countries. "One of the major contrasts between Europe and the United States is the later adoption of the multidivisional structure in Europe. In the three major European industrial countries – the United Kingdom, France, and West Germany – there were few (if any) firms adopting the multidivisional structure prior to 1950" (Kogut and Parkinson, 1993, p. 191). And: "...the pattern of diffusion for the United Kingdom, France and Germany is broadly similar to that of the United States, with *an initial lag of a few decades*" (p. 193, italics added). The main reason for this slow diffusion across borders, according to Kogut and Parkinson, is the relatively low level of competition in the European countries compared to America. A new market, technological and legal environment gave the impetus to adopt the multidivisional structure in Europe (p. 192). Yet, this finding is qualified by the possibility that at least in the United Kingdom, the multidivisional structure was perhaps only adopted on paper. The absence of strong central headquarters and the absence of a clear separation of divisions are indications for this (p. 195). For historical reasons (the failure of management to gain control over the shopfloor and the absence of consolidation of companies following mergers (p. 195)) it was easy for the British firms to put the name-tag of the multidivisional form on their companies, while in fact not implementing the form. Kogut and Parkinson find similar evidence regarding the diffusion of Taylorist principles to Europe: the diffusion was slow and the principles were adapted to a large extent.

These findings corroborate the thesis of slow and only approximate diffusion of organizational innovations across borders. As a result it is plausible that organizational innovations can contribute to sustainable competitive advantage on a national level.

There is one reservation to be made regarding Kogut's hypothesis on diffusion and the permeability of borders. Table 1.5 summarizes some of the main conclusions of literature on the diffusion of organizational innovations. A diffusion within a country and inside one company is relatively easy. Diffusion between companies is more difficult, but most onerous of all is the diffusion of an innovation across both firm and country borders. This kind of diffusion is the one Kogut (1991) has focussed on, when claiming that country borders were less permeable than firm borders. In the top righthand corner there is another way of diffusion between countries, which has not been considered by Kogut: the cross-country diffusion of a new organizational form inside one company (e.g. a transnational or a Japanese transplant in Europe). Perhaps a transnational is better able to transfer an organizational innovation developed in one country to another country. If this is true, than the transnational organization form would not only stimulate innovation in general (Van den Bosch and Van Prooijen, 1992b), but also the diffusion of new organizational forms. On this subject of intrafirm, international diffusion not enough literature is available to draw a definite conclusion (some relevant papers here are: Florida and Kenney, 1991; Dunning, 1993).

Table 1.5 The diffusion of organizational innovation

	inside a country	**between countries**
inside one company	relatively easy	still inconclusive
between companies	difficult	very difficult

Source: based on section 1.5 and 1.6.

As there is no barrier between firms in this case, much will depend on the influence of country specific circumstances. In the car industry some studies have been done in relation to this subject. Krafcik (1988) found that the transplant of Japanese methods was more successful when done by Japanese firms than when done by American or European corporations: "Corporate parentage and culture do appear to be correlated with plant performance; the level of technology does not". Similarly, Florida and Kenney (1991) found that Japanese car producers were quite successful in transplanting Japanese organization forms (sometimes even including the transplant of Japanese suppliers) to the U.S.A., but unlike Krafcik they conclude that the impact of cultural factors is overestimated. Other studies in other countries should be conducted before definitive conclusions can be drawn. Further research in this direction is interesting, as the increasing internationalization of individual firms may speed up the diffusion of organizational innovations between countries, thereby increasing the permeability of borders. The consequences of this for country competitiveness are unclear. The original innovator still increases his wealth and claims on foreign assets (an important consequence of competitiveness according to Kogut, 1991). On the other hand the receiving country may increase its competitiveness as well, because of the fact that the identifiability (see section 1.6.1) of the innovation increases.

1.7 *Summary*

Two approaches to competitiveness have been defined: one focussing on the level of input costs as the determinant of competitiveness (comparative advantage) and one focussing on innovation (competitive advantage). This study into organizational innovation is part of the competitive advantage tradition in research.

The competitive impact of organizational innovations is not to be neglected. Both on a firm level and on a country level new organizational forms can play a role in creating competitive advantage. Moreover, this impact appears to be sustainable (durable), as an overview of literature on the diffusion of organizational forms suggests. It is the difference in speed and extent of diffusion, that is at the basis of shifts in competitiveness.

The observed relevance of organizational innovation for competitive advantage makes the question how organizational innovations emerge interesting. It is this question that will be addressed in the ensuing chapters. To answer it, having a clear conception of what organizational innovation is, is a necessity. Hence, the next chapter will be concerned with defining the subject.

2

Demarcation, definition and analytical tool

2.1 *Introduction*

The previous chapter has shown the relevance of organizational innovation for competitiveness on both a firm and a country level. So far a definition of organizational innovation has not yet been given. This chapter tries to provide the answers to three main questions:

- How different are organizational innovations from technological innovations?
- How can organizational innovation be defined from a strategic perspective?
- Can this definition incorporate recent developments, as networks, strategic alliances etc.?

Firstly, it will be shown in what ways organizational innovations differ from technological innovations. Next to considerable interaction between these two, there is also ground for treating organizational innovation separately. Secondly, a conceptual definition of organizational innovation is developed. The quest for this definition simultaneously provides a tool of analysis, by building on an extension of the concepts of activities and linkages similar to those used in the value chain (Porter, 1985). Such a definition can also incorporate interfirm organizational innovations. Moreover, the definition is of a strategic nature, because it incorporates the concept of competitive advantage which was shown to be of importance in the previous chapter. The analytical tool of the value chain can be of help in searching for the determinants of organizational innovation: a tool for describing new organizational forms allows specific questions to be formulated pertaining to the way in which activities and linkages are configured. It also makes it possible to describe in great detail the way in which a new organizational form works, which simplifies the search for answers to these questions and increases the understanding of hc 'he form works.

2.2 *Organizational vs. technological innovation*

Van Someren (1991) states that organizational innovations in his definition are not directly associated with technological innovations, but may arise without being induced by a change in technology. Indeed, he claims that the relation between organizational innovations and technological innovations may run both ways: technological innovations may induce organizational innovations and vice versa. Examples of the latter can be the organization of the research and development function in a company, the innovativeness of networks (Porter, 1990a) and, on a broader scale, the use of an organic form (Burns and Stalker, 1961). Child (1987) basically agrees with this idea in a study concerned with the role of information technology: "IT is not the determinant of organization, though it certainly extends the range of possibilities. Indeed, there are historical precedents, for most of the organizing modes discussed here which long pre-date the new technologies".

Interactions between organization and technology do exist Besseyre des Horts (1991) and sociotechnical systems design (Van Eijnatten, 1994) explicitly take these interactions into account. But as Lazonick (1990) and Williamson (1980a, 1983) point out the degrees of freedom in organizing around technology are considerable enough to warrant separate treatment of organizational innovation. "The search for the factors that determine a mapping of a specific technology to a specific organizational structure has proved elusive" (Dosi and Kogut, 1993, p. 254) and they can only be related in a more general way. "The problem is that we observe there to be far more internal organization than one could possibly explain on technological grounds" (Langlois, 1984, p. 27). Quite some important differences between technological and organizational innovation can be found. An overview of these is given in table 2.1, which will be discussed below. This table is illustrative and by no means exhaustive or applicable to every innovation.

Table 2.1 Some key differences between technological and organizational innovations

Technological innovation	Organizational innovation
• tangible	• intangible
• reverse engineering possible	• no reverse engineering
• tradeable	• non-tradeable (see table 1.5)
• often patentable	• usually not patentable (Cole, 1968)
• relatively fast diffusion	• relatively slow diffusion (Kogut, 1991, p. 33)
• inventor and user often differ	• inventor is user
• major reassignments of tasks not always necessary	• major reassignments of tasks always necessary (Teece, 1980, p. 465)
• uncertainty, but limited	• greater uncertainty (Nelson, 1991, p. 71)

Source: see text.

The first difference in table 2.1 is the one between tangibility and intangibility. A consequence of the intangibility of organizational forms is that it limits the

possibilities for reverse engineering and institutionalized research, which is contained in a laboratory. For technological innovation these things are feasible.

Some of the differences identified in table 2.1 are related to this first difference. For instance, because of the fact that most technological innovations are embodied in a tangible unit (whether a blueprint or a machine), they are relatively easily tradeable compared to their organizational counterparts which are mostly embodied in social processes (see also table 1.5 and the related discussion). When a firm would like to adopt an organizational innovation, this is more difficult. Firstly, because the element of learning to work with an organizational form cannot be bought or sold on the market, but takes time to develop. Secondly, there is the possible necessity of adaptation of the innovation to firm specific conditions, which may also impede tradeability. Whereas most technologies can function without its basic characteristics being changed, organizational forms often need to be tailored to specific needs. "Trade" of organizational innovations may occur by means of management consultants, franchising, or an original innovator assisting the adopting firm in implementing the innovation e.g. in a joint venture (the GM-Toyota NUMMI plant is an example of this). This form of trade can however better be compared with the delivery of a service than with the classical notion of a sale.

Whereas technological inventions may be patentable, there is no such facility for organizational invention. Cole (1968; quoted in Williamson, 1985, p. 404) already observed that "if changes in business procedures and practices were patentable, the contributions of business change to the economic growth of the nation would be as widely recognized as the influence of mechanical innovations or the inflow of capital from abroad". As patents can not be obtained, the full benefit of the innovation may not always accrue to the inventor and consequently the true value of an organizational innovation may be obscured.

Empirically it has been established that organizational innovations take a longer time to diffuse (Kogut ed., 1993). This issue has been discussed in section 1.6. Both theoretical and empirical studies support the relevance of this observation for the study of competitiveness.

The inventor of a technological innovation is not necessarily its main user. Certainly in product innovation, a large group of consumers will exist outside the inventing firm. With regard to organizational innovation on the other hand, there usually is no such separation between the inventor and the user. The firm inventing the new form is normally also the firm making use of it. One of the consequences of this is that in the selection environment (Nelson and Winter, 1982) the role of the consumer is absent. As a result, no quick and clear market-based evaluation of the new form can be obtained. A firm may keep investing in the form, even though the competitive advantage it generates is limited. Technological innovations, and certainly the subset of product innovations, have clearer evaluations in the market.

Teece (1980) puts forth the idea that technological innovations do not necessarily involve major reassignments of functions and responsibilities in organizations, whereas with organizational innovations these are always required. It is therefore

perhaps more difficult to contain organizational innovations to small parts of an organization. Moreover, the organizational changes may not leave all personnel better of, which may mean that organizational innovations are challenged more than technological innovations.

Finally, Nelson (1991, p. 71) conjectures that the uncertainty surrounding organizational innovation is greater than that around technological innovation. One of the reasons for this is that new organizational forms may have advantages and disadvantages that are not thought of before they are implemented. These unexpected consequences contribute to the increased uncertainty.

This by no means complete overview of differences between organizational innovation and technological innovation shows that there is ground for a separate treatment of organizational innovation, despite the fact that the interactions between technology and organization are plentiful. The observed differences merit attention in research as already was shown in the sections dealing with empirical evidence on the diffusion of organizational innovations. Before such research can start, it will be necessary to focus on organizational innovation with the aim to establish a workable definition of it. Next to that a tool to describe organizational innovations will be convenient for further research, because it will enable us to analyse the process of organizational innovation in more detail.

2.3 *Unbundling organizational innovation: a conceptual definition*

2.3.1 The language of organizational innovation

Empirical analysis of successful organizational innovations runs into difficulty because a conceptual definition of organizational innovations has not yet been developed. In the absence of such a conceptual definition, analyzing organizational innovations becomes a difficult task. Although a conceptual definition is missing, the concept of organizational innovation is used widely. For example, Chandler (1962, chapter 6) devotes a whole chapter to organizational innovations without giving a clear definition. Williamson (1975, p. 193) describes organizational innovations as "organization form changes" and stresses: "the fact that the language for characterizing organization form changes is rather primitive..... Being conceptually less tractable, organization form innovations have received much less in the way of formal analysis than have technical innovations".

This section tries to contribute to this "language" for characterizing organizational innovations by way of proposing a conceptual definition based on Van den Bosch and De Man (1993). From the strategy perspective chosen in this article, two aspects are relevant here. Firstly, the key building blocks of organizational innovations are defined. Secondly, a demarcation criterion is developed which makes it possible to distinguish between regular changes of organizational forms and organizational innovations.

2.3.2 An overview of definitions

Schumpeter already recognized that the concept of innovation has a much broader meaning than a purely technological one. As he defines it, innovations are formed by new combinations of things and forces. He identifies five cases: new goods, new methods of production, new markets, new sources of supply and new organization of an industry (Schumpeter, 1911). Since Schumpeter conceived of and extended his theory, there have been made great advances in the study of technological innovation. With regard to the emergence of new organizational forms, there have also been made some landmark contributions, yet overall the quantity of literature in this area of research is modest. Williamson (1975, p. 193) points to the absence of good definitions and tools of analysis with which to analyse new organizational forms as one of the reasons for this. The absence of a definition also hinders our understanding of the process of organizational innovation. It is for instance not possible to describe the way a form emerges, if there is no tool that allows us to do so.

Looking at some of the contributions to this field, many different conceptions can be found. First, there is a group of authors which defines organizational innovation as "the implementation of an internally generated or borrowed idea – whether pertaining to a product, device, system, process, policy, program, or service – that was new to the organization at the time of adoption" (Damanpour and Evan, 1984). This definition which includes both technological and non-technological innovations has been in use for quite some time (e.g. Sapolsky, 1967). Also, there are authors that claim to use this definition, but limit their research to only technological innovation (e.g. Baldridge and Burnham, 1975; Amabile, 1990). The broadness of this definition is therefore not very distinctive. This was already acknowledged by Damanpour and Evan, and therefore they pointed out that innovation can be divided in technical innovation and administrative innovation (similar divisions had been used previously by Evan (1966) and Daft (1978)). In this view technical innovation is the implementation of an idea for a new product, process or service. Administrative innovations are "those that occur in the social system of an organization". An administrative innovation "can be the implementation of a new way to recruit personnel, allocate resources, and structure tasks, authority and rewards" (Evan, 1966).

The necessity of distinguishing the technological from the administrative, is shown in a review by Damanpour (1991) of empirical studies in this field. The conclusion of the review was that there were important differences between these two kinds of innovation. Predictor variables for the rate of adoption of innovations (e.g. centralization and specialization) had worked out differently for technical innovations than for organizational innovations. For instance: centralization was positive for the adoption of administrative innovations, but worked out negatively for the adoption of technical innovations (p. 561). Similarly, organic forms seemed to be better suited for the initiation of technical innovations, whereas the initiation of administrative innovations was often surrounded by mechanistic conditions (p. 581). But the definition of administrative innovation, provided by the authors mentioned, is not satisfactory. The enumeration of

examples of administrative innovations is no real definition, no matter how helpful in making the concept intuitively clear[1].

Table 2.2 gives an overview of other key definitions of organizational innovation in the literature. A distinction is made between definitions that are limited to the intrafirm level and definitions that also include interfirm relations. Next to the main theoretical definitions, table 2.2 also provides an overview of the analytical concepts proposed by the authors to operationalize the definition.

The first thing to be noticed is that most authors have limited themselves to discuss organizational innovation as an intra-firm phenomenon. Yet in reality many new forms of organizing are of an interfirm nature e.g. networks, regional conglomerations (Best, 1990), joint-ventures, some forms of franchising. It is characteristic of many new forms of organization that they challenge traditional ideas about the firm's boundaries (Baden-Fuller and Stopford, 1992, p. 111). In this respect Godfroij (1993) concludes that networks are not fundamentally different from individual organizations and that therefore they should be analysed with similar techniques. "Organizations and networks are not essentially different phenomena; they only show gradual differences along dimensions that measure the degree of organization" (p. 77).

Secondly, many of the definitions are very general and can mean various things. Aldrich (1979), for example, is more concerned with the business an organization is in and the start-up of new firms, than with the way the organization is structured. Nelson and Winter (1982) state that organizational innovations can be analysed by means of their theory, but concentrate on technological innovation (p. 38). Their general description of innovation as "changing the routine" is however a helpful one. Following Schumpeter's (1911) identification of innovation with the "carrying out of new combinations", Nelson and Winter (1982, p. 130) state "Innovations in organizational routine similarly consist, in large part, of new combinations of existing routines". This emphasis on both "new combinations" and "existing" has to play a key role in a conceptual definition of organizational innovation from a strategic viewpoint. Williamson's (1975) framework is focussed on transaction cost economics and its application is mainly limited to the multi-divisional form and questions of vertical integration. Nevertheless, Williamson is one of the most influential contributors to the theory of organizational innovation.

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1 In the terminology of this group of writers the subject of this thesis would be called administrative innovation instead of organizational innovation, which in their view, encompasses both technological and administrative innovation. In this line of reasoning the term organizational innovation is superfluous, as simply using the word innovation would cover the same subject. The broadness of this definition, is probably one of the reasons why Wolfe (1994) finds that authors, working in this branch of research, hardly build on each others results.

Table 2.2 Overview of contributions to the definition of organizational innovation

level	author	definition	analytical concepts
intrafirm	Evan (1966)	"a new way to recruit personnel, allocate resources, and structure tasks, authority, and rewards" (p. 51)	
	Cole (1968)	"changes in business procedures and practices" (p. 61)	
	Mintzberg (1983)	"creation of a new configuration, an original yet consistent combination of the design parameters and the situational factors" (p. 296)	nine design parameters, four sets of situational factors
	Williamson	"organization form changes" (1975, p. 193) "new hierarchical methods of organizing economic activity (organization structure) and associated incentive, control and planning instruments" (1980b, p. 183)	
	Aldrich (1979)	"changes in the activities involved in organizational decision-making" (p. 98)	"no agreed upon criteria for identifying qualitative breaks between organizational forms" (p. 110)
	Nelson and Winter (1982)	"change in routines" (p. 128)	
intra- and interfirm	Chandler (1977)	"new ways of doing business between or within enterprises" (p. 48)	
	Best (1990)	"new rules that enable cooperative action" (p. 116)	
	Van Someren (1991)	"new way of grouping or coordinating firm activities, within or between firms" (p. 119)	grouping is the creation, elimination or reallocation of business activities (p. 120)
	Grandori (1993)	"a viable and effective combination of dimensions or elements of organizing" (p. 6)	nodes and links

Source: as indicated.

Thirdly, although definitions of the concept of organizational innovation are provided, operationalizations of the concept are scarce. Mintzberg (1983) for instance does provide analytical concepts to operationalize, but he limits himself to intrafirm changes. Also his concepts prove difficult to use in a dynamic situation: in his description of the emergence of the multidivisional form he does not use them (p. 233). Van Someren (1991) looks at organizational innovation from an economic point of view and does not focus on the way organizational innovations are brought about in practice. His analytical concepts are provided in a footnote and not developed further[2]. Yet, the stress in his conception of organizational innovation on firm activities holds interesting clues. Especially because it can be linked to the value chain concept (Porter, 1985). In section 2.3.4 the usefulness of the value chain for the analysis of organizational innovation will be explored, after having discussed a recent contribution by Grandori (1993). Summarizing: the limited view of organizational innovation as essentially intrafirm, the general unclarity of existing definitions and the lack of workable operationalizations provide ample reason for further attempts to define the subject.

2.3.3 Nodes and links: Grandori's contribution

Grandori (1993) departs from some of the same observations that have been made above. She states that the largely static view of organizations that is predominant in current organization theory should be replaced. According to Grandori organization theory has, up till now, been concerned with explaining the efficiency of *existing* organizational forms in *individual* firms by looking at specialization, coordination and power distribution as dimensions of organization form. Galbraith (1973, p. 149) seems to agree with her when he states that the drawback of his theory is that "it leaves little room for new structures".

Grandori goes on to observe that this approach is no longer valid because of three reasons. First of all in practice new forms of organization have emerged that are "external" to the firm (these have been called interfirm organizational innovations in section 2.3.2). Secondly, organizations make increasing use of new coordination mechanisms that are not typical of bureaucracies. These include among others market and cultural mechanisms as well as technical systems (e.g. information technology). Finally, there are new organizational forms that not only decentralize decision rights, but property rights as well.

Another objection of Grandori to organization theory as it has developed, is that it does not provide the practitioner and researcher with tools for being ahead of practice. That is, no new forms can be designed or predicted. Instead, justifying and rationalizing existing forms are at the core of research.

One of the examples of organizational innovation Grandori gives, is the networked form or N-form. In this organizational form the use of property rights (joint ventures, cross-partnerships, minority partnerships) as a coordination mechanism between firms instead of market mechanisms is remarkable. Owner-

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[2] Van Someren's definition is translated from Dutch by the author.

ship arrangements are a dimension of organizing that have not been considered by organization theory. Another new trait of the N-form is the role information technology plays as a coordinating mechanism. Other new forms and their new dimensions, identified by Grandori are assembled in table 2.3. Especially the broad range of coordination mechanisms is striking. Partnerships (like law firms and accountancy firms) use democratic ways of decision making; in flexible specialization informal relations are used; in Japan norms and culture play an important role in this regard.

Table 2.3 New dimensions of new organizational forms

New Organizational Form	New Dimension
M-form (multidivisional)	• Market as a coordination mechanism
N-form (network)	• Interfirm coordination by non-market mechanisms (property rights/ownership arrangements) • Use of information technology as a coordination mechanism
P-form (partnerships)	• Democracy as a coordination a mechanism
FS-form (flexible specialization)	• Restricted action rights (specialization) • Informal relations as a coordination mechanism
J-form (Japanese)	• Norms as a coordination mechanism • Culture as a coordination mechanism

Source: based on Grandori (1993).

Based on these observations Grandori turns to organizational components for analyzing organizational forms. Grandori proposes two types of organizational components: (1) properties of nodes and (2) properties of links. The first organizational component, properties of nodes, has to do with the allocation of rights to different parts of the organization. One can think of property rights, information rights, communication rights etc. These rights are allocated to people associated with activities. The second organizational component, properties of links (modes of linking nodes), also come in various guises. Prices, contracts, social norms, information technology (Huber (1990) argues strongly in favour of seeing information technology as related to organizational structure) are only some of the properties mentioned by Grandori. Porter (1994) points to geographical proximity as a coordination mechanism. The way he uses the concept, seems to suggest that Grandori's mechanisms of culture and informal relations constitute the coordinative capability of geographical proximity. The complete overview of links and nodes presented by Grandori can be found in table 2.4. Although Grandori (1993) does not give a precise definition of organizational innovation, organizational innovations in her conception are described as new combinations of the two mentioned organizational components, which lead to viable and effective organizational forms.

Table 2.4 Organizational components

Properties of nodes	(people associated with activities)
• Property rights	(who owns which assets)
• Action rights	(who is assigned what tasks)
• Decision rights	(who is entitled to define what matters)
• Communication rights	(who can talk with whom)
• Information rights	(who has access to what information)
• Reward rights	(who should expect what type of reward)
Properties of links	(modes of linking nodes)
• Prices	
• Contracts	
• Associational and federative agreements	
• Authority	
• Formal rules and procedures	
• Formal integration units	
• Social norms	
• Standardization	
• Informal relations/liaison roles	
• Information and communication technologies	

Source: Grandori (1993).

Because of the fact that the organizational components can be combined and recombined as if they were Lego, Grandori claims that with these components it is possible to design organizational forms. This is a big step in the direction of a more operational definition of organizational innovation. There is however some unclarity in the way she treats the organizational components as building blocks of organizational forms. Especially it is not exactly clear what nodes are: people, activities, a combination of these two or still something else. Moreover, the nodes and links do not seem to be separate entities. Formal rules and procedures for instance, usually assign action and decision rights to people, and prices and contracts are related to property rights (falling under the heading of nodes). The distinction between nodes and links is therefore not always clear. In the next section a definition of organizational innovation is given based on the value chain, where Grandori's conception of nodes is replaced by a less ambiguous focus on activities.

Furthermore, the demarcation criterium developed by Grandori to distinguish between organizational invention and organizational innovation is incomplete from a strategic viewpoint; in the next section the idea that an organizational innovation should be viable and effective, is redefined from a strategic perspective. Organizational invention refers to the discovery of a new way of organizing; organizational innovation encompasses the discovery and its *successful application* in practice. From the viewpoint of organization theory, viability and effectivity may be a sufficient demarcation criterion for the success of the organizational innovation. The strategic perspective taken in this paper however, requires a stricter criterion, for the viability and effectivity criterion does not exclude many very small and incremental changes of which the competitive impact may be

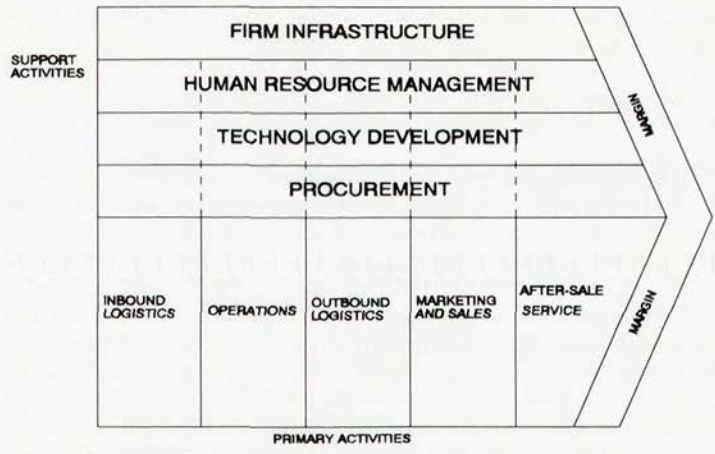
negligible. Consequently, a strategic perspective will have to incorporate a stricter criterion of success which does say something about the competitive impact.

2.3.4 Organizational innovation in the value chain

As was shown in table 2.2 Van Someren relates organizational innovations to the grouping of activities. It seems to be interesting to explore this idea further, because it can lead to a conceptual definition and an operationalization of organizational innovation based on the value chain concept. Before turning to this, first the background of the value chain concept and its position in the work of its author Michael Porter will be discussed, specifically in relation to innovation. Next it will be argued that an extended conception of the value chain can provide empirically identifiable "building blocks" for the analysis of organizational innovation, namely activities and linkages between these activities.

The value chain describes the firm as an interdependent system or network of activities, connected by linkages (see figure 2.1). These activities are divided in support activities and primary activities. Support activities are those that are needed in every primary activity, like human resource management and procurement. Primary activities are those activities that are part of the direct production process. With respect to linkages, Porter (1985, p. 48) states: "Linkages are relationships between the way one value activity is performed and the cost or performance of another". Linkages do not only connect activities inside the firm, but create interdependencies between a firm and e.g. its suppliers as well. This larger system of interdependent value chains is called the value system. Linkages within and between value chains can contribute to competitive advantage in two ways: optimization and coordination. Especially with respect to interfirm relations it is important to note that: "A company can create competitive advantage by better optimizing or coordinating these links to the outside" (Porter, 1990a, p. 43).

Figure 2.1 The value chain



Source: Porter (1985).

The question arises whether the value chain is a useful instrument for operationalizing the concept of organizational innovation. To answer this question firstly it has to be studied whether organizational structure can be defined on a value chain level. Secondly the question has to be answered whether both organizational innovations within and between organizations can be incorporated in the analysis. A third issue is how the emergence of organizational innovations can be described by means of value chain analysis.

The first question is easy to answer. In *Competitive Advantage*, Porter himself goes into the relation between organizational structure and the value chain. As he defines organization as the grouping of activities (Porter, 1985, p. 39), he claims that every organizational structure can at least in principle be reproduced in the value chain. Faulkner and Bowman (1992) even maintain that the appropriate level to carry out organizational analysis is the value chain activity level. In their view the firm's organizational structure can be adapted on a value activity basis to realize a strategy. That's why in their view a higher level of analysis is less appropriate for the description of changes in organizational structuring. Similarly, Jarillo (1988, p. 35) states: "In order to understand the way firms structure themselves (which activities are integrated and which are farmed out) we must break up the firm into smaller units of analysis" and "The concept of the value chain (Porter, 1985) is very useful in this effort to break up the firm". A practical illustration of the versatile possibilities of the value chain, can be found in Wijers (1994) who uses the value chain to identify organizational mechanisms that create horizontal synergy.

Harvey, Lefebvre and Lefebvre (1993, p. 482) point to the usefulness of the value chain for this purpose as well. In addition they point to four characteristics that enhance the usefulness of value chain analysis of organizational forms:

- comprehensiveness: it includes all important dimensions of organizational design, although they claim that interfaces between groups of activities must be explored further;
- it is conducive to both strategic and tactical analysis: it is global enough to allow a general evaluation of different configurations of activities to take place and detailed enough to allow a detailed design of work;
- visuality: it makes alternative designs visible and thus allows identification of inconsistencies and solutions to these;
- simple and general applicability: it is not industry specific.

Regarding the second question, namely whether interorganizational relations can be part of Porter's value chain, Porter also provides the answer himself. The concept of the value system can be used for this. Different links between value chains of different firms can be made explicit with the concept of the value system. Also, Porter and Fuller (1986) use a simplified value chain in order to describe the various ways in which interorganizational forms in global industries can be given substance. They distinguish between X- and Y-coalitions. X-coalitions are those in which partners perform different activities (e.g. one partners produces, while the other is responsible for marketing). In Y-coalitions partners share the activities (e.g. a joint marketing agreement). Different coalitions can be described by making use of the concepts of activities that are carried out by the

different partners in the coalition and the linkages between these partners. The characteristic of the value chain that it can be applied on different levels of aggregation is the basis of an almost unlimited flexibility. The building block (Lego) approach to organization that is its fundament, provides the freedom and possibility to study interorganizational relations as well.

The third question deals with the issue whether the value chain can also be used in a dynamic situation, that is whether it is appropriate for analyzing changes in the grouping of business functions. In the literature this subject has not really been taken up. Quinn, Doorley and Paquette (1990) provide one example. They have used the value chain for the analysis of in- and out-sourcing of services. They show that the emergence of the hollow corporation (an example of an organizational innovation) can be described in terms of the value chain. In- and out-sourcing are examples of, respectively, creation and elimination (Van Someren, 1991) of value chain activities. According to Normann and Ramirez (1993) new configurations of business activities cannot be described by means of the value chain because in their view it is a static instrument. Normann and Ramirez claim that consistently changing the value chain, especially in relation to a firm's customers, is the key to competitive advantage. Yet, as Lundquist (1993) points out, it is precisely the use of value chain analysis that can become a guide in deciding where to reconfigure the value chain. In this regard it must be noticed that the value chain is a flexible concept that can be adapted to different businesses and should not be seen as a static instrument in which every business should fit, as Normann and Ramirez seem to suggest. The concepts of activities and linkages that constitute the value chain allow sufficient flexibility in this regard and do provide ample opportunities to describe the new configurations pointed at by Normann and Ramirez. The only claim made by Porter, is that firms can be described in terms of linkages and activities. It would be a misinterpretation to suggest that Porter claims that the picture presented in figure 2.1 holds for all firms. Instead, the content of each activity and linkage is firm specific. This is clearly illustrated by Harvey, Lefebvre and Lefebvre (1993) who use a slightly modified value chain model for describing the organization form of service firms.

Harvey, Lefebvre and Lefebvre (1993) also incorporate new relationships with clients in their value chain model. Especially in service delivery, the client can play an important part as a co-producer by means of taking over activities from the service provider. Van der Aa and Elfring (1993) stress the importance of the client in performing activities. In a study into innovations in services they found that clients can a play a role as co-producers, can specify what services they want and can even play a role in marketing. Hence, to some extent the role of individual clients can be incorporated in the value chain model. Transfer of activities and changes in linkages cannot only take place between firms, but seem to occur between firms and persons as well.

Rearrangements of activities can make an organization more efficient (Håkansson and Johanson (1992) claim that this is true for networks as well). As stated in table 2.2, next to creation and elimination as ways of rearranging the value chain, reallocation of activities has also been distinguished as a form of organizational innovation. Creation refers to adding an activity to the value chain or system, that previously was not performed. Elimination is the removal of activities out of the

value chain or value system. Reallocation refers to shifting activities inside or between value chains. After the reallocation has taken place, the reallocated activity is still performed in the value chain or system, but by different persons or firms. To this trio of creation, elimination and reallocation can be added integration: a novel combination of activities in which two formerly separated and different activities are being linked or simultaneously carried out. These four categories of changing the configuration of activities in and between value chains can be described together as reconfigurations of activities. Reconfiguration of activities in and between value chains becomes the first building block for a definition of organizational innovation. Some examples of organizational innovations as reconfigurations of activities are shown in table 2.5.

Table 2.5 Examples of organizational innovations in the value chain and value system

	examples	**in value chain**	**in value system**
RECONFIGURATION	*creation*	add quality control to incoming logistics	joint marketing consor-tium of small companies, where previously marketing was absent
	reallocation	first sales, then production instead of the other way around	distributors taking over packaging and labelling from producers
	elimination	hollowing-out (choose the buy option in a make or buy decision)	stock of parts in the JIT-system
	integration	integration design-prototyping in the car industry (multi-functional teams)	selling insurance and financial services through the same channel

Source: see text.

Important to reconfiguration is the notion of time and place (for a rigorous discussion of the role of time and place in economics see e.g. Clark (1987, p. 260) and Harvey (1989)). Dicken (1986, p. 212) for example points to the role geographical reallocations of activities play in the world economy. Time plays a role in reallocation of activities in that for example activities that formerly were performed successively now are carried out simultaneously or even in a different order altogether. In theory every reconfiguration has aspects of time and place in it, as in every reconfiguration the question has to be answered where and when an activity has to be performed. The where question is especially relevant for research into national competitiveness. The location of the central activities determines country competitiveness. Porter (1990a) for instance identifies a firm's home base as the place where the central value adding activities (in his view these are the innovative activities) are performed. Another example is Reich and Mankin (1986) who maintain that the division of research and production in Japanese-American joint ventures is detrimental to American competitiveness. Opposite to Porter's view they suggest that not the innovative activities are of

importance to national competitive advantage but the manufacturing capabilities. Another example is Dunning (1993, pp. 208/209), who finds differences between Japanese and American firms regarding where activities are performed when these firms open up transplants in Britain. Hence, there clearly are differences in where and when activities are performed. What the determinants of these differences are, remains vague. A combination of inside-out and outside-in factors may be helpful in clarifying this issue[3].

The second key building block of a conceptual definition of organizational innovation are the links already pointed at by Grandori. These are also part of the value chain. Links in the value chain are traditionally seen as adding no value; an assumption which is changing (Lamming, 1993, p. 91). Grandori's ideas on links are an extension of Porter's views on linkages. Porter's "linkages" and Grandori's "modes of linking nodes" both relate to coordination mechanisms. Porter's linkages are defined as the connections between one activity and the cost or performance of another activity. Porter does not go into detail about what kinds of linkages there may be, while Håkansson and Johanson (1992) point out that there are various ways to link individual activities. Grandori's links seem to be a useful extension of the value chain on this point as she makes a subdivision of linkages. Activities can be coordinated by mechanisms that are economical (prices/costs), legal (contracts), cultural (values), political (democracy), technological (information technology) etc. (see the bottom half of table 2.4). This analysis of the concept of linkages seems to be more in line with the present focus on organization form and is more operational than Porter's rather general notion of linkages. It also provides an answer to the observation by Harvey, Lefebvre and Lefebvre (1993) that the interfaces between groups of activities should be explored further.

So far, it has been shown that the configuration of the two building blocks of organizational forms, namely activities and linkages, can describe new organizational forms. The next and final step of a conceptual definition of organizational innovation should be a demarcation criterion which ascertains whether the form is indeed an innovation, in the sense defined by Schumpeter (1939, p. 84). Schumpeter states that invention as such is not interesting, but that the commercial application of something new is the interesting feature to study in economics. This is what Schumpeter calls innovation. Following this line of reasoning, a definition of organizational innovation is inadequate if it does not take into account that not only the invention of organizational forms matters, but also the actual successful application. It is this successful application that triggers the dynamics of competition. So, not only the invention which is internal to the firm(s) is of interest but also the impact the invention has in the competitive process. This means that in order to be an organizational innovation, the new organizational form must also lead to a competitive advantage: it must also have consequences outside the innovating firm(s), specifically for its competitors in the industry (Baden-Fuller, 1994; Barney, 1991; Hall, 1994). A parallel with Schumpeter's

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[3] Chapter 8 will analyse a spatial transfer of activities in the distribution sector which is mainly induced by changes in demand and governmental regulations.

creative destruction (1942, p. 83) can be drawn: the new organizational combination should in principle undermine the competitive position of other firms. Preferably, the competitive advantage should also be sustainable. As far as this sustainability is concerned, section 1.5 has shown that many organizational innovations are sustainable.

This also rules out a definition of innovation as being something new to the adopting organization. Such a definition may be relevant to organizational theorists, but lacks the explicit reference to the outside, which is incorporated in the concept of competitive advantage. In the view customary in organization theory, when a firm is the last to adopt an organizational innovation, this still is considered to be an innovation even though the competitive impact of it will be negligible. For the study of organizational change this is not a problem, as it studies the process of organizational change and not the strategic impact of this process. The strategic perspective endorsed here, however, does require an external focus and therefore the innovation must cause a shift in competitive position. Hence, innovation will be defined as something new to the industry in which the innovation occurs[4].

In this demarcation criterion the wider societal impact of a new way of configuring the value chain is abstracted from. It may very well be that a reconfiguration diffuses rather quickly and thereby provides an important impetus for economic growth. From a strategic viewpoint however, this is a less interesting innovation because the sustainability of such an innovation for individual companies is limited. Taking a strategic perspective implies using a relativity criterion: only those innovations are of interest that contribute to a stronger position of an individual firm compared to its competitors. Grandori's demarcation criterion does not enable researchers to make this distinction. Of course this is not surprising, as she does not adopt a strategic perspective, but looks into this subject from organization theory.

The preceding analysis leads to the following *conceptual definition of organizational innovation*:

> an organizational innovation is a new combination of the building blocks of organizational form i.e. of the activities and/or linkages in the value chain (system), contributing to a sustainable competitive advantage of the organization(s) involved.

This definition emphasizes the *form* of the configuration of the building blocks. To be able to answer the main research question, two other attributes of organizational innovation have to be taken into account as well. These attributes are: the *speed* with which an innovation is implemented and the *extent* (importance and number) of the organizational innovation (see Wolfe, 1994). The speed with which innovations are implemented is an important feature of innovative processes: some determinants force a company to implement changes swiftly, other determinants may slow down the implementation. Whereas the extent of the inno-

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[4] Of course, it goes without saying that whether an invention leads to a competitive advantage can only be determined with hindsight.

vation is concerned, it is part of the research question to see which determinants limit the number of innovations and which determinants increase this number. Moreover some determinants are more influential than others and may require more important changes in the value chain. Speed and extent are therefore important attributes of organizational innovation: not only the way the value chain is reconfigured matters (form), but also the velocity with which the changes take place and the number of them.

2.3.5 Comparing two approaches

It will be clear that there are some similarities and differences between Grandori's approach and the approach developed here (see table 2.6). Grandori's nodes have been replaced by activities. Her ideas concerning links are an extension of linkages between activities in the value chain and are incorporated in the modified value chain approach put forth above. Next, Grandori's view of organizations as being composed of different building blocks as if they were Lego, is fully subscribed in the value chain approach. Yet, the value chain approach seems to be somewhat more operational than the "nodes and links"-approach, predominantly because the focus on activities is clearer than the focus on nodes. Finally, instead of defining organizational innovations as viable and effective, the demarcation criterion of sustainable competitive advantage has a more explicit focus on the influence of the innovation on the environment. Therefore it is more closely related to Schumpeter's ideas on innovation.

Table 2.6 *Differences and similarities between the nodes and links approach and the (modified) value chain approach*

Issues in a conceptual definition	**Nodes and links approach**	**Value chain approach**
1. First building block	1. properties of nodes (people associated with activities)	1. activities
2. Second building block	2. properties of links/ coordination mechanisms (modes of linking nodes)	2. similar linkages
3. Applicability of Lego-metaphor	3. yes	3. yes
4. Possibilities for operationalisation	4. problems with nodes, but operational conception of linkages	4. less problems with activities, Grandori's linkages incorporated
5. Demarcation criterion	5. viable and effective	5. sustainable competitive advantage

Source: see text.

2.3.6 Reorganization or innovation?

In what does organizational innovation differ from reorganization? Every innovation will change the structure of a firm and will therefore entail a reorganization. The opposite is not true: not every reorganization is an innovation, at least when the definition of organizational innovation given above is accepted. For convenience, the word reorganization will be used here in the sense of organizational change towards an *existing* organizational form.

Defined in this way, the difference between reorganization and organizational innovation lies in the degree of novelty of the innovation. A reorganization is not necessarily new to the industry. Many firms may have organized or reorganized their business in a similar way as a reorganizing firm does. Consequently, such a reorganization does not lead to a new organizational form and does not have any innovatory aspects, according to the developed definition.

Chandler (1962, p. 284) distinguished between organizational changes which are creative innovations and those that are adaptive responses. Creative innovations go "beyond existing practices and procedures", whereas an adaptive response "while involving major changes for the individual or firm making the response, stayed within the range of current custom". Adaptive responses have many imitative features. Reorganizations can be said to belong to this latter category of adaptive response.

Three other differences between organizational innovation and reorganization can be found in the literature (see also table 2.7). These are:

- higher uncertainty with regard to the benefits (Mahajan, Sharma, Bettis, 1988) of innovation as compared to reorganization. This effect occurs because no examples can be found of organizations that have organized themselves in the new way. As Bartlett and Ghoshal (1993, p. 43) show, this phenomenon also inhibits a detailed discussion of the benefits of newly arisen organizational innovations. Only long after the innovation has been implemented it will be clear whether it has led to a competitive advantage or not;
- a greater need for experimentation in the case of innovation, as the key characteristics of the new form are not yet known (search and trial and error dominate, see Nelson and Winter, 1982);
- and connected to the previous two: lack of legitimacy (Hannan and Freeman, 1977), which is more relevant in the case of developing a new form of which the consequences are completely unclear, than in the case of implementing an existing form of which the effects may be better known. Because no examples are available to convince people that the new organizational structure should be adopted, there is no possibility to legitimize the new form.

Uncertainty and lack of legitimacy have been known to be endemic to innovative approaches since a long time (see for example Machiavelli, 1513). Together with the need for experimentation, they make the process of organizational innovation more complicated in comparison to reorganization.

Table 2.7 Differences between organizational innovation and reorganization

Organizational innovation	Reorganization
• creative innovation	• adaptive response
• higher uncertainty	• precursors exist: lower uncertainty
• importance of trial and error, as basic characteristics are unknown	• lower need for experimentation, as basic characteristics are known
• lack of legitimacy	• higher legitimacy

Source: see text.

2.4 *Summary*

Differences between organizational and technological innovations have been discussed. Organizational innovations are sufficiently different to allow separate discussion of them, even though there are many relations between organization and technology. Next a conceptual definition has been developed as a contribution to the "language" of organizational innovation, as Williamson calls it. The building blocks of organizational form, activities and linkages, enable a description of new organizational forms to take place. Most important in this respect is that organizational forms in this definition are not limited to intra-organizational forms, but that interorganizational forms have also been incorporated in the definition. In doing so, the growing amount of interorganizational relations that have come into being can be studied with the developed tool as well. In the definition a strategic perspective has been chosen: the impact an innovation has on competitive advantage is the demarcation criterion that not only sifts unimportant changes from the important ones, but also embeds the definition in Schumpeterian theory.

The definition developed in the preceding sections also provides an interesting research question. The operationalization of the concept of organizational innovation allows a detailed study to be made of new organizational forms. It enables shifts in activities and linkages to be identified, so that it is possible to rephrase the key research question in a more operational form, namely by operationalizing organizational innovation as shifts in activities and linkages, contributing to a competitive advantage. Next to this aspect of the form of the innovation, two other attributes of organizational innovation were defined: the speed with which the changes take place and the extent (number and importance) of the changes.

The operationalization of organizational innovation by means of the value chain makes it possible to describe changes in organizational forms in great detail. Thus detailed propositions on the determinants of innovation and their impact on the configuration of activities and linkages can be put forth and tested. Above that a better insight can be obtained in the way the new organizational form works in practice. The empirical chapters 7 and 8 will show the value of this approach in depicting organizational forms and testing propositions.

The question why firms choose for one reconfiguration of activities and linkages over another will be treated in the following chapters by delineating the impact

of determinants inside and outside the firm. First of all the next chapter will look into the contributions existing theories of organizational innovation have made.

3

Overview of the theory of organizational innovation

3.1 *Introduction*

An Inquiry into the Nature and Causes of the Wealth of Nations by Adam Smith (1776), opens with an account of the division of labour in a pin factory. This analysis, by virtue of being the first in what is probably the most classical text of economics, has become one of the best-known descriptions of an organizational innovation viz. the division of labour. Yet in the many years following the appearance of the book, economics has been primarily concerned with formalizing Smith's analysis of the working of markets, instead of directing its attention towards theorizing about innovation in the organization of labour. The subject has however been picked up in the course of this century. In the following subparagraphs some key contributions to the theory of organizational innovation have been assembled. Only those theories are discussed which specifically discuss organizational innovation; chapters 4 and 5 will deal with the question whether theories of technological innovation can contribute to a coherent explanation of organizational innovation. Hence chapters 4 and 5 will discuss the contribution other theories can make to the study of new organizational forms, while this chapter reviews existing theories of organizational innovation.

Section 3.2 will briefly discuss the requirements a theory of organizational innovation must meet based on the schema developed in the introduction. The literature will be reviewed in section 3.3. Each author's theory will be summarized and criticism on the author's viewpoint will be brought forth. Table 3.4 summarizes some of the main points of the literature reviewed.

The conclusion in section 3.4 will show that some authors have defined building blocks for an inside-out perspective, but that these building blocks may be combined in a more coherent perspective. Chapter 4 will use innovation theory to realize that. Next, even though the influence of the business environment (outside-in approach) is discussed by several authors, this has always been done ad-hoc. A well-structured and in-depth analysis of the way the business environment influences organizational innovation is lacking. Chapter 5 will propose

Porter's diamond framework (Porter, 1990a) as a suitable tool for such an analysis. Briefly stated, the different theories presented provide parts of the picture of organizational innovation which have not yet been combined into a coherent framework.

3.2 *Requirements for a theory of organizational innovation*

In the subsequent sections different theories related to organizational innovation will be discussed in connection to figure I.1. Diverse concepts will be presented, and evaluated on their contribution to the theory of organizational innovation. Special attention will be given to the determinants of organizational innovation: those factors that influence the way the value chain is reconfigured. Figure I.1 has shown that a theory of organizational innovation should incorporate both an outside-in and an inside-out approach. Chapter 2 has explicitly added two other criteria: the theory should explain the pluriformity of organizational forms (both the intra- and interorganizational innovations) and more specifically, a competitive advantage approach is required.

Outside-in

As Powell (1990, p. 323) stated, a theory explaining the diversity of organizational forms should be context-dependent. Economical, social, political and technological factors can shed light on the reasons why diverging forms emerged. The outside-in approach refers to this contingent and situational nature of organizational forms.

Different aspects of the business environment may influence the process of organizational innovation. It is not only interesting to know which determinants are of interest, but also in what direction the influence of different determinants runs. Some factors may be conducive to organizational innovation, others may be prohibitive.

Inside-out

Next, Powell (1990) points to historical contingency as important in explaining diversity. Even though the business environment has important historical backgrounds, it is especially the inside-out approach that can meet this requirement. A firm's resource-base and knowledge influence its choice of organizational form. The way the organizational form emerges can be understood by investigating the historical process in which these firm specific resources were accumulated.

The characteristics of this process of innovation are incrementality, search for the right solution, and trial and error (cf. Nelson, 1991). Lamming (1993, p. 174) found such characteristics in interorganizational relations as well, when he speaks of "the lumpy, piece-meal and involuntary nature of evolution of relationships". Powell (1990) made similar observations for the case of networks. These dynamics of the process of organizational innovation should be properly incorporated in a theory of organizational innovation.

Organizational innovation: pluriformity of forms

The many different organizational innovations which have come to the foreground, not only in recent times but also at earlier moments in history, should be amenable to analysis with the developed framework. Especially the increasing amount of interorganizational innovations are of interest in this regard. It will be shown below, that some existing theories have not studied this phenomenon at all or run into difficulty when they attempt to explain it.

This point is especially important in connection to the goal a company is assumed to have. When this goal is competitive advantage pluriformity is of interest, as competitive advantage is rooted in differences between firms (Porter, 1985).

Competitive advantage

A strategic perspective has been chosen in the preceding chapters. Chapter 1 showed that organizational innovations can contribute to competitiveness in many ways, hence the choice for competitive advantage as the company goal. This point has been elaborated in section 2.3.4 of the previous chapter. Most theories have focussed narrowly on cost and efficiency and have for example not incorporated effectivity and value creation as being important for the way firms are structured. In explaining organizational innovation, the firm should be seen as a strategic actor, pursuing a broad set of goals. A focus on competitive advantage is therefore appropriate.

The following sections will discuss the contributions made to these analyses and identify the gaps in literature dealing with this subject. Different authors have highlighted some of the above mentioned elements, but few have discussed them comprehensively or explicitly integrated them in their framework. Especially the influence of the business environment is not well incorporated in the analysis of organizational innovation and for so far it has been treated, this has not been done in a well-structured way. Therefore there remains considerable unclarity regarding the question how and which variables in the business environment influence the creation of new organizational forms.

3.3 *Overview of the theory of organizational innovation*

3.3.1 Schumpeter

No account of innovation is complete without Schumpeter. He was one of the first to see innovation as central in the economic process. This paragraph will give an overview of Schumpeter's ideas with regard to innovation in general, but organizational innovation in particular. His ideas on innovation will be discussed, as they are presented in three of his books: *The Theory of Economic Development* (first printed in 1911), *Business Cycles* (1939) and *Capitalism, Socialism and Democracy* (1942)[1].

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[1] The exact editions used here are: Schumpeter (1949), Schumpeter (1986), and Schumpeter (1992) respectively.

The Theory of Economic Development

The basic thesis of *The Theory of Economic Development* is that business cycles like the Kondratieff are caused by the simultaneous and discontinuous occurrence of innovations. These innovations come in five forms: new goods, new methods of production, new markets, new sources of supply, and new organization of an industry (see table 3.1). As producing means combining materials and forces, innovation is described as creating "new combinations". Essentially, Schumpeter is concerned with the economic phenomena to which innovations give rise. His focus is not primarily on the genesis of innovations, but on how an economy reacts to them and reaches a new state of equilibrium.

Table 3.1 Schumpeter's five forms of innovation

1. The introduction of a new good
2. The introduction of a new method of production
3. The opening of a new market
4. The conquest of a new source of supply
5. The carrying out of the new organisation of any industry

Source: Schumpeter (1911, p. 66).

Pertaining to organizational innovation, Schumpeter does not define new organization of an industry. He only gives two examples, of which he thinks that they are included in the definition: the emergence or breaking up of monopoly and the emergence of large-scale business. The meaning of the word "new" is clearer: "new" is defined on an industry-level. Existing forms of organization that for the first time get implemented in a particular industry are new and such an implementation is an example of innovation.

Schumpeter does not make a distinction between organizational and technological innovation as far as the way they emerge is concerned. With regard to the creation of new forms of organization (and therefore for any other innovation in Schumpeter's theory) some points can be noticed. There is no innovation without an entrepreneur. The function of the entrepreneur is not only invention but also the application of it (the real innovation). The invention will be directed by the question what new combination is more fruitful in terms of getting more products in the same time by means of the same amount of production factors. The most difficult thing for the entrepreneur however, is overcoming the resistance against the innovation, in the form of obtaining "workers, trained personnel and the necessary market conditions. Innumerable resistances of a social and political character work against it" (p. 133).

A last remark about this coming into being of innovation is that innovations come in swarms, simply "because the appearance of one or a few entrepreneurs facilitates the appearance of others" (p. 228). The first entrepreneurs remove obstacles to innovation, thereby making it easier for less able entrepreneurs to follow their example, which leads to more obstacles being removed etc. In this way one innovation, through the acts of entrepreneurs, induces the others.

Business Cycles

In *Business Cycles* (1939) Schumpeter keeps his theoretical framework intact. There are some extensions, which however do not strike at the heart of his theory. The first extension is that he now defines innovation as a shift of the production function. This seems to be more a theoretical underpinning of his idea of new combinations by relating it to mainstream economical theorizing, than a basic shift in his ideas. Regarding organizational innovation "organization of an industry" as an example of innovation is replaced by "new business organization" (p. 84).

However, a clear definition of organizational innovation is absent. There is only impressionistic evidence as to what Schumpeter considers new organization forms: he mentions department stores, mergers, the replacement of craft guilds by corporate enterprise. The latter's rise is extensively discussed by Schumpeter. The gradual evolution of the corporate form demonstrates the importance of risk, specialization and legislative barriers to the genesis of a new structure. Schumpeter also mentions developments in the railroad field where there were present "two leading men (Harriman and Hill). One of them was as much an organizer and reformer of administrative routine as he was a stock exchange leader" (p. 405). Schumpeter's discussion of the growth of railroads however, limits itself to merger activity and does not go into the importance or form of the "new administrative routines".

Further evidence on the creation of innovation is scant. Innovation is said to be connected to the appearance of new plant, new firms and new men. Like in his *Theory of Economic Development* innovation is considered to be the first application of something new in a certain sector. Using this definition, Schumpeter hints at some obstacles to innovation. The spread of the corporate form into banking for instance, was forbidden by the English government until 1826 (p. 278). Further, Schumpeter found evidence that in some sectors the corporate form spread rather quickly (like in railroads, public utilities and shipping), while in others like cotton-manufacturing this form was almost non-existing. Except for the element of risk (riskier projects are carried out in a corporation), it does not become clear why diffusion of the corporate form differed so much between industries.

Capitalism, Socialism and Democracy

Finally, in *Capitalism, Socialism and Democracy* some new ideas emerge. The first one is the idea of Creative Destruction ("the process of industrial mutation -if I may use that biological term – that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one", p. 83), which implicitly was present in his earlier work as well. The second idea is more implicit: Schumpeter seems to have altered his view that innovation is always connected with new firms. The routinization of innovation towards which capitalism develops, appears to be connected with existing firms. Innovation may occur both in existing and in new firms. Thirdly, innovation is not only connected with efficiency in the narrow sense. Quality can be part of innovation too, while the goal of innovation is profits. Fourthly, Schumpeter, gets less consistent in his terminology regarding organizational innovation. In the book he speaks about "new forms of industrial organization" (p. 83), in the preface to

the second edition he talks about "new forms of organization" (p. 411 in the 1992 edition) Perhaps Schumpeter sees both industry structure and organizational structure as subject to innovation. The examples of new organizations he gave in his two earlier books can be divided along these lines: monopoly and merger belonging to industry structure and the corporate form and department stores to organizational structure.

CONCLUSION

Schumpeter's main contribution is that he puts the analysis of innovation central in his theory. He also distinguishes organizational innovation from technological innovation, but does not make a difference with regard to the way they are created and diffused and with regard to the economic consequences they have. The nature of innovation (and thereby of organizational innovation) consists of enhancing efficiency by means of new combinations with the aim to reap profits and innovation means anything new in a certain *industry*. As was pointed out in sections 2.3.4 and 2.3.5 the competitive advantage criterion is consistent with this.

The creation of innovation is dependent on:

- the entrepreneur
- other innovations (innovations come in swarms in time and place)
- external barriers (legislation, labour, finance etc.)
- competition (creative destruction).

Innovations in organizational structure ("administrative routine") and industry structure (a.o. mergers) are not clearly separated. Schumpeter's focus is mainly on industry structure, as is clear from his description of mergers. Concluding, the emergence of innovation in terms of the inside-out and outside-in approaches largely remains a black box.

3.3.2 Chandler

Strategy and Structure

Chandler studies the rise of the modern enterprise from a historical perspective. The basic tenet of his book *Strategy and Structure* is that structure follows strategy. New strategies emerge because of changes in the environment. "Strategic growth resulted form an awareness of the opportunities and needs – created by changing population, income and technology – to employ existing or expanding resources more profitably" (p. 15). Put differently, the possibility of more efficient production, noticed by management, led to new strategies. According to Chandler there are basically two strategies: vertical integration and diversification.

Strategy is essentially a means to bring about growth. Firm growth may bring an existing organizational structure into difficulty, especially when this growth is achieved by the strategy of diversification. This may lead to an overload of operational decisions at the top, because of which top managers may neglect long term decision making. For the modern enterprise the multidivision form relieves managers from the pressure of day-to-day affairs. This enables them to direct their attention to strategic decision-making, while division management takes care of

daily operations. It is remarkable that the multidivisional form was invented at the same time by different companies (GM, DuPont, Jersey Standard, and Sears). Next to some exchange of management between these firms, this reflects "changes in the over-all American economy", according to Chandler (p. 385).

Chandler finds that organizational forms do not diffuse to every company. There are both firm and industry specific factors that enhance or slow down the spread of the innovation. Of the firm specific factors not only the chosen strategy matters, but also the administrative history of the company. An example of industry specific factors is given in the steel industry, where the production process demands tight control, so that decentralized decision making cannot be applied there.

The Visible Hand

In *The Visible Hand* Chandler (1977) does not make many changes in the framework of analysis developed in *Strategy and Structure*. He focusses more strongly on technological innovation and changes in consumer demand as determinants in the business environment. Furthermore, he claims to have identified three propositions[2] that "help to explain the initial appearance of modern business enterprise: why it began, when it did, where it did, and in the way it did" (p. 12).

These propositions are:

1. "modern multiunit business enterprise replaced small traditional enterprise when administrative coordination permitted greater productivity, lower costs, and higher profits than coordination by market mechanisms" (p. 6);
2. "the advantages of internalizing the activities of many business units within a single enterprise could not be realized until a managerial hierarchy had been created" (p. 7);
3. "modern business enterprise appeared for the first time in history when the volume of economic activities reached a level that made administrative coordination more efficient and more profitable than market coordination" (p. 8).

Whether these 3 propositions are really enough to explain "why, when, where and the way" remains to be seen. Point 2 and 3 are conditions which were fulfilled in the USA in the beginning of this century (when and where), but probably also in other countries. Point 1 is part of the explanation of "why". "The way in which" does not seem to follow from these propositions. Even when the propositions are satisfied, there may still be many ways of organizing. The answer to the question why the specific forms of the business enterprise discussed by Chandler (the divisional form and functional form) are chosen, does not follow from these propositions. It is exactly this issue that is at the core of the research questions identified in section 2.4. In terms of chapter 2 "the way in which" refers to the configuration of activities and linkages that eventually comes about. The propo-

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[2] Next to these three propositions, Chandler develops five propositions that explain the continuing growth of the firm. These are not treated here, as the focus is on the initial derivation of new organizational forms.

sitions do not identify determinants of such reconfigurations. These are scattered throughout Chandler's text and include the already mentioned demand, technology and the administrative problem of overload at the top.

Whereas in *Strategy and Structure* Chandler described organizational innovations in four major firms, in *The Visible Hand* his focus is primarily on organizational innovations in railroads. The revolution in transportation together with the revolution in production made possible the growth of the modern industrial enterprise. The modern industrial enterprise, characterized by managerial hierarchies (the "visible hand"), "emerged and spread only in those industries and sectors whose technology and markets permitted administrative coordination to be more profitable than market coordination" (p. 11). So hierarchy is limited by the market: only where it is more efficient hierarchy will occur.

Scale and Scope

> "It was the development of new technologies and the opening of new markets, which resulted in economies of scale and of scope and in reduced transaction costs, that made the large multiunit industrial enterprise come when it did, where it did, and in the way it did. These technological and market changes explain why the institution appeared and continued to cluster in certain industries and not in others, why it came into being by integrating units of volume production with those of volume distribution, and finally, why this multifunctional enterprise continued to grow (though not in all cases) by becoming multinational and multiproduct" (Chandler, 1990, p. 18).

This lengthy quotation from *Scale and Scope* will make clear that Chandler still maintains the basic ideas that have been developed in his previous work. There are however also some extensions. First of all, Chandler elaborates about factors internal to the firm. Successful firms were first movers, that kept their advantages only if they followed a strategy of three-pronged investment in production, management and distribution. These investments had to be related to the firm's capabilities. The idea of capabilities as the core of the dynamics of industrial capitalism, is also new in Chandler's work and will be discussed further below.

Next, Chandler moves beyond a description of business in the U.S.A. to include Germany and Great-Britain. Chandler finds that his analysis also holds in these countries, although the exact form of enterprise that emerged in the three countries differed. Chandler names these forms: competitive managerial capitalism (U.S.A.), personal capitalism (Great-Britain: management and ownership were not separated to such an extent as in the other countries) and cooperative capitalism (Germany: extensive forms of cooperation, like cartels, were allowed). The explanation given by Chandler is that differences in the firm environment are responsible for this. He mentions factors like education, markets, legal systems. That the way in which enterprise developed is not adequately explained by the three propositions in *The Visible Hand*, now becomes clear. It is the business environment that ultimately determines the exact form enterprise takes (the "way in which" the form emerges).

The "capability articles"

In *Scale and Scope* Chandler explains the dynamics of industrial capitalism by making use of a capability approach. "These organizational capabilities were the collective physical facilities and human skills as they were organized within the enterprise. They included the physical facilities in each of the many operating units – the factories, offices, laboratories – and the skills of the employees working in such units" (Chandler, 1990, p. 594).

In subsequent articles Chandler expanded on the notion of capabilities (Chandler, 1992a; Chandler, 1992b). Chandler (1992a) claims that after World War II the pioneering firms were not new firms, as was the case in the period before World War I, but long-established managerial enterprises. Chandler is not specific on this point, but the explanation seems to be that in the mean time more advanced capabilities had become more important in the competitive process. A further extension of *Scale and Scope* is that Chandler now also discusses recent developments. He hints at the possibility of applying his framework to organizational innovations in the 1980's. Especially the rise of Japan is claimed to be related to the three-pronged investments in capabilities, yet Chandler does not elaborate this point.

In Chandler (1992b) it is stated, that capabilities that have developed over a long period of time are powerful barriers to entry and therefore account for long-term persistence of profits by the same companies. Next he divides capabilities in capabilities learned through exploiting economies of scale and capabilities learned through exploiting economies of scope. The move of companies into geographically distant areas was normally based on the former capabilities and the move into related product markets rested on the latter. Capabilities are company- and industry-specific learned skills and knowledge. They are "difficult to transfer from one industry to another, or even from one company to another, precisely because they had been learned within a very specific organizational context" (p. 84). The examples of capabilities given by Chandler are mostly of a technological nature: Du Pont's chemical capabilities, Dow's salt-based chemicals, electrical equipment firms' radios and x-rays, Lever Brothers' margarine etc. Chandler maintains that a capability explanation of shifting competitive advantage is insightful.

CRITICISM

Chandler's work has been criticized on several points. Perrow (1981) for instance, disagrees with Chandler's limited view on the role of labour and his focus on efficiency in *The Visible Hand*. Chandler (1981) acknowledges that many factors play a role in the rise of the industrial enterprise, but he believes the factors identified by him to be essential. Also it has been pointed out that next to "structure follows strategy" there may as well be "strategy follows structure" (e.g. Hall and Saias, 1980; White and Hamermesh, 1981; Burgelman, 1983; in the preface to a later edition of *Strategy and Structure* Chandler (1993) maintains he has always recognized the interdependency between strategy and structure). Organizational structure may limit the strategic options and people lower in the organization may act contrary to the strategy developed by top management. DuBoff and Herman (1980) in reviewing *The Visible Hand*, direct their main

criticism at the fact that Chandler does not recognize market power as a goal of modern enterprise. As minor points they state that government-business relations are not adequately incorporated and that technology is seen as exogenous to firms, while in practice business is rather influential in shaping technology.

Methodological objections to Chandler's *Scale and Scope* have been brought forth by Hannah (1991). Firstly, Hannah points out that there is a bias into some of the cross country comparisons, because Chandler focusses on the 200 largest firms in the U.S.A., Great-Britain and Germany. Yet, the size of the American economy is such that the 200 largest American firms are considerably larger than the 200 largest British and German firms. Secondly, Chandler judges firm success on the basis of the "survivor technique". This means that an organizational arrangement is seen as efficient when it remains in place for a considerable period of time. This method is allowed when looking at the United States and perhaps also in present day Britain and Germany, but this method is not to be applied in Britain and Germany before World War II. In the prewar period the economies of both countries were too small and too much protected for a reasonable level of competition to exist. The efficiency of certain organizational structures was therefore not really tested and the "survivor technique" not applicable. Thirdly, Chandler ignores the possibility of other non-American structures of business that have emerged in Europe and which may be equally efficient or even more so (see e.g. Piore and Sabel, 1984). Best (1990, pp. 8-10) pointed out that Chandler's perspective cannot not aptly deal with these organizational forms and seems to consider them primarily as precursors of big business. According to Best, Chandler makes a distinction between markets and hierarchies that cannot be maintained. In the context of the pluriformity of organizational forms which have to be explained by a theory of organizational innovation, this observation seems to be right. The question is whether Chandler's analysis can also be applied to JIT, networks and alliances, which are on the interfirm level (White and Hamermesh (1981), Hannah (1991) and Teece (1993) also pointed to the limited scope of the structures discussed).

Harvey and Jones (1992), while admiring Chandler's achievements, point out that Chandler mainly focuses on firm internal variables "attaching relatively little weight to wider environmental influences on the competitive strength of firms, industries and nations" (p. 6). They point to a complementarity between Chandler (1990) and Porter (1990a), who sees the environment as central to competitiveness. In relation to the outside-in perspective in Chandler's work, Harvey and Jones rightly observe that Chandler's main focus is on the firm internally. Although Chandler does point to developments in the business environment (like for instance demand), there seems to be room for further research into the environmental determinants of organizational innovation.

CONCLUSION

Chandler's work has great value for its historical tracking of organizational innovation that makes clear the incremental way in which organizational forms emerge. The significant role of trial and error in the search for the right solution to internal organizational problems is clearly shown. In his latest book the incorporation of the capability approach in his framework adds a coherent inside-

out explanation to his explanation of firm growth, even though it does not become clear why some firms made the three-pronged investment while others didn't. Nevertheless, Chandler's important contribution is that he clearly shows the historical contingency of organizational forms.

The role of management is put central in creating organizational innovations. In figure I.1 management has been identified as the group which initiates organizational innovation. Chandler fully subscribes to this viewpoint.

His treatment of the business environment is a bit ad-hoc and unclear; demand and technology seem to be the essential factors but other variables like country specific factors can also be found. The outside-in perspective is not adequately developed and may be extended. Other disadvantages of Chandler's work are the limited number of organizational innovations analysed as well as the narrow focus on efficiency as organizational goal.

3.3.3 Williamson and the transaction cost paradigm

The basic idea of transaction costs can be found in Coase (1937). The core of Coase's thinking has not been fundamentally changed, but it has been extended; most clearly in Williamson (1975, 1985), who integrated it with concepts defined by Arrow (1971). Essentially, the theory can be summarized as follows: the reason firms exist, is that there are market failures that can be dealt with more efficiently within the context of a firm. Specific transactions can be internalized for this reason. Whether a transaction is to be internalized has to be judged on a case by case basis, with efficiency as the discriminating factor.

For organizational innovation the reasoning is that new forms of organization are a response to market failures. In this view efficiency and cost considerations are central to the emergence of new organizational configurations.

Williamson (1970) relates organizational innovations to firm size. Innovations "have permitted the corporation to limit the degree of control loss and subgoal pursuit that ... were consequences of large size". In an article concerning research opportunities in Industrial Organization, Williamson (1972) points out that the study of organizational innovation is essential to judging market forms. Too often in his view, strict competition policy breaks up efficient forms of organization, like the multidivisional form (called the M-form) and the franchise.

In *Markets and Hierarchies* (1975) the focus is completely on transaction costs. The M-form hypothesis states "the M-form favors goal pursuit and least-cost behavior more nearly associated with the neoclassical profit maximization hypothesis than does the U-form (functional) organizational alternative" (p. 150). Internalizing transactions and separating strategic decision-making from day to day affairs, were the considerations that led to the M-form. Factors enhancing internalization of transactions are assembled in the organizational failures framework. These factors are: bounded rationality and opportunism (human factors) and uncertainty/complexity and small numbers (environmental factors). Depending on the relative importance of each of these factors in relation to the alternative of market coordination a transaction can be internalized or not. In developing his framework

Williamson draws heavily on Chandler. He tries to develop a rigid economical underpinning of Chandler's analysis of the U- and M-form. For "Chandler is more concerned with the description than with the interpretation of organizational change" (Williamson, 1981, p. 1543).

In his 1985 book *The Economic Institutions of Capitalism* the emergence of organizational innovations is central in Williamson's analysis as economic institutions "are the evolutionary product of a fascinating series of organizational innovations" (p. 15) and it are these organizational innovations "that warrant reassessment in transaction cost terms" (p. 17). The basic theoretical theme of *Markets and Hierarchies* is maintained. Williamson describes transactions by three dimensions: frequency, uncertainty and asset specificity. The reasoning remains the same: organization (hierarchy) will emerge where it is comparatively more efficient than market coordination. Examples of organizational innovations are the M-form, the line/staff dichotomy, the conglomerate and the multinational (the last two forms are simply different shapes the M-form takes (Williamson, 1981)). The main focus is on forward and backward integration (the make or buy decision). Williamson acknowledges that especially for this subject transaction cost analysis works very well. He claims that for other organizational innovations his framework is suitable too, although he admits that an explanation will remain on a rather general level.

For organizational innovation some of Williamson's articles are very instructive. Williamson (1980a) is particularly interesting because six alternative modes of organizing the process of pinmaking are compared on efficiency grounds. The thing of interest is that in the discussion ensuing this article, Williamson establishes the independence of organization from technology to a large extent (Williamson, 1983a; Jones, 1983; Williamson, 1983b). Alternative modes of organizing are consistent with the same technology, according to Williamson. The relative efficiencies of one form over the other will determine which form will prevail. In another article (Williamson, 1980b, p. 183), Williamson provides one of the few definitions of organizational innovations (see also table 2.2): "Organizational innovation is used here to describe not only new hierarchical methods of organizing economic activity (organizational structure) but also the incentive, control, and planning instruments that are associated with new organizational forms."

CRITICISM

The transaction cost approach has been widely criticized. Grandori (1987) points among others to the fact that the transaction cost framework is very difficult to operationalize, so that the suitability for empirical research is limited. Perrow (1981, 1986) makes two points. Firstly, he claims that Williamson does not incorporate in his theory that there are also transaction costs inside the firm. Therefore a shift from market to hierarchy may not be as efficient as Williamson thinks. This argument can be easily refuted, as Williamson never claims that hierarchies are efficient in an absolute way. On the contrary hierarchies only arise when they are comparatively more efficient than the market (Williamson and Ouchi, 1981). Secondly, the element of the quest for market power is overlooked by Williamson, according to Perrow. Williamson and Ouchi dismiss this

argument, because it cannot be an explanation for the limits to firm growth, as this quest for power is unlimited. According to the market power argument forward and backward integration should never stop.

Some criticism that is connected with organizational innovation specifically will now be treated. Firstly, the exclusive focus on efficiency as organizational goal is as much a limitation as in Chandler's work. Zajac and Olson (1993) show that there are not only transaction costs to be saved, but also transaction values to be gained. The focus on cost-saving should be supplemented with one on value creation. Hoskisson, Hill and Kim (1993) also have difficulty with the efficiency view, as next to efficiency many other factors may play a role in firm structure. They specifically refer to agency considerations (e.g. Eisenhardt, 1989a; Jensen and Meckling, 1988; Van der Zaal, 1993).

Secondly, the business environment is highly stylized and limited to aspects of bilateral relations. Only uncertainty and small numbers are part of the business environment. This is probably one of the reasons why the pluriformity of organizational forms we observe in reality can be explained by the framework only to a limited extent.

And indeed a third criticism is that Williamson limits his discussion of organizational forms mainly to the M-form. More specifically Williamson's framework has difficulty in explaining organization forms that are between market and hierarchy like networks (see e.g. Child, 1987; Beije, 1988). Different authors have tried to remedy this (e.g. Nooteboom (1992) by means of social cognitive factors; Zenger and Hesterly (1993) by pointing to the role of information technology; Ring and Van de Ven (1992) by elaborating on risk and trust; Williamson himself has tried to incorporate hybrid forms in his analysis as well (Williamson, 1991)). Schneiberg and Rogers Hollingsworth (1990) have shown that in the case of trade associations, transaction cost economics cannot explain the initial emergence of these associations. These associations are cooperations between firms that compete with each other and have no transactions going on between them. It is therefore impossible for characteristics of transactions to explain the emergence of a cooperation, as between the cooperating firms transactions were non-existent.

Most notably, Chandler (1992b) rejects the framework for the reason that it is too limited in explaining pluriformity. This is remarkable as Williamson frequently makes use of the analyses provided by Chandler. Chandler, however, presents a different explanation for the observed shifts between markets and hierarchies, using a capability approach. He puts forth a theory in which for example a firm that lacks capable suppliers will develop the capabilities in house, while the presence of capable suppliers leads to market governed transactions.

Lazonick (1991) provides an in-depth analysis of the work of Chandler and Williamson and claims that these cannot be reconciled. Table 3.2 gives some differences between Chandler and Williamson, as identified by the authors mentioned in the table. First of all Lazonick (1991, p. 213) points to the fact that Chandler developed a theory of the innovative organization that changes its environment, while Williamson developed a theory of the adaptive organization, that can only adapt to a given economic environment and not change it (Johanson

and Mattson (1987) provide a similar critique). In terms of figure I.1, in Williamson's work the feedback loop from organizational innovation to the environment is missing.

Table 3.2 Some differences between the work of Chandler and Williamson

Chandler	Williamson
Lazonick (1991)	
• Theory of the innovative organization (p. 213)	• Theory of the adaptive organization
• Dynamic (p. 216)	• Static
• Explains the initial derivation of administrative coordination, vertical integration, M-form (pp. 233-261)	• Organizational Failures Framework does not explain these
Nelson (1991)	
• Theory about innovation: trial and error (p. 66)	• Theory about choice between different existing governance structures (no trial and error)
Foss (1993)	
• Coordination problems (p. 140)	• Incentive problems
Chandler (1992b)	
• Unit of analysis is firm (p. 85)	• Unit of analysis is transaction

Source: see indicated literature.

Secondly, Williamson ignores "the dynamic interaction between technology and organization" and builds a static framework that assumes all enterprises face the same cost conditions (Lazonick, 1991, p. 216). This cannot be reconciled with a capability approach, because differences in capabilities lead to differences in cost curves between firms.

Thirdly, regarding the empirical material Lazonick shows that Williamson's examples do not agree with Chandler's, despite the fact that Williamson claims that he made use of Chandler's studies. In this regard administrative coordination is not explained by Williamson in the same way as Chandler did. It did not arise because of opportunism, but because of safety requirements (Lazonick, 1991, p. 233); it did not arise between the small railroads, but in the larger ones (Lazonick, 1991, p. 234); and opportunism between established railroad operators did not bring down railroad cartels (thereby forcing companies to grow internally), but new speculators did (Lazonick, 1991, p. 235). Next, backward integration between production and distribution cannot be explained solely by means of transaction costs, as economies of speed were also central to the success of that strategy (Lazonick, 1991, p. 240). This integration was not as much cost saving as it was value creating. Also, Williamson's account of the emergence of the multidivisional form in Du Pont differs in two ways from Chandler: boundaries on rationality

were no cause of unknown developments, but were caused by Du Pont's diversification strategy (p. 253); opportunistic subgoal pursuit by lower level managers did not cause the breakdown of the old organizational structure, as in Du Pont at that time no goals were set at all, which situation left managers free to act as they saw fit (p. 254). In General Motors, Williamson also claims that division managers were opportunistically pursuing their own goals instead of the firm's. This however was not true, as the division managers were members of the executive committee and thus were setting the goals. In fact, the company goals and the division goals coincided.

A fourth objection in relation to the way Williamson's work relates to Chandler's is the way in which Williamson treats organizational innovation. He does not really go into detail about the question how these innovations arise. Williamson assumes that different organizational structures are present, do not have to be developed and can be implemented by any company when it wants to. As pointed out by Nelson (1991) this is in great contradiction to historical descriptions made by Chandler. Indeed the coming into being of a new organizational form is a gradual and incremental process. "Nowhere does he (Williamson) recognize explicitly the halting, trial and feedback, often reactive rather than thought-through, process that led to the new ways of organizing that Chandler describes" (Nelson, 1991, p. 66). The framework may be an ex-post rationalization. From an evolutionary perspective, Williamson's organizational failures framework can be seen as a description of the selection environment in which a new organizational form has to work[3]. It does however provide no explanation of the "initial derivation of a system" (Hodgson, 1988, p. 214).

Fifthly, Foss (1993, p. 140) states that Chandler is more concerned with problems of coordination of activities, whereas the Williamson contractual perspective deals with incentive problems. Chandlerian perspectives deal with coordination in situations of innovation, whereas contractual perspectives are of relevance for economic organization when inputs, outputs and technology are given (compare with static efficiency and dynamic improvement in section 1.2.2). This is strongly connected to Chandler's point (Chandler, 1992b) that the unit of analysis of Williamson is different from the one focussed on by Chandler. Williamson studies transactions, whereas Chandler studies the firm. Consequently, Chandler claims that in Williamson's theory the attention for firm skills and assets is limited in comparison to his own work.

CONCLUSION

Williamson holds that organizational innovations arise because of market failure and problems internal to organizations. Most important seems to be the first reason. Efficiency is the key to new organizational forms. The firm sometimes is superior as a coordinating mechanism to the market. Although Williamson's framework is a remarkable achievement, his ideas have some drawbacks which

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[3] Throughout time this environment may change however. Hoskisson, Hill and Kim (1993) claim for instance that the market failures identified by Williamson, may have been lifted by new financial instruments and institutional shareholdership.

make them less applicable in explaining the emergence of new organizational forms (although perhaps not less relevant in explaining their efficiency). The absence of the study of historically developed characteristics of a firm (an inside-out factor), the limited role the environment plays (an outside-in factor) and the narrow focus on efficiency, make that the pluriformity of organizational forms the framework can explain, is limited.

The question of how organizational forms emerge out of an interaction between different determinants, is the subject of this research. Williamson is concerned with a different question, namely the efficiency of existing forms, not the creation of new ones.

3.3.4 The flexible specialization scenario

The previous sections on Schumpeter, Chandler and Williamson have all pointed at the fact that they only discussed a limited amount of organizational innovations and were especially weak on explaining interorganizational innovations. In this section, literature on a much discussed interorganizational innovation of a more recent date than the ones analysed by the mentioned triumvirate, is reviewed to see what it can contribute to the theory of organizational innovation, namely flexible specialization. Most important for this subject is Best (1990), but one of the first books dealing with the subject is Piore and Sabel's *The Second Industrial Divide* (1984), which heavily inspired Best's work. Research into flexible specialization is directed at new forms of interorganizational relations, often between smaller firms. These interorganizational relations show the relevance of extending the concept of organizational form beyond pure intra-organizational forms.

Piore and Sabel's The Second Industrial Divide

Piore and Sabel were among the first to point to new and competitive models of organizing production by means of flexible specialization. The basic claim of Piore and Sabel is "that the present deterioration in economic performance results from the limits of the model of industrial development that is founded on mass production" (p. 4). As a substitute of mass production Piore and Sabel propose a flexible specialization scenario, that goes back to old craft methods of production. Both systems are viewed as technological developments initiated and maintained by political processes. The authors claim that in the nineteenth century a first industrial divide took place in which mass production became the dominant method of production, instead of the craft alternative. The choice of technology was not primarily based on economical reasons, but depended on the distribution of power and wealth and was therefore essentially a political process. Mass production was in the interest of the dominant group in society and therefore emerged victorious. As it needed stable markets the modern corporation was invented as a tool to stabilize mass markets. In conjunction, later, with Keynesian governmental policies this was a system that worked well into the twentieth century.

Piore and Sabel discuss this development in a historical cross-country analysis. Developments in France, Germany, Italy and Japan are compared. In France and

Germany mass production emerged, albeit in a different form; in Italy craft production remained the dominant paradigm while in Japan an intermediate form of production came into being. The reason for these differences lies in specific historical conditions in those countries. The overall picture of the world economy in the first sixty years of the century, can be summarized in four points: mass production won, market stabilization was necessary, the state played a dominant role in creating and stabilizing markets and workers using the same equipment, were differently organized in each country (p. 164).

It are exactly these last differences that determine how each country reacts to the crisis, that according to Piore and Sabel became apparent in the mass production paradigm in the late 1960's. Social unrest, the oil crises, floating exchange rates and the breaking up of mass markets are some of the reasons why mass production ran into difficulty. Especially the alleged breaking up of mass markets is important. Piore and Sabel claim that once mass markets began to stagnate in the 1970's, firms started differentiating products and re-educating customers. This strategy eventually made the standardization of the mass production paradigm inappropriate. This is the reason that we now are in the middle of a second industrial divide, in which craft production (in a twentieth century form called flexible specialization) has a chance of becoming the dominant production method, as it probably can provide more diversified products than mass production. Countries will react differently to the identified crisis; the authors claim that in the United States for instance flexible specialization is unlikely to emerge. Also flexible specialization is not expected to come up in all industries. It will be concentrated in certain segments.

Flexible specialization can come in four "institutional settings" (p. 265-267), which in the terminology developed in chapter 2 are four new organizational forms:

1. Regional Conglomerations. These are regionally concentrated groups of comparatively small companies working in the same industry. No firm is permanently dominant; enterprises cooperate in unions; there are trade associations and cooperatives for purchasing materials and the productive units of the production process are not formally linked. Examples can be found in the New York garment district and Emilia-Romagna in Italy.
2. Federated Enterprises. These are federations of enterprises, holding each others stocks and having interlocking boards of directors. The current loose federations of Japanese enterprises, coming out of the more strictly coupled zaibatsu, are examples of this form of flexible specialization.

3/4 "Solar" Firms and Workshop Factories. Piore and Sabel do not go into specific differences among these forms. Solar firms consist of a core firm with a network of suppliers around it. Workshop factories are internally decentralized factories. Usually these enterprises have a large size, but their internal organization is craft-based. This model of organization reverts to old organizational forms from the nineteenth century.

The basic characteristics of these four forms are flexibility and specialization, limited entry of new firms, encouragement of competition of firms against firms,

but at the same time limits on competition on especially the procurement of production factors. These characteristics have led to a high innovativeness.

CRITICISM

Williams et al. (1987) challenges the proposition that mass production replaced craft production for the reasons given by Piore and Sabel. Based on an in depth case study of Ford, Williams et al. prove that it was the inherent economic advantage of mass production that explains its the rise and not the power of a dominant group in society. They further point out the limited amount of empirical material in Piore and Sabel's book to support the difference between mass production and flexible specialization. Next, the alleged breaking up of mass markets, is said not to be supported by any data. More importantly, diversification of consumer demand does not necessarily lead to a demise of mass production, because different variants of products can be mass produced, as is shown in the car industry (see Coriat (1991) for a related argument). This amounts to a Neo-Fordist account, in which mass production becomes increasingly flexible, as opposed to a Post-Fordist account, in which the end of mass production is expected to be near (Dunford and Benko, 1991).

Teague (1990) agrees with these points and adds that Piore and Sabel have stressed the extremes, thereby neglecting the pluriformity of business strategies and accompanying organizational forms that have existed throughout history (Winch (1992), Amin (1993) and Best (1990, p. 9/10) put forth similar critiques). The specific examples used by Piore and Sabel have been criticized as well. Winch (1992) provides a different analysis of the construction industry than Piore and Sabel. Yet there have also been identified other empirical examples that support their ideas and provide similar examples of regionally concentrated flexible specialization (e.g. Karlsson and Wiklund, 1992; Herrigel, 1993).

With regard to the theory of organizational innovation Piore and Sabel do incorporate the business environment as an explanatory factor of the emergence of new organizational forms. One of the core determinants they identify is demand. Several chance elements like the oil crisis and the decision to let exchange rates float are mentioned as well. Their analysis however does remain on a rather general macro-level. Next, Piore and Sabel have a clear focus on technology as a dominating factor, not withstanding their claim that people working with the same technology can be organized differently. Furthermore, the development of new forms is not traced back in any great detail.

Best's The New Competition

The main contribution of Piore and Sabel lies in the fact that they have brought to the foreground some interesting forms of organization that were ignored before they wrote their book. Especially their emphasis on interorganizational innovations is of interest.

Also, as may be evident from the discussion above, their work has led to an amount of follow-up studies that have expanded their theory. One of the people who draw heavily on Piore and Sabel but avoids some of the pitfalls of their analysis is Best (1990) in *The New Competition*. Best does not try to give an overall

historical account of the developments of entire economies. Some points of criticism of Piore and Sabel are thereby avoided. For instance strict interpretations of the breaking up of mass markets are not presented in Best's work. His work differs from Piore and Sabel in four ways relevant for organizational innovation:

1. Firstly, more than Piore and Sabel he puts the analysis of organizational ideas central in his analysis as opposed to technology. As was shown in table 2.2, he develops a definition of organizational innovation: "Firms that develop new rules that enable cooperative actions are engaging in organizational innovation" (p. 116).
2. Secondly, the firm is seen as a strategic actor striving for competitive advantage by means of organizational innovation (p. 10). Therefore Best is capable of analyzing more forms of organization, than Piore and Sabel, whose division in mass and craft production is too general. The pluriformity of organizations is a central point in Best's analysis. In this regard Best's work is also an improvement over Chandler and Williamson, who ignore recent developments as networks, regional conglomerations etc. and limit themselves to the one organizational goal of efficiency.
3. Thirdly, Best also draws heavily on Chandler's work. In depth analysis of the emergence of organizational forms not only underlines the environmental influence on organizational innovation, but also the evolutionary way in which these innovations come about. Pertaining to the role of the environment, Best does not give an overview of the relevant elements constituting an outside-in approach. Government, competition and country specific factors all have an impact at one time or another, but a rigorous analysis of how, why and when these determinants are important is lacking.
4. Finally, Best incorporates an inside-out perspective of the learning firm based on Penrose. Resources owned by the firm and knowledge developed in the firm play a role in this inside-out perspective.

Best claims that a new form of competition has emerged in the last years, which is named the New Competition. "The idea of the New Competition is of productive systems oriented to continuous improvement in product and process, whereas the Old Competition is a productive system geared to minimize cost for a given product and process" (p. 227). In other words innovation has replaced efficiency. This observed shift, underpinned by some fascinating case studies, enables Best to include both Piore and Sabel's work as well as Chandler's in his analysis. The way in which organizational innovations come about in both forms of competition are analysed in a Chandlerian way: organizational innovations come into being by a process of incremental change in existing organizational forms in which many factors identified by Chandler play a role (see for instance Best's account of the Springfield Armory and the Just-in-Time system).

Best identifies four characteristics of the New Competition:

1. The firm is a collective entrepreneur. This kind of firm "seeks strategic advantage on the basis of Schumpeterian innovation in product, process, or organization" (p. 11) instead of seeking profit maximization by minimizing costs, as in the Chandler and Williamson frameworks.

2. Consultative coordination in the production chain. In the New Competition an analysis based on a dichotomy between markets and hierarchies does not hold. "Allowance must be made for consultative coordination or cooperation amongst mutually interdependent firms each of which specializes in distinct phases of the same production chain" (p. 15).
3. A balance between competition and cooperation in the sector. Cooperation in the New Competition does not come in the form of cartels, but in the form of "a variety of inter-firm practices and extra-firm agencies such as trade associations, apprenticeship programs, labor education facilities, joint marketing arrangements, and regulatory commissions" (p. 17). But care must be taken that competition is not stifled. This is done by creating the cooperative institutions in such a way, that price (Neoclassical) competition is restricted, while Schumpeterian competition (competition on innovation) is maintained by keeping it outside these cooperative institutions. By using marketing associations or combined purchasing, costs are the same for every firm. This means that firms will have to find another way to distinguish themselves from each other. This way is innovation.
4. A strategic industrial policy. Government's purpose is not to substitute planning for markets but it is "to shape and use" markets. Industrial policies are not used for distributional purposes, but promote the New Competition e.g. by maintaining the balance between competition and cooperation along the lines laid down in the previous paragraph. Also policy is strategic, in that it targets sectors for growth with the goal to increase the value added to resources.

Best applies this framework to Japan and the Third Italy (so called because it provides an alternative to the industrial north and agricultural south of the Mediterranean country). Best identifies a variety of Italian organizational innovations ranging from industrial parks to all sorts of interfirm consortia.

CRITICISM

One cannot escape the feeling that Best has focussed on extremes in defining the old and new competition, whereas both organizational models co-exist (Tomlinson, 1992). This is a bit surprising because next to marked differences there also is a considerable amount of continuity between the two. The question can be asked whether the JIT system (belonging to the New Competition) would have been developed without the assembly line (belonging to the Old Competition). The way in which these organizational innovations come about points to a continuity in history that is largely overlooked by Best. This alleged discontinuity between Old and New may be accounted for by time-gap there is between the examples Best gives of the Old Competition (which mainly plays before the Second World War) and the New Competition (the examples of which are mainly drawn from the 1970's and 1980's).

Finally, Perrow (1992) in a praising review of Best's book points to the fact that organization theory plays a limited role in his analysis. Yet, Perrow states, Best comes a long way and it seems that the contribution organization theory can make to his theory is limited. The only limitation in this regard is that Best

ignores recent developments in the tradition of research into theories of the firm, started by Penrose. Here, Perrow probably refers to the resource-based tradition and evolutionary economics (see chapter 4), which might have provided an even stronger underpinning of Best's theory of the firm.

The case of the Third Italy has become an exemplar (Kuhn, 1962) in literature on competitiveness and organizational innovation. Detailed studies have been assembled by Inzerilli (1990, 1991) and include Becattini (1991), Dei Ottati (1991) and Fuà (1991). Bianchi and Gualtieri (1990) question the viability of the Italian scenario. In the 1970's and early 1980's the Third Italy was successful as small companies filled in the gaps in the market left open by inflexible hierarchical mass producers. Now these producers have restructured to more flexible organization types and therefore are able to outcompete small companies, also in the niches. As a reaction to the increased competition by large firms in the late 1980's a merger wave took place in Emilia-Romagna, especially in foodstuffs and the machine industry. Consequently, the small scale characteristics of production in the region are changing. Yet, the social relations developed in the region retard the restructuring of the district. Herrigel (1993) reasons in the opposite direction. In the case of Baden-Württemberg he found that the flexible specialization scenario could develop exactly because of the implementation of more flexible structures in large firms. The contracting out that was connected to flexibilization of large firms provided the possibilities for small firms to develop in the direction of the flexible specialization scenario.

Hence, the viability of flexible specialization is still subject to debate, mirroring the debate on the much predicted decline of big business. All this merely confirms the idea implicit in Best (1990) that organizational forms are not static but dynamic. They evolve constantly.

CONCLUSION

Concluding, the flexible specialization scenario has been analysed most clearly by Best. Best also incorporates other organizational innovations in his analysis. The empirical support given by Best and Piore and Sabel, may not justify the conclusion of a large scale shift into the flexible specialization scenario. The stress on two extreme ways of organizing is another drawback of Best's analysis.

Best does take competitive advantage as an organizational goal and discusses a wide range of pluriform organizational forms. Best's contribution is that he analyses both intra- and interfirm organizational changes as organizational innovations. Moreover he shows that the trial and error character of intra-organizational innovation also applies to interorganizational innovation. Together with the stress on resources and firm-specific knowledge, this combines to an inside-out perspective that incorporates historical contingency.

The outside-in perspective is present as well, but again in a rather unstructured way. Different environmental determinants have an impact on organizational innovation, but no overview of the determinants is given. Neither is a fullblown discussion presented of the way in which these determinants influence the emergence of new organizational forms.

3.3.5 Lazonick

Lazonick believes that the way work is organized, plays a central role in national competitiveness. He provides an analysis of the relative economic decline and rise of countries in relation to the organizational forms in use in those countries. As part of this analysis, he touches upon the subject of how the various organizational forms come into being. The discussion of Lazonick's work below, will mainly highlight this latter part of his work.

Lazonick (1990) puts the relation between labour and management central in his analysis of national shifts of competitive advantage. Labour-management relations determine the organization of work on the shop-floor. Central to this is the relation between effort and pay: effort must be sufficiently remunerated, in order to develop cooperative relations. Effort-saving technology is a key to these relations as it enlarges profits, out of which higher wages can be paid. This will induce workers to keep up their efforts. Rising productivity will mean higher profits, lower prices, higher wages and eventually industrial dominance for firms. Once workers observe that their efforts are sufficiently rewarded, they will be cooperative.

Lazonick's account is historical and starts by analyzing the rise of England as an industrial power in the 18th and 19th century. English cotton manufacturers rose to dominance by means of a system of production that required many skills on the shop floor. Gradually, through a series of strikes and negotiations, a system developed in which management lost power to workers. This labour control meant that no investments in effort-saving technology took place and that no managerial elite developed. As a consequence productivity did not rise and England gradually lost out to American competitors.

The Americans developed a managerial elite that took skills of the shop floor and invested in effort-saving technology. Next to higher wages, made possible by the realization of economies of speed embodied in the new production technology, American managers offered security of employment to workers. These developments led to cooperative relations between management and labour, which provided the basis for rising productivity and thereby America's economic dominance. This system collapsed in the 1960's (p. 280) because of tightening labour markets (increasing turnover and absenteeism of workers) and social unrest.

It was then, that the Japanese took over. By putting skills back on the shop floor and promising employment stability, cooperative relations developed. This enabled them to reap the benefits of new effort saving technology. What Lazonick tries to show is that long term commitments between management and workers are the source of lasting competitive advantage.

The empirical support for his ideas is broad as far as the English situation is concerned. Lazonick does however not elaborate on the collapse of the American system and his analysis of the Japanese system is very limited (French, 1992). It would also be interesting to know whether Lazonick's ideas are equally applicable to other industries then those discussed (cotton spinning and car manufacturing).

It may for instance be questioned whether his framework holds for service industries.

In Lazonick (1991), Lazonick meets some of these criticisms. Again, the firm (and specifically its organization structure) is seen as the engine of economic development: "Because capitalist economies ultimately rely on the strategies and structures of business enterprises to create value, the analysis of the process of value creation requires an explicit conception of the value-creating business organization" (p. 15). In Lazonick's view, the capitalist economy is not so much a market economy as an economy guided by organizations. He considers three countries (Great-Britain, the U.S.A and Japan) and defines three forms of capitalist development that prevailed in these countries and were at the basis of the countries' economic success. The first form is proprietary capitalism that was in use in England. It was replaced by managerial capitalism that emerged in the U.S.A. and made America the number one economic power in the world (the proprietary and managerial form are similar to Chandler's (1990) personal and competitive managerial capitalism). The third form, collective capitalism, is the Japanese form that threatens the dominance of American managerial capitalism. The word "collective" refers to the considerable amount of cooperation inside firms, between them and between firms and government. In short Lazonick's thesis is that the relative economic demise of a country is related to the rise of a more successful model elsewhere that the country is unable to emulate, mainly because social institutions prevent adaptation to new organizational models.

According to Lazonick, next to institutional barriers which inhibit organizational innovation there is another determinant which stimulates it: competition. Competitive uncertainty pressures firms to restructure in such a way that competitive uncertainty is replaced by productive uncertainty (p. 246). Productive uncertainty is the uncertainty in the firm's production process (or productive capabilities (p. 199)) and its human resources. Productive uncertainty is easier manageable than competitive uncertainty, Lazonick claims. One of the ways in which competitive uncertainty can be replaced by productive uncertainty is vertical integration, which can guarantee stable markets or insure the flow of resources into the production process. Hence, Lazonick defines two outside-in factors (competitive uncertainty and institutional barriers) and one inside-out factor (productive uncertainty consisting of capabilities and human resources).

Lazonick (1991) is not so much concerned with developing a theory of organizational innovation, as with criticizing the dominant theories of the firm in use in mainstream economics. His analysis of organizational forms is aimed at showing that Williamson's theory of the adaptive enterprise as he calls it, is not sufficient to explain economic developments and shifts in competitiveness (see table 3.2 for Lazonick's critique of Williamson). Instead, he develops a theory of the innovative enterprise in which competitive uncertainty is converted into better manageable productive uncertainty and higher-quality products can be generated at lower unit costs. In this theory the organizational form used, is of prime importance in explaining the dynamics of capitalism on a national scale. Again however the pluriformity of organizational forms discussed, is limited. Lazonick mainly concentrates his arguments on vertical integration.

His contribution to the theory of organizational innovation lies in the fact that he delineates the role of competition (an outside-in factor) in relation to productive uncertainty (an inside-out factor consisting of capabilities and human resources). Both elements play a role in shaping new organizational forms but exactly how they do so remains unclear. The importance Lazonick attaches to new organizational designs, stresses the need for further research into the way new organizational forms emerge.

3.3.6 Population ecology

As was pointed out in chapter 2, surprisingly little is said about organizational innovation by organization theorists. They mainly study the characteristics of existing organizational forms (Grandori, 1993) and the relation to their environment, but pay hardly any attention to the coming into being of new ones. Organizational innovation, in the scarce instances when the word is used, is equated by them with reorganization (the implementation of an existing organization form that is different than the form that was in use by the firm before the reorganization took place). As Perrow (1992) pointed out, Best (1990) was able to contribute a theory of organizational innovation without making use of organization theory. Yet it would be an audacious claim to suggest that organization theory has nothing to say on organizational innovation at all. Contingency theory (e.g. Thompson, 1967; Lawrence and Lorsch, 1967; Pugh, Hickson, Hinings and Turner, 1969; Lawrence and Dyer, 1983) for example broke the ground for the outside-in perspective which is relevant for the current subject. Without its insight that the environment and the organization form are connected, the question how the environment influences organizational innovation would probably not have been asked.

Nonetheless, Grandori and Perrow's observations contain a large amount of truth. One of the exceptions however is population ecology theory, that has looked into the emergence of new organizational forms. Its contribution will be discussed briefly. In the next chapter, the related evolutionary view of economics will be used to construct an inside-out perspective on organizational innovation. In order to clarify the differences between these two perspectives, they are compared here.

The population ecology theory (Hannan and Freeman, 1977, 1984; Aldrich, 1979) studies the organizational form at the population level. Not the way individual firms interact with their specific environment is object of study, but the way groups of similar firms fit in their environment. The environment selects the optimal form (Hannan and Freeman, 1977). Aldrich (1979) summarizes his position in the words variation, selection, retention: a variation in organizational form is subject to environmental selection and if it survives, it retains its characteristics.

For the subject of organizational innovation there are several points of interest. First of all, organizational innovation is not treated as a process. The influence of selection on organizational forms is subject of research, not the reasons how and why these forms emerge. Of course the level of analysis in population ecology precludes such an analysis. Furthermore, in Aldrich (1979) organizational

innovation is not so much defined as a new way of coordinating activities (which is the focus here), but as the establishment of a new firm. Next, it does not seem possible for organizations to influence their environment. Although this idea does not by necessity mean that the population ecology view is a deterministic theory (Grandori, 1987), it does limit an organizations' strategic choices. Competitive advantage as organizational goal is not incorporated in this view. Aldrich (1979) by integrating resource-dependency (Pfeffer and Salancik, 1978) in his model has incorporated some more voluntaristic elements in his theory.

Nevertheless, the population ecology has some interesting ideas on organizational innovation. Even though the innovative process is not treated, Hannan and Freeman (1977) clearly establish the influence of environmental constraints on organizational innovation: new organizational forms arise when extra constraints emerge (p. 944). Consequently, according to population ecology theory, the need for an outside-in approach when explaining organizational innovation, is obvious. Unfortunately, the conceptualization of the business environment provided by Hannan and Freeman is not very operational.

Also interesting for organizational innovation however, is the treatment of structural inertia. Hannan and Freeman (1977, 1984) give an analysis of the factors prohibiting firms to change, from both an inside-out and an outside-in perspective. These inertial pressures are a cause of the selection process. Firms are selected for their reliability and accountability. These two factors limit the possibility for a firm to change.

In chapter 4 an evolutionary perspective on organizational innovation will be developed. Because both the evolutionary and the population ecology view make use of a biological metaphor, there may be some confusion as to what the differences between these views are. In table 3.3 some of the differences between population ecology and evolutionary theory have been assembled, as defined by Winter (1990) and Grandori (1987).

Table 3.3 Differences between population ecology and evolutionary theory

Population ecology	**Evolutionary theory**
Winter (1990)	
• No intra-population variation	• Firm differences
• Emphasis on legitimacy	• Emphasis on competence
• Size does not matter	• Size matters
• Adaptation at the population level	• Adaptation at firm level
Grandori (1987)	
• Optimal forms	• Superior forms

Sources: based on Winter (1990, pp. 286-292), Grandori (1987, p. 106).

Because in population ecology, "intra-population variance in (genotypic) fitness is not among the variables considered" (Winter, 1990, p. 286), it is not concerned

with explaining the pluriformity of organizational forms. As Douma and Schreuder (1991, p. 164) put it, in population ecology "the organization is a relatively empty box". Furthermore, the perspective taken is not a strategic one, as in the competence view of evolutionary theory. Instead, legitimacy is the factor that makes a firm survive. Organizational size is not deemed of much importance in population ecology, whereas in evolutionary theory it is. Population ecology mainly studies the number of firms in an environment, without looking at the impact that big firms can have on the business environment. Fourthly, in population ecology adaptation takes place at the population level. In the evolutionary view on the other hand, firms adapt their routines. Finally, Grandori (1987, p. 106) points out that Hannan and Freeman (1977, p. 939) state that "it is the environment which optimizes". The notion of optimal organizational forms can however be criticized: "Indeed, the mere fact that the environment helps to select organizational forms as well as decisionmaking processes in firms themselves does not necessarily imply that both these processes are governed by an optimizing logic. Both the firms and the environment may simply select organizational arrangements that are superior to other current arrangements at that time in that environment rather than select optimal arrangements" (Grandori, 1987, p. 106). The next chapter will show that Grandori's opinion is supported by evolutionary economics: no optimal forms emerge, only superior ones.

3.4 *Conclusion*

Table 3.4 gives an overview of some of the theories discussed so far. The table presents the motive firms have, the means with which they try to achieve their goal and the determinants (inside-out and outside-in) that influence the means used. The unit of analysis is given and the specific contribution the author made to the schema of analysis in figure I.1.

Based on the requirements for a theory of organizational innovation presented in section 3.2 the following conclusions apply:

- especially the outside-in view of organizational innovation has been underdeveloped. Although there seems to be agreement among the authors reviewed that organizational innovation is context dependent, a well-structured discussion is lacking. The way different elements from the business environment influence organizational innovation has not been discussed. For instance the question whether, how and why different determinants in the business environment influence organizational innovation is not treated. Chapter 5 will make a start in dealing with this subject.
- the inside-out approach has been filled in by Chandler and Best. Some further conceptualization may take place in this area and the next chapter will extend some of Chandler en Best's observations and try to provide a stronger conceptual basis to their views, by connecting them to the theory of innovation.
- pertaining to the pluriformity of organizational forms, existing theories have not really dealt with that. Chapter 4 will show that the concept of routines can deal with this subject, while chapter 5 will show that the environment is a determinant of pluriformity as well. None of the theories discussed related the

determinants identified to specific reconfigurations of the value system: the theories did not link the determinants of innovation to specific changes in linkages and activities.

- the goal of competitive advantage has been studied in relation to organizational innovation by Best and Lazonick. Chapters 1 and 2 have also discussed this issue. The different forms of competitive advantage, extending far beyond efficiency, can be related to different forms of organization.

Table 3.4 Views on organizational innovation summarized

Author (section)	Motive	Means	DETERMINANTS		Unit of Analysis	Specific contributions to the theory of organizational innovation
			Inside-out	Outside-in		
Schumpeter (3.3.1)	net present value of profits	new combinations		other innovations external barriers competition	firm	• distinction between organizational and technological innovation
Chandler (3.3.2)	efficiency/cost	administrative coordination (managerial hierarchy)	technological capabilities internal organizational problems	technology consumer demand country specific factors	firm	• historical contingency and trial and error (mainly inside-out) • management as actor
Williamson (3.3.3)	efficiency/cost	internalization	bounded rationality opportunism	uncertainty/complexity small numbers	transaction	• efficiency of new organizational forms analysed
Best (3.3.4)	competitive advantage	organizational innovation	resources knowledge	government competition country specific factors	firm (intra- and inter)	• interfirm relations incorporated in the theory • inside-out view based on Penrose • competitive advantage as organizational goal
Lazonick (3.3.5)	competitive advantage	organizational innovation	productive uncertainty (capabilities, human resources)	competitive uncertainty institutional barriers	firm	• relation between an outside-in and an inside-out determinant
Hannan and Freeman (3.3.6)	survival	strategy	inertial pressures	increasing constraints inertial pressures	population	• necessity of outside-in perspective clearly established

Source: see indicated sections.

4

From the inside out

4.1 *Introduction*

One of the influences on organizational innovation comes from within organizations. The characteristics acquired by firms in the course of their existence influence the process of organizational change. Hence, the process of organizational innovation is historically contingent. In this chapter, this historical contingency is analyzed by means of an evolutionary and resource-based perspective on the emergence of new organizational forms based on among others Nelson and Winter (1982) and associated literature. The perspective developed by Nelson and Winter (known as neo-Schumpeterian or evolutionary theory) is related to the resource-based approach, developed in strategic management, which will be briefly discussed as well. The method followed in this chapter is to apply concepts from the theory of technological innovation to organizational innovation. Some of the basic mechanisms applying to technology also hold for organization, while other concepts have to be adapted.

An approach to organizational innovation based on what has come to be known as the Nelson/Winter/Dosi-paradigm and resource-based theory, fills in two of the requirements given in section 3.2. Firstly, it is well suited to fill in the inside-out part of a theory of organizational innovation. The concepts developed in evolutionary economics and the resource-based approach incorporate a historical view on the internal development of firms. The perspective taken by both approaches is dynamic, in that they show how circumstances and decisions of one period of time, influence a firm's behavior in later time periods. As organizational innovations usually evolve over time such a dynamic perspective is a prerequisite for studying innovative phenomena.

Secondly, both theories (evolutionary and resource-based) are able to cope with the pluriformity in organizational forms. The historical perspective taken by evolutionary and resource-based views contributes to an explanation of these differences, which are central to competitive advantage. Hence, evolutionary

theories are capable of providing a coherent inside-out view on organizational innovation that meets the demands discussed in section 3.2.

The idea of applying evolutionary theory to organizational innovation is not new, but has not yet been worked out consistently. Williamson (1985, p. 404) for instance already stated that linking the Nelson and Winter approach to organizational innovation might be especially instructive. Nelson and Winter (1982, p. 38) hinted at the possibility that their evolutionary view might not be restricted to technological innovation: "in principle, an evolutionary theory can treat organizational innovation just as it treats technical innovation". This chapter will largely corroborate that statement, be it that some changes to the theory of technical innovation will be proposed in order to be able to analyze organizational innovation adequately. As far as the resource-based view of the firm is concerned, it was shown in section 3.3 that Chandler and Best had incorporated some aspects of it in their theories. Some elaboration of their views will take place in section 4.5.

The main aim of the chapter is to show that organizational innovation is a *path dependent* process. The search for new organizational forms is directed by existing organizational forms: "the general organizational concepts that one uses in designing a firm – such as the idea of the M-form studied by Chandler (1962) – certainly develop in an organic way from earlier forms" (Langlois, 1986, p. 19). Moreover, the process of development of organizational forms can be characterized as a *search* for the right solution. The uncertainty connected to this search process is the cause of the fact that the process is characterized by *trial and error*. Unexpected consequences of organizational changes, lack of knowledge of the way the structure works, imperfect foresight of organizational and environmental developments all contribute to this uncertainty.

Firstly the evolutionary perspective will be discussed, emphasizing the notions of routines, trajectories and paradigms, with their respective applications to organizational innovation. Next, a short outline of the resource-based view will complement this discussion. In total three elements will be identified which make up the inside-out view on organizational innovation: routines, capabilities, resources. These attributes of path dependence guide organizational developments in a certain direction. The attributes are operationalizations of the variable path dependence and simplify empirical research.

4.2 *Static and dynamic routines*

The evolutionary approach "emphasizes the inevitability of mistaken decisions in an uncertain world, and the active, observable role of the economic environment in defining "mistakes" and suppressing the mistakes it defines" (Winter, 1991, p. 187), hence search and trial and error are characteristic of evolutionary processes. Input for evolutionary economics mainly comes from Schumpeter's work, that can be read as a biological metaphor of economic developments. Alchian (1950) was one of the first to further develop this biological metaphor. His idea was that conscious profit maximization is unlikely to occur because of incomplete information and uncertain foresight. Instead, firms which by chance show good

results are selected by the environment to survive (environmental adoption as opposed to organizational adaptation). The biological metaphor of evolution and natural selection has since then proved to be a fruitful one for economic research. Hirshleifer (1977) provides numerous interesting parallels between biology and economics. This chapter will show that management research can benefit from an evolutionary view as well.

Hayek (1979) provides an account of the evolution of institutions that is more or less a precursor of the account of organizational innovation given below. Hayek (1979, p. 154) stated: "What has yet to be more widely recognized is that the present order of society has largely arisen, not by design, but by the prevalence of the more effective institutions in a process of competition". These institutions came about by a process of incremental, evolutionary change (North, 1990). Here the focus will be narrower than Hayek's. Not institutions in general, but organizational innovations will be analyzed. Moreover, an analysis of the role of the environment in organizational evolution will be postponed to the next chapter. Instead, the focus here is on those aspects of the evolutionary view which have contributed to an inside-out perspective.

Well-structured ideas on evolutionary economics can be found in Nelson and Winter (1982), who use the concept of routines to explain innovation. Routines are "regular and predictable behavior patterns of firms" (p. 14) and as innovation is non-regular, it can be concluded that "innovation, involves a change in routine" (Nelson and Winter, 1982, p. 128), which often is a "combination of existing routines" (p. 130). Routines enable organizations to function, as they are the basis of the skills (at other places Nelson and Winter speak of "organizational capabilities") that firms need in order to attain their goals. In short, Nelson and Winter claim that firms search for solutions to problems on the basis of routines that embody a firm's previous experiences. This means that innovations can not only be described as changes in routines, but routines direct the search for these changes as well.

So in fact there are two different kinds of routines at work: one kind in which the innovation takes place and one kind which initiates the innovation and steers it in a certain direction. To distinguish between these two aspects, Nelson (1991) makes a distinction in lower order routines and routine-changing routines. In Nelson and Winter (1982) the former were referred to as operating characteristics, which govern short-run behavior (p. 16) while the latter were defined as "routines which operate to modify over time various aspects of their operating characteristics" (p. 17). A hierarchy of routines can be constructed in which routine-changing routines act to judge or modify lower order routines. As lower order routines refer to processes in which there is no change and similar tasks are performed in similar ways and routine-changing routines refer to a situation of change and innovation, Teece, Pisano and Shuen (1992), coin them static and dynamic routines respectively. "*Static routines* embody the capacity to replicate previously performed tasks" (Teece, Pisano, Shuen, 1992, p. 28), whereas dynamic routines are directed at establishing something new (breaking the static routines). The conclusion to be drawn from this distinction, is that routine behavior is not necessarily inert (Vromen, 1994): dynamic routines guide and enable change.

The concept of routines had been developed before Nelson and Winter gave their account of routine behavior. Simon (1945) already used it to indicate that organizations are only rational in a limited way and regularly stick to fixed ways of working ("standard practices" as Simon (1945, p. 102) called them), that have proven successful in the past. Other authors, working in the field of organizational change, have used similar ideas to explain firm behavior (e.g. Cyert and March (1963) use the concept of standard operating procedures). Later, routines have been related a.o. to organizational learning (Levitt and March, 1990) and corporate renewal (Mezias and Glynn, 1993). The concepts of industry recipes (Spender, 1989) and dominant logic (Prahalad and Bettis, 1986) are examples of standard practices on a higher level of analysis.

Some characteristics of routines are (see table 4.1):

- routines have a tacit dimension (Nelson and Winter, 1982, p. 76), which means that it is not always clear to the person performing the routine, precisely what conditions enable him to perform it. This tacit dimension inhibits other firms to easily imitate a competitor's routines. Consequently, a successful routine may lead to a sustainable competitive advantage (see table 1.5).
- routines have a paradoxical characteristic: on the one hand they enable firms to act and change; they are the memory of an organization, without which an organization would be unable to function. On the other hand routines constrain firms in the activities to be performed: it is difficult for a firm to look for solutions beyond the prevailing routines, as the set of routines in use only allows a limited magnitude of change to take place. The reason for this may be that a firm does not have the required capabilities to go beyond current practice or is locked into its routine of problem solving and thereby is unable to perceive other approaches to dealing with problems.

Table 4.1 Characteristics of Routines

• Tacit
• Enabling and restraining
• Repetitive
• Embodied in human and physical assets
• Easy identifiable

Source: Nelson and Winter (1982), Winter (1990).

- repetitiveness (Winter, 1990). Firms will tend to do those things which they have done successfully in the past. This means that change is often incremental: new routines will resemble the old so that change builds on past successes. There is therefore an element of path dependence in firm behavior (for the concept of path dependence see further below). Search for the solution of organizational problems is localized: one looks for solutions near to current and successful practice. This is a cognitive element of routines (Reve, 1990).
- routines are embodied in human and physical assets (Winter, 1990). Hence, changing routines always comes at a cost as it requires the learning of new

ways of working, the unlearning of old ones and sometimes a considerable amount of new investment. It follows that routines are difficult to change.

- similar routines are easy to identify as belonging to the same class (Winter, 1990). This characteristic is especially relevant when detailed empirical research into routines and innovation is required.

Path dependence

Routines are a way of coping with uncertainty in the search for solutions to problems. It is impossible for firms to look at all possible solutions to a problem and retrieve the substantial amount of information that plays a role in dealing with this problem, so that satisficing behavior on the basis of routines takes place. As existing routines are the point of departure for solving problems, the way a problem is solved will reflect the original routines. This is called path dependence[1]: "Path dependence is a way to narrow conceptually the choice set and link decision making through time" (North, 1990, p. 98) and "A path-dependent sequence of economic changes is one in which important influences upon the eventual outcome can be exerted by temporally remote events, including happenings dominated by chance elements rather than systematic forces" (David, 1986, p. 30). Put differently, at the organization level firm specific circumstances at one point in time, can influence firm specific circumstances at a later point in time (path dependence will be discussed elaborately in section 4.3). The choice set of an organization can be limited by temporary events. The reaction to such a chance event can become embodied in routines so that long after the event took place it can still influence organizational decisions, because of the impact it had on the routines.

Routines and organizational innovation

Although various authors pointed to the possibility of analyzing organizational innovation in terms of the evolutionary view, it wasn't until Nelson (1991) that a first step in the application of this theory to the emergence of new organizational forms was made. In this article, Nelson begins to extend the Nelson and Winter framework with concepts taken from Chandler's work. Nelson however does not yet study organizational innovation as a separate phenomenon. In his view it is "usually a handmaiden to technological change" (p. 70). Miner (1994, p. 85) separates the organization from technology and claims that studying "recombination of administrative routines may yield more fundamental results" than studying technical routines. The possibility of studying the first routines is limited because the advance made in the theory of organizational innovation since

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[1] Liebowitz and Margolis (1990, 1995) have criticized the notion of path dependence, focusing on that kind of path dependence which researches the possibility of lock-in into suboptimal product standards. This is not to be confused with the concept of path dependence used here: in the present case it refers to patterns in the way changes follow each other in time. Here it is about dynamic processes instead of static market positions of product standards. It must be observed that this distinction (as well as other distinctions pointed at by Liebowitz and Margolis (1995)) is not always recognized in the various papers dealing with the topic.

Nelson and Winter first provided their analysis of routines is limited, so that according to Miner the routines which define organizational innovation are less tractable than those defining technical innovation. In chapter 2 the value chain concept has been put forth in order to make organizational innovations more tractable in practice: routines can be distinguished by looking at shifts in activities and linkages.

It is not that there has been no progress at all in the analysis of organizational innovation. There is widespread agreement that organizational forms can be described in terms of routines. Winter (1990) for example uses the M-form as an example of a routine. When the terminology of static and dynamic routines is applied to this example, the M-form can be said to consist of different static routines, like reporting and control routines, which are performed regularly and according to a relatively fixed pattern. Changes in these static routines are organizational innovations. In addition, *dynamic* routines can be helpful in explaining the *way* in which static routines are changed[2]. In practice a change of routines can be attained by a reshuffling of activities and linkages in the value chain. Detailed analysis of changes in routines can take place by making use of the value chain concept as reconfigurations of the value chain cause people to work differently: that is they cause them to start a new static routine. Following Nelson and Winter, these reconfigurations will probably be near to the previous configuration of activities.

In summary:

> *Dynamic routines are historically grounded mechanisms, that partly direct the reconfiguration of the value chain. The fact that each firm has its own history and therefore its own dynamic and static routines, is one of the reasons for the existing pluriformity of organizational forms.*

Routines grounded in historical experience can contribute to an explanation of the way organizational forms evolve. This evolution has a path dependent character, as the organization form in time t co-determines the organization form in time t+1. "The past is retained in rules that guide the present" (March, 1994, p. 41). This element of path dependence will now be discussed more elaborately.

In conclusion, dynamic routines guide organizational innovation in a certain direction. Moreover, their repetitive nature stimulates changes in the value chain.

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2 Illustrations of static and dynamic routines related to the value chain will be given in the empirical chapters, specifically sections 6.2.1 on JIT and 8.3.2 on European Distribution centers.

4.3 *Trajectories and paradigms: path dependence in the development of new organizational forms*

4.3.1 Theoretical background

Paradigms and trajectories in technological innovation

In research on technological innovation path dependence can be found back in the concepts of technological paradigms and technological trajectories. The terms were coined by Dosi (1982) who points at the analogy of the technological paradigm concept with the concept as developed in epistemology (Kuhn, 1962). Dosi defines a technological paradigm as a ""model" and a "pattern" of solution of *selected* technological problems, based on *selected* principles derived from natural sciences and on *selected* material technologies" (p. 152). A technological trajectory is defined as "the pattern of "normal" problem solving activity (i.e. of "progress") on the ground of a technological paradigm" (p. 152).

As among others Van den Belt and Rip (1984) point out, Dosi gives many examples of technological paradigms which unfortunately are not always compatible. Although the theory of paradigms has been extended since Dosi first noted the possibility of analyzing technology in terms of paradigms, there has been more concern with finding new paradigms (e.g. techno-economic paradigms (Freeman and Pérez, 1988)) than with fundamentally defining what a paradigm is (Wijnberg, 1995, is an exception to this rule). The same holds for trajectories. Neither is it clear that paradigms can always be neatly distinguished in practice (Van den Belt and Rip, 1984, p. 34). Furthermore, even though paradigms can explain innovation within paradigms, Van den Belt and Rip claim that the emergence of a new paradigm cannot be explained.

Despite these drawbacks, the notion of paradigms and trajectories is interesting for two reasons. First of all, the path dependence element inherent in it provides an explanation for innovation. The emergence of an innovation is explained by the fact that there is some logic in the innovative process, namely that innovations build on each other by means of reproduction of routines. Arthur (1988, p. 10) suggests four causes for this self-reinforcement: large set-up or fixed costs, learning effects, coordination effects (advantages to going along with others implementing an innovation) and adaptive expectations (one expects a successful innovation to spread further). These may lead to path dependence, next to multiple equilibria, possible inefficiency and lock-in.

The second interesting feature of trajectories and paradigms is that they may explain shifting competitiveness. Companies and countries working in one paradigm may not be able to shift to a more successful paradigm, as routines have become entrenched (cf. the lock-in identified by Arthur). Being locked in a certain paradigm or trajectory may lead to an erosion of competitive advantage, when a new more successful paradigm or trajectory emerges elsewhere.

Technological versus organizational paradigms and trajectories

Can the idea of trajectories and paradigms be applied to organizational innovation? Nelson (1991) and Kogut (1991) suggest that it can. As Kogut (1991, p. 37)

puts it: "There is, of course, no reason to limit this notion of a trajectory spreading within an economy to a narrow definition of technology. Changes in the organization of work, either at the factory, corporate, or industry level, can also follow a natural trajectory". He proceeds by giving three examples of organizational trajectories: the division of labour within the factory, the american system of manufacturing, the just-in-time system. Langlois (1984, 1986) also subscribes to such a viewpoint.

In this regard, North (1990, p. 95) argues that Arthur's (1988) four causes of self-reinforcement apply to all decision making in organizations. For organizational innovation, large setup costs are present: changing an organizational structure usually means a considerable disruption, and the costs associated to that can be immense. Learning effects can also be found: the longer an organization works with a certain structure, the smoother it will function, as the different pitfalls and drawbacks of the structure become known. As to coordination effects, it is easier (inside as well as between organizations) to change a structure in a direction near to current practice than in a radically new direction. Adaptive expectations can be found where a successful organizational innovation leads to the expectation that a similar innovation will be successful as well. Above that, the spread of a new organizational form to other firms acts as a legitimating force for further changes in the direction of that form, thus strengthening its trajectory of development.

The idea of organizational paradigms[3] has also emerged. Piore and Sabel (1984) use the paradigm concept to analyze historical developments. For instance, they describe the craft paradigm as a production model of which small companies form the basis. Pascale (1990) points to the usefulness of using the concept of paradigms in business. Not only prevailing conceptions on organizational forms, but also ideas on management in general can be analysed by means of the paradigm concept. He specifically refers to hidden assumptions in the way management operates. These two approaches do not pertain to organizational forms alone, but include some other variables as well.

Zenger and Hesterly (1993) relate the idea of organizational paradigms to the development of organizational forms exclusively, when they attempt to explain "The "New Paradigm" of Organization", as the title of their paper is. In this new paradigm economic activity is "converging towards exchange involving either internal (within-firm) or external (between-firm) networks of small, autonomous production or service units" (p. 2). Ruigrok and Van Tulder (1993, p. 101) following Cooke and Morgan refer to this as the network paradigm.

Following the authors mentioned above, the idea of paradigms and trajectories, will be used as an analogy for what can be observed in organizational innovation. Of course no analogy is a direct translation, but nevertheless it can be insightful to see whether the theory of technological innovation can be applied to organizational innovation as well. It will be shown that though the concepts are not

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[3] The idea of organizational paradigms used here is different from the one Grandori (1987) ascribes to Argyris and Schon (1978). Here it refers to organizational form, Grandori refers to knowledge and theories shared and used by organization members.

entirely similar, some of the basic mechanism do apply to both technological and organizational developments. Table 4.2 provides an overview of definitions of technological paradigms and trajectories together with the application to organizational forms.

Table 4.2 Paradigms and trajectories: analogy with organizational innovation

	Technological paradigms and trajectories	**Organizational analogies of these concepts**
Paradigm	• "model" and a "pattern" of solution of *selected* technological problems, based on *selected* principles derived from natural sciences and on *selected* material technologies" (Dosi, 1982, p. 152)	• organizational problems and organizational principles play a role and patterns can be discerned, but they are not so much derived from science and neither are they material, but social
	• examples given pertain to relatively narrowly defined technologies	• examples given are broader in scope
	• contains several trajectories (Dosi, 1982; Utterback and Suárez, 1993)	• idem (see table 4.5)
Trajectory	• "the pattern of "normal" problem solving activity (i.e. of "progress") on the ground of a technological paradigm" (Dosi, 1982, p. 152)	• idem for organizational trajectories
	• "advance seems to follow advance in a way that appears almost inevitable" (Nelson and Winter, 1982, p. 258)	• path dependence is also present
	• "are specific to a particular technology" (ibid)	• specific to a particular organization form (configuration of activities and linkages)

Source: based on Nelson and Winter (1982), Dosi (1982), Utterback and Suárez (1993), also see text.

The definition of a technological paradigm given by Dosi (1982) may apply to organizational innovation in so far that organizational paradigms also are patterns of solutions. These solutions may incorporate selected organizational principles. The analogy seems to stop as soon as the role of science gets into play (although Grandori (1993) would like to invent organizational forms in an almost scientific way). Moreover the role of material technologies is absent in organizational paradigms (also see table 2.1).

The examples given of technological paradigms usually refer to rather narrowly defined technologies. Van den Belt and Rip (1984, p. 35) assembled some of them: organic chemistry technologies, the internal combustion engine, semi-conductor

technologies etc. The organizational paradigms which can be defined are much broader in scope (in section 4.3.2 three paradigms will be defined). In relation to this, Dosi does not refer to exemplars (Kuhn, 1962) in paradigms, which according to Kuhn are exemplary achievements that serve as examples and reference points to scientists. For organizational innovation exemplars would be "best-practice" firms, using a certain organizational form and they can be found at the level of trajectories[4].

From the broad range of possibilities present in a paradigm only a few materialize. These are called trajectories and every paradigm contains several of these. The paradigm only defines the "outer boundaries" (Dosi, 1982, p. 154) of the possible developments. Table 4.5 will show that within organizational paradigms various trajectories can be found as well. Trajectories (both technological and organizational) are the patterns of actual problem solving within the boundaries of the paradigm (Dosi, 1982, p. 152). Interesting in this pattern is its path dependence: advance builds on advance (Nelson and Winter, 1982, p. 258).

The connection with routines and search

The ideas of dynamic and static routines and paradigms, trajectories and innovation can be combined as in table 4.3. In this table the relation between the different kinds of routines on the one hand and organizational paradigms, trajectories and innovations on the other, is made clear. As higher order routines are needed to invoke the lower order ones (Nelson, 1991), it will be the dynamic routines that initiate change in the static routines. A change in static routines is an organizational innovation (if it also contributes to a competitive advantage). Dynamic routines can be defined on the trajectory level. As different kinds of routines are easily identifiable (see table 4.1), the definition of trajectories and innovation in terms of dynamic and static routines, simplifies it to distinguish trajectories and innovations in practice. In this way the difficulty and arbitrariness of distinguishing paradigms, trajectories and innovations (Van Someren, 1991) is partly remedied.

Table 4.3 Evolutionary aspects of organizational innovation

Evolutionary aspects of innovation	**Related changes in**
Organizational paradigm	Broad conceptions about organizing
Organizational trajectory	Dynamic routines
Organizational innovation	Static routines

Source: see text.

[4] Table 4.3 will define some trajectories. Some exemplars of the different trajectories are (or were) GM's M-form, Unilever's Transnational structure, the Toyota JIT-system, Benetton as a Strategic Center, ABB as a Federated Enterprise. These companies are the exemplary achievements which are always referred to in management literature, when the corresponding organizational forms are discussed.

The elements in table 4.3 are hierarchically related from the top down. A change in paradigm entails a change in trajectory and therefore is an organizational innovation. An organizational innovation however, does not have to lead to a change in trajectory. Instead it can confirm and extend the developments within a trajectory. Usually, changes in paradigms and trajectories can be discerned only with the benefit of hindsight. The reason for this is that because of the path dependence of organizational innovations changes towards new trajectories or paradigms build on elements of existing paradigms/trajectories. Consequently new organizational paradigms/trajectories may develop gradually out of existing ones. Furthermore, for organizations in the middle of such a row of consecutive organizational innovations, it is often not clear in which way the developments head: "With the benefit of hindsight, the development can be described relatively clearly.....In the midst of this development it is much more a chaotic search and trial, than a planned and structured development.....Looking back there seems to be a structure in the process of change. In the midst disorientation prevails." (Mastenbroek, 1993, p. 66; translation APdM). This view is subscribed to by managers as well. The former CEO of Unilever explicitly recognizes the unplanned and trial and error nature of the discovery of the transnational structure (Maljers, 1992).

Hence, whether a new trajectory or paradigm has formed out of an initial organizational innovation, can only be determined long after the innovation took place, when a new organizational form has crystallized. Nelson's (1991) view that it is exactly this incremental and experimental character of organizational innovation that is not acknowledged by authors like Williamson, is largely consistent with the ideas developed above.

4.3.2 Trajectories and paradigms: examples from the theory of organizational innovation

In table 4.4 some examples of organizational paradigms have been assembled. Although the phrasing may differ, there is a remarkable similarity between the authors: all of them offer varieties on the theme craft-unitary-network. Some of the authors (Best, Piore and Sabel, Lazonick) do not focus exclusively on organizational forms. However, as was shown in chapter 3, they do relate their concepts to organizational innovations. Piore (1992) explicitly states that connected to the paradigm of mass production and flexible specialization, are the organizational forms of hierarchy and networks. Zenger and Hesterly (1993) and Winch (1992) do limit their views on organizational developments to organizational forms.

Based on the different approaches assembled in table 4.4, Winch's terminology will be used here. Hence, here his discussion of the developments in organizational forms will be followed. Consequently three different paradigms can be found:

Table 4.4 Paradigms of Organizational Innovation

Author	Paradigms of Organizational Innovation		
Best (1990)		Old Competition	New Competition
Zenger and Hesterly (1993)			Network Paradigm
Lazonick (1991)	Proprietary Capitalism	Managerial Capitalism	Collective Capitalism
Piore and Sabel (1984)	Craft	Mass Production	Flexible Specialization
Piore (1992)		Hierarchy	Network
Winch (1992)	Craft	Unitary	Networked

Source: see table.

- craft paradigm: skilled men produce customized products. The craft paradigm has a low productivity and firms produce in and for regional and national markets. It lost its dominance in most industries and (western) countries in the course of the 19th century.
- unitary paradigm: the firm is a clear separate entity, which is vertically differentiated in clearly defined functional units. The unitary paradigm prevailed in regulated national markets, in (roughly) the period 1910-1970.
- networked paradigm: lateral communication (often by making use of information technology) within firms of which the boundaries become increasingly less clear is the core of this form. Not only do firms become more and more embedded in interfirm relationships, also firms themselves start to look more like networks. The network paradigm is of increasing relevance in unregulated and global markets, appearing in the course of the 1970's.

Winch (as well as the other authors mentioned) claims that these three broad conceptions of organizing have succeeded each other in time. Even though Winch does not go into the subject, there does not seem to be a reason why organizational forms belonging to different paradigms, cannot co-exist. Depending on firm-, industry- and context-specific factors, different paradigms may be viable in different and perhaps even similar industries. Because of the broadness of the identified paradigms, such an observation does not undermine the usefulness of the paradigm concept. Specifically in the 1980's a move into the networked paradigm is widely believed to have taken place (e.g. Zenger and Hesterly, 1993).

Of course, these are very general statements that do not do justice to the pluriformity of organizational forms. These broad statements do however shed light on general developments in the field. Based on Best's (1990) and Lazonick's (1991) views on national competitiveness, the proposition can be advanced that paradigms are connected to country competitiveness. The craft paradigm is then connected with British dominance in the 19th century; the unitary paradigm is

related to American dominance in this century and the networked paradigm correlates with Japanese (and partly Italian) success in the last decades of this century (compare Kogut's (1991) and Dosi and Kogut's (1993) views on country competitiveness which corroborate this idea).

Within every paradigm a multitude of forms can be found, which can be called organizational trajectories. Organizational trajectories can be distinguished by the fact that they have different dynamic routines. The dynamic routines which define an organizational form are similar to the dominant designs (Utterback and Abernathy, 1975; Utterback and Suárez, 1993), that are used to distinguish separate technological trajectories. Once these organizational forms have established themselves they may provide a strong converging pull: individual organizations can and do use the dominant design as a benchmark for their own organizational change.

As mentioned before, each paradigm consists of a number of organizational trajectories. To illustrate this, different organizational trajectories in different paradigms have been assembled in table 4.5. In some instances, the difficulty of ranking these separate forms will be clear. The matrix for instance has some networked properties (transnational structures often make use of matrix-like structures as well) and seems to be an intermediate form. This may be an illustration of the idea that paradigms may emerge from each other. Nevertheless, the different forms mentioned have proven rather easy to identify, thus illustrating Winter's claim on the ease of identification of routines (see table 4.1).

The existence of trajectories may mean that inefficiencies in organizing exist because of the lock-in in a certain direction of organizational change. Other possible ways of organizing may not get noticed or, if noticed, not be implemented. Along a trajectory superior forms replace their precursors, but there is no inherent reason why these superior forms should be perfect. In short: no optimal forms exist, only superior forms which replace less effective ones (Gould, 1988).

Table 4.5 Some examples of organizational trajectories in organizational paradigms

Craft	Unitary	Networked
• Single craftsmen • Guilds (Schumpeter, 1939) • Industrial Districts (Marshall, 1890) • Cooperatives • Commission Merchant (North and Thomas, 1973)	• Functional Form (Chandler, 1977) • Multidivisional Form (Chandler, 1962) • Multinational Enterprise (Dunning, 1981) • Matrix (Davis and Lawrence, 1977) • Conglomerate (Williamson, 1985)	• Federated Enterprise (Handy, 1992) • Transnational (Bartlett and Ghoshal, 1989) • Just-in-Time (Cusumano, 1988) • Spider's web (Quinn, 1992) • Strategic Center (Lorenzoni and Baden-Fuller, 1995)

Source: see text.

There is a longitudinal element in the table, in that the paradigms succeed each other in time: the craft paradigm preceded the unitary paradigm which in its turn was succeeded by the networked paradigm. One important qualification is that the paradigms did not replace each other completely: they co-exist. Vertically, the trajectories have not been arranged along a chronological line, even though further research might suggest that there is a succession of trajectories. In relation to the research questions posed, the table shows that part of the pluriformity of organizational forms can be explained by an inside-out perspective based on routines, trajectories and paradigms. What the table does not show, is the path dependence of the individual forms. Chapters 6 and 8 will give some examples of path dependence inside trajectories.

4.4 *On radical and incremental innovation*

A much used distinction in literature on technological innovation is the one between radical and incremental innovation. Radical innovations are usually defined as those that break away from established routine and may lie at the basis of new paradigms or trajectories (Dosi, 1982, p. 158). Interestingly, existing routines are the reference point of many radical innovations (Winter, 1990) so that a completely new way of working will never occur: the existing routines have the new routines enclosed in them somehow, even when they are their mirror image.

For strategy research, the distinction between radical and incremental innovation is of limited use. The two types of innovations are only based on the characteristics of the respective innovation and not on their competitive impact. It can very well be that a radical innovation meets with a quick and sudden death in the market place, while an incremental innovation or a series of incremental innovations, can have a radical competitive impact. "It implies we cannot deduce the original scale of managerial intervention from the scale of impact" (Miner, 1994). As this is not recognized in the discussions around radicality and incrementality strategy research will not benefit from these concepts very much. This is of relevance because organizational innovation has been defined as a strategic change in chapter 2.

Henderson and Clark (1990) have distinguished two other types of innovation next to radical and incremental, namely modular and architectural innovation (see figure 4.1). They propose two dimensions along which innovations can be classified: firstly, whether the core concepts are reinforced or overturned and, secondly, whether the linkages between the core concepts are changed or not. Incremental innovations reinforce the core concepts, while maintaining the linkages; modular innovations overturn the core concepts and maintain the linkages; architectural innovations reinforce the core concepts but change the linkages and radical innovations overturn both concepts and linkages. Though this is an insightful extension for technological innovation, it does not completely remedy the criticisms given above. For example, Henderson and Clark only discuss the competitive impact of architectural innovations.

Figure 4.1 Henderson and Clark's framework for defining innovation

		CORE CONCEPTS	
		Reinforced	**Overturned**
LINKAGES BETWEEN CONCEPTS AND COMPONENTS	**Unchanged**	Incremental innovation	Modular innovation
	Changed	Architectural innovation	Radical innovation

Source: Henderson and Clark, 1990.

Organizational innovations can usually be described as a number of successive reconfigurations of the value chain, as the preceding sections have made clear. Of the M-form it can clearly be said that the competitive impact was radical, but from this does not follow that it emerged in a radical way. The separate divisions in the M-form for instance, still have preserved many characteristics from the preceding functional form and Lazonick (1991, p. 261) stresses the M-form's path dependence. Hence, it is impossible to tell how much change is necessary in order to call a particular innovation radical. The process of innovation is both continuous and discontinuous: some concepts and linkages may be changed while others are strengthened at the same time.

In addition, innovations that on first sight look "radical", on closer scrutiny appear to consist of many incremental innovations. This is for instance the case with the JIT-system (see chapter 6 for an elaborate analysis), as described by Cusumano (1988). The JIT-system as it functions today, is radically different from the traditional way of building cars. But with knowledge of the slow, incremental process by which it emerged, one can not judge it to be a radical innovation in the sense of Henderson and Clark or any other of their types. This is precisely because innovation is a process in which at any moment in time either one of the types of Henderson and Clark may prevail, only to be replaced by one of the others in another period.

It is therefore a fallacy to take current differences among forms or longitudinal differences of forms as prove of the alleged fact that an innovation is either radical, incremental, modular or architectural (compare with Darwin (1859) who goes to great length in order to show that the observed differences between species do not justify the claim that these species are independently created and hence unrelated). Even though considerable discontinuity exists in organizational innovation, too often differences are taken as a "prove" that there is radical change. In reality however, historical research finds considerable continuity in the process as well. Because organizational innovation is a process of different changes, in the course of time all four types of innovation defined by Henderson and Clark may occur and in combination they may lead to a new organizational form. In this process of change however, continuity is important as well.

These empirical difficulties, which may be greater in organizational innovation than in technological innovation, make that the concepts of radical and incremen-

tal innovation are of limited use for organizational innovation. Above that, the fact that such a distinction bears no relation to the competitive impact of the two forms of innovation limits the relevance of these concepts for strategy research. From a strategic perspective radicality versus incrementality of an organizational innovation is not the interesting point: most organizational innovations are to some degree incremental, as they are continuations of previous forms. Next, more than the extent of the change, the external consequences of the innovation are of interest. As Baden-Fuller (1994) seems to imply it is not so much the magnitude of change as the magnitude of the impact the change has on the competitive process that determines whether an innovation is radical or incremental. Hence, the forms of innovation identified by Henderson and Clark (1990) are not applicable to organizational innovation because they lack a strategic perspective and because organizational innovations may emerge over time as a combination of these forms, while simultaneously continuity can be observed as well.

4.5 *Resource-based theory*

The resource-based theory of the firm (rooted a.o. in Penrose, 1959) explains firm behavior on the basis of the resources a firm has at its disposal. The concept of resources has broadened considerably in the trajectory of development of resource-based theory and a bable-like confusion is going on with regard to the meaning of different concepts as capabilities, competences, resources, assets etc. The key ideas are, first of all, that organizations exist because in firms knowledge is embodied which is more effectively combined and developed inside the firm than in the market and, secondly, that organizational decisionmaking is influenced by the resources accumulated throughout an organization's existence (for an example see Elfring and Baven, 1994). Table 4.6 provides some definitions of capabilities and resources.

Foss (1994) divides the resource-based tradition in a formal (e.g. Peteraf, 1993) and appreciative school (including Prahalad and Hamel, 1990; Teece, Pisano and Shuen, 1990). The former is rooted in neo-classical equilibrium analysis and will not be considered further. The latter is firmly rooted in evolutionary theory (Foss, 1994). The concept of dynamic capabilities put forth by Teece, Pisano and Shuen (1990; 1992) explicitly acknowledges this intellectual background.

Amit and Schoemaker (1993, see table 4.6) make a distinction between resources and capabilities. Resources are mainly non-firm specific and tradeable goods (occasionally knowledge), needed in a firm's production process. Next to resources, firms also have developed firm specific and nontradeable knowledge (sometimes goods), which Amit and Schoemaker call capabilities. Nelson and Winter (1982) and Nelson (1991) show that the latter ones are grounded in routines. Likewise, Grant (1991a) defines a capability as follows: "A capability is the capacity for a team of resources to perform some task or activity" (p. 119), but also "A capability is, in essence, a routine, or a number of interacting routines" (p. 122).

The separate word capability is only used to denote those routines that the firm performs more effectively than its rivals (Grant, 1991a, p. 115). Teece, Pisano and

Shuen (1992, p. 21) stress the importance of capabilities and especially those that pertain to organization: "organizational or coordinating capabilities appear to vary across firms. It is these differences which allow some firms to earn higher rents than others". Similarly, Kogut and Zander (1992) state that all capabilities are essentially organizational.

Those capabilities that are hard to imitate and lead to a competitive advantage can be called "core", "distinctive" or "strategic" capabilities. The aspect of inimitability etc. has been discussed in chapter 1, section 1.5 and will not be analysed further here. It is however an important part of the resource-based view of the firm. Neither will the concept of routines, which underlie capabilities, be discussed here as it has been dealt with in section 4.2.

Table 4.6 Different definitions of resources and capabilities provided by various authors

concept	definition
Amit and Schoemaker (1993, p. 35)	
capabilities	• information-based, tangible or intangible processes that are firm specific and are developed over time through complex interactions among the firm's resources
resources	• stocks of available factors that are owned or controlled by the firm
Barney (1991, p. 101)	
resources	• all assets, capabilities, organizational processes, firm attributes, information knowledge etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve efficiency and effectiveness
Grant (1991a)	
capability	• the capacity for a team of resources to perform some task or activity (p. 118) • a routine, or a number of interacting routines (p. 122)
resources	• inputs into the production process (p. 118)
Kogut and Zander (1992, p. 384)	
capabilities	• capabilities rest in the organizing principles by which relationships among individuals, within and between groups, and among organizations are structured

Source: see table.

In an inside-out view on organizational innovation these capabilities can be of importance in directing the reconfiguration of the value chain. This was shown by Chandler (1990, 1992b) who claims that forward and backward integration "should be seen in terms of the enterprise's specific capabilities" (Chandler, 1992b, p. 89). When a producer lacks certain capabilities he will try to obtain them by either forward or backward integration. Foss (1993) uses a similar argument in

which the competence of firms to communicate and understand knowledge, determines the extent of vertical integration. It can therefore be concluded that not only organization guides the development of capabilities (Nelson, 1991, p. 70), but also vice versa: capabilities guide the development of organizational form.
Likewise, it seems to be a plausible proposition that the presence or absence of resources (financial, technological, etc.) can stimulate firms to reconfigure their activities and linkages in a certain way. The various organizational implications emanating from the analyses given in resource-dependency theory (Pfeffer and Salancik, 1978) are an example of this. As Grant (1991a, p. 122) states: "...resources available to the firm have an important bearing on what the firm can do since they place constraints upon the range of organizational routines that can be performed...".

Other examples of the relation between resources/capabilities and organizational form can be found in Teece, Rumelt, Dosi and Winter (1994) and Grant (1996). Teece et al. advance the proposition that the boundaries of the firm are, next to technological opportunities and the selection environment, determined by learning, path dependencies and complementary assets. Based on this view several hypotheses are developed which are aimed at explaining different organizational forms. Allocative, transactional and administrative competence play a role in determining the relevant organizational form. The approach taken by Teece et al. is static in that it looks at the efficiency characteristics of existing forms and not at the development of new ones. They explain how existing forms can be understood in terms of the firm's existing competences and do not go into the question how existing forms have evolved out of previous settings. Nevertheless, their idea that competences co-determine organizational forms does offer support to the ideas developed here.

Likewise, Grant (1996) proposes to study organizational structures from the perspective of knowledge. This knowledge is, according to Grant, embedded in capabilities. Integration of capabilities is one of the functions of organizational structures: "the architecture of capabilities must have some correspondence with the firm's structure of authority, communication, and decision making, whether formal or informal" (p. 6).

Concluding, the inside-out view of organizational innovation not only exists of dynamic routines, but also incorporates capabilities (which basically are routines which are of strategic importance) and resources. These can play a role in determining the reconfiguration of value chains.

4.6 *Proposition and attribute-table on path dependence*

The next proposition can summarize the main findings of the inside-out perspective:

> The process by which organizational innovations come about is path dependent, in that new organizational forms to a large extent build on their precursors. The reason for this lies in such firm specific attributes of path dependence as dynamic routines, capabilities and resources.

This does not mean that innovation is always a slow process. Instead the proposition highlights the idea that innovation is not only a process of breaking with the established order, but that a considerable continuity is present as well. Or as Galbraith (1973, p. 74) puts it, new organizational forms "are resurrections of previous forms that need to be perfected".

Furthermore the proposition implies that the process of organizational innovation is one of *search* for a *tailored* solution to organizational problems. It does not have a Williamsonian view of the process of organizational innovation as a *choice* between *discrete* organizational forms. "Which mode (of organization, APdM) we observe will depend not only on its a priori superiority over other known modes but also on the specific historical sequence that the evolutionary process followed" (Langlois, 1984, p. 39; also see David, 1986). Note that this is not a deterministic process: in the way routines are used to reconfigure the value chain there is ample room for strategic choice.

Table 4.7 presents an overview of the influence of path dependence on organizational innovativeness. For this purpose the dependent variable (organizational innovation) and the independent variable (path dependence) have been operationalized by means of *attributes*. These attributes make it easier to observe the role of the variables in practice. Organizational innovativeness has been operationalized in three attributes as in chapter 2, section 2.3.4: form (do the independent variables influence the way the form looks), speed (do they speed up or slow down the process of innovation) and extent (do they lead to more important innovations or do they limit the number of reconfigurations in the value chain). These attributes are arranged vertically in the column completely at the left. Path dependence has been operationalized with the attributes dynamic routines, capabilities, and resources which can be found in the top row of the attribute table 4.7.

Table 4.7 Theoretical attribute-table on path dependence

	Dynamic Routines	**Capabilities**	**Resources**
Form	Y	Y	Y
Speed			
Extent	+		

Y = Yes, the independent variable influences the dependent variable
\+ = The independent variable influences the dependent variable positively
Source: see text.

The hypothesized relations between the attributes have been denoted by the symbols "Y" and "+", explained by the legend under the table. If no relation can be hypothesized based on the theory, no symbol is given. In the chapters 6, 7 and 8, similar attribute-tables will contain entries based on results of empirical research. By comparing these empirical tables with the theoretical tables, a conclusion can be reached as to the relevance of different relations (a task done in the final chapter 9). The method of attribute-tables simplifies the testing of

propositions in theory-building studies. A detailed discussion of the ins and outs of the method of attribute-tables can be found in the Appendix.

The relationships between the different variables have been hypothesized, based on the theoretical discussions given in this chapter:

- dynamic routines influence the form of the organizational innovation because they direct the search for value chain reconfigurations in a certain direction: namely in the direction of previous successes;
- the repeated application of a dynamic routine leads to an accumulated change over time, so that a completely new organizational form can emerge. Hence, dynamic routines influence the extent of organizational innovation positively. Repetitiveness was among others discussed in table 4.1;
- based on the discussion in section 4.5, capabilities and resources do seem to have an impact on steering organizational form in a certain direction, but whether they enhance or limit the speed and extent of the innovation cannot be ascertained beforehand. Sometimes a lack of capabilities and resources can stimulate organizational innovation; sometimes an abundant amount of capabilities and resources can help in innovating. Authors do however agree on the idea that the current resources and capabilities influence the organizational form chosen and hence the "Y" in the boxes relating resources and capabilities to form.

4.7 *Conclusion*

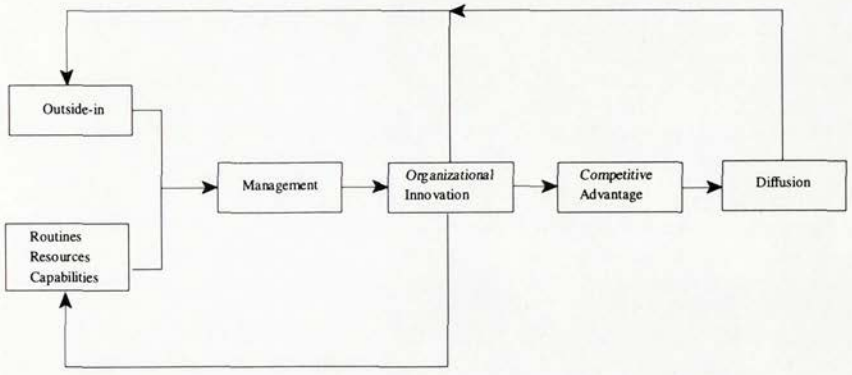
The inside-out factors which determine the reconfiguration of the value chain are resources, capabilities and dynamic routines. Analogical to technological innovation, different authors have used the concepts of trajectories and paradigms to explain organizational innovation, building on the idea of routines. These concepts show the path dependence inherent in the emergence of new organizational forms. Dynamic routines are specifically interesting. They are historically grounded mechanisms, that partly direct the reconfiguration of the value chain. The fact that each firm has its own history and therefore its own routines, may be one of the reasons for the existing pluriformity of organizational forms.

The method of applying the theory of technological innovation to the subject of organizational innovation showed that especially the role of routines is similar for both technology and organization. The ideas of trajectories and paradigms can be applied to organizational innovation as well, even though the concepts have to be adapted (see table 4.2). By relating the concepts of innovation and trajectories to the distinction between static and dynamic routines, it becomes easier to define trajectories empirically. Finally, the distinction between radical and incremental changes is proposed to be of little use for organizational innovation because of its neglect of the strategic impact of the innovation and because of the fact that organizational innovation exhibits both continuity and discontinuity, thus making it hard if not impossible to distinguish incremental change from radical change.

If the inside-out perspective developed here is incorporated in the basic schema of analysis, figure 4.2 results. The remaining blind spot in the figure is the

outside-in approach. The next chapter will show a way of reasoning that can begin to fill this in as well.

Figure 4.2 *Routines, Resources, and Capabilities in the Analytical Schema of Organizational Innovation*



5

From the outside in

5.1 *Introduction*

In chapter 3 it has been shown that the literature on organizational innovation has paid relatively little systematic attention to the role of the business environment in shaping new organizational forms, even though there seems to be widespread agreement that such an influence exists. No structural research has been done into the question what the key environmental determinants of organizational innovation are. As far as environmental determinants have been identified, there have been no detailed analyses of the way in which they influence organizational innovation. As a consequence there is much unclarity on the question which environmental determinants are conducive and which are inhibitive to organizational innovation. For these reasons the focus in this chapter will be on the outside-in part of figure I.1.

It will be impossible to deal with all environmental variables in this chapter, yet a beginning will be made. In order to create some structure in the bewildering amount of elements that together form the business environment, in the next section (5.2) a choice will be made to use the determinants of Porter's (1990a) framework and evaluate them on their impact on organizational innovation. The aim is to show that this is a fruitful approach to analyse the context dependence of organizational innovation. The following sections (5.3 and 5.4) will look into more detail to the role of interfirm relations and demand conditions. These two are picked because they have proved to be relevant in innovation research. The research question will be whether demand and related and supporting industries are conducive or inhibitive to organizational innovation. To answer this question, three subquestions will be dealt with:

1. Do demand and interfirm relations influence organizational innovation? Important for this question is *whether* different kinds of demand/interfirm relations have an impact on the emergence of new organizational forms.

2. If so, *why* do these determinants effect organizational innovation? Of relevance here is what the mechanisms are that explain this influence.
3. *How* do they influence organizational innovation, that is: do they have a positive or a negative effect?

5.2 *A general picture: the influence of the business environment on organizational innovation*

5.2.1 The business environment: a choice for Porter's diamond

In the outside-in perspective the key question is what elements in the business environment determine firm level processes. Different frameworks have been developed to describe the business environment. The overview of theories in table 3.4, also provides an overview of which determinants have been identified in different theories as key characteristics of the business environment. Next to these theories, approaches specifically aimed at environmental analysis have contributed to this field (e.g. Fahey and Narayanan, 1986).

One of the most recent and elaborate contributions has been Porter (1990a), whose diamond of national competitive advantage identifies several factors in the business environment which stimulate innovation. This framework will be taken as a point of departure for identifying factors that may influence the process of organizational innovation.

Next to the fact that Harvey and Jones (1992) observed that there is a complementarity between the Porter (1990a) framework and Chandler's work on organizational innovation, there are five other reasons to choose Porter's framework. These are:

1. Suitability for theory-building studies
2. Integration of theories
3. Right level of analysis, related to competitive advantage
4. Focus on innovation
5. Theoretical consistency with inside-out approach.

ad. 1 Porter's framework is well-suited for the theory-building approach adopted here. It specifies factors in the business environment, which can be related to the process of organizational innovation. Operationalizations of the business environment made for large scale empirical studies (as for example can be found in contingency theory), are of less relevance if one wants to make an in-depth study of the way the environment influences organizational innovation. What are needed are not variables that are helpful in finding correlations, but variables that allow a study into causal relationships to take place. Porter's determinants do allow such a detailed scrutiny of variables and thereby provide a good basis for the current analysis.

ad. 2 Porter draws together different strands of literature. The need for this kind of integrative frameworks in business administration, crossing the boundaries of theories and integrating them, has been pointed out before

(Van den Bosch, 1989; Porter 1990a, p. 29/30). For the study of innovation it is especially important to look from different perspectives (see for instance Van de Ven, 1986). Porter's framework meets this requirement to a large extent. A brief discussion of the theoretical background of Porter's framework can be found in section 5.2.3.

ad. 3 Analysis of problems in business administration can take place on many levels, for instance a macro-level (Fahey and Narayanan, 1986), industry-level (Porter, 1980), population level (e.g. Aldrich, 1979), firm level (e.g. Lawrence and Lorsch, 1967), transaction level (e.g. Williamson, 1975). Levels of analysis can also be defined geographically: world level (e.g. Ohmae, 1985; 1990), national level (Reich, 1991), regional level (De Smidt and Wever, 1990), city level (Porter, 1995). Care must be taken that questions playing on a certain level of analysis are not studied by instruments developed for another level of analysis. Relating different levels of analysis can shed light on interesting issues, however. The level of analysis in Porter's diamond (see section 5.2.2) is useful for the current study of innovation. Porter's diamond deals exactly with the issue of interest namely: the influence of the business environment on firm level processes or as he puts it "the way in which a firm's proximate "environment" shapes its competitive success over time" (p. 29). As the level of analysis required for study of organizational innovation is the firm, this is consistent with Porter's diamond.

ad. 4 Porter's framework is meant to explain innovativeness and it is one of the very few frameworks for environmental analysis that put innovativeness central. Despite the drawback identified by McKelvey (1991), that Porter conceptualizes innovations as static blueprints and not as emerging trajectories and paradigms, the focus on innovation is interesting because Porter takes an outside-in view of innovation instead of the inside-out view which is incorporated in the notion of routines, capabilities and resources. This focus on innovation naturally leads to the question how the framework relates to organizational innovation. Are the factors defined by Porter of importance for all kinds of innovation and is the direction of influence similar for all these factors?

This question is of relevance because Porter, though recognizing explicitly that innovation is much broader than technological change (Porter, 1990a, p. 45), focuses on the technological aspects of innovation. He does claim that new ways of organizing are innovations (p. 579), but in his cases few examples of them can be found and neither does he address the question whether there are significant differences between these two kinds of innovation. His main focus seems to be on technology. Take for instance his statement on the factors of influence in the competitive process: "A new theory must reflect a rich conception of competition that includes segmented markets, differentiated products, technology differences, and economies of scale. Quality, features, and new product innovation are central in advanced industries and segments. Moreover, cost advantage grows as much out of efficient-to-manufacture product designs and leading process technology as it does out of factor costs or even economies of scale" (p. 20). Organizational form is absent in this statement.

Looking at the case study of the Third Italy described by Porter and comparing it to Best's description of the same case, the lack of attention for organizational innovation becomes even clearer. In chapter 3 it has been shown that Best (1990) emphasized the farreaching influence of organizational innovations in the competitiveness of this region. Two questions are of relevance here. First of all, does Porter mention organizational innovation and secondly, if so, does he explain them in the same way as he explains technological innovation, namely as emerging from an interaction of the determinants of competitive advantage (section 5.2.2 will discuss these determinants in more detail)?

Porter's analysis can be found on pp. 210-225. With regard to the first question, Porter does not really elaborate on the organizational aspects of the Third Italy. For instance, at p. 220 where Porter discusses continuous innovation, all the examples given are product or process innovations: material handling equipment, continuous process technology, the third-firing method, designer tiles. The only reference to an organizational innovation is Assopiastrelle (p. 216), an industry association that coordinated some of the activities of the firms. He does however not explain the emergence of Assopiastrelle as an interaction between the different innovation enhancing determinants he identified. On a broader level, Porter does point to some specific organizational forms in Italy in general (see pp. 421-453). He describes the high level of contracting out (p. 443), and the lack of formal structures in small firms (p. 445; on this page Porter limits his discussion of organizational structure mainly to organizational size). Again, he does not relate these characteristics to his determinants of innovation. In conclusion it is clear that Porter has not incorporated organizational innovation as a separate subject in his research, but has focussed on studying technological innovation. Hence the question whether his framework is also applicable to organizational innovation is relevant.

ad. 5 Finally, on a theoretical level Porter's approach in *The Competitive Advantage of Nations* is similar to the inside-out approach defined in chapter 4. The inside-out approach builds on a neo-Schumpeterian perspective. Whereas Porter's (1980) work is grounded in the industrial organization tradition, Porter (1990a) appears to subscribe to a neo-Schumpeterian/resource based perspective (Grant, 1991b; De Man, 1994a). The inside-out and outside-in approach used in this thesis are therefore not theoretically incommensurable, but have common roots. In Porter's diamond some inside-out elements are present (Van den Bosch and Warmerdam, 1995), but the approach put forth in chapter 4 facilitates more detailed research and is specifically aimed at organizational innovation.

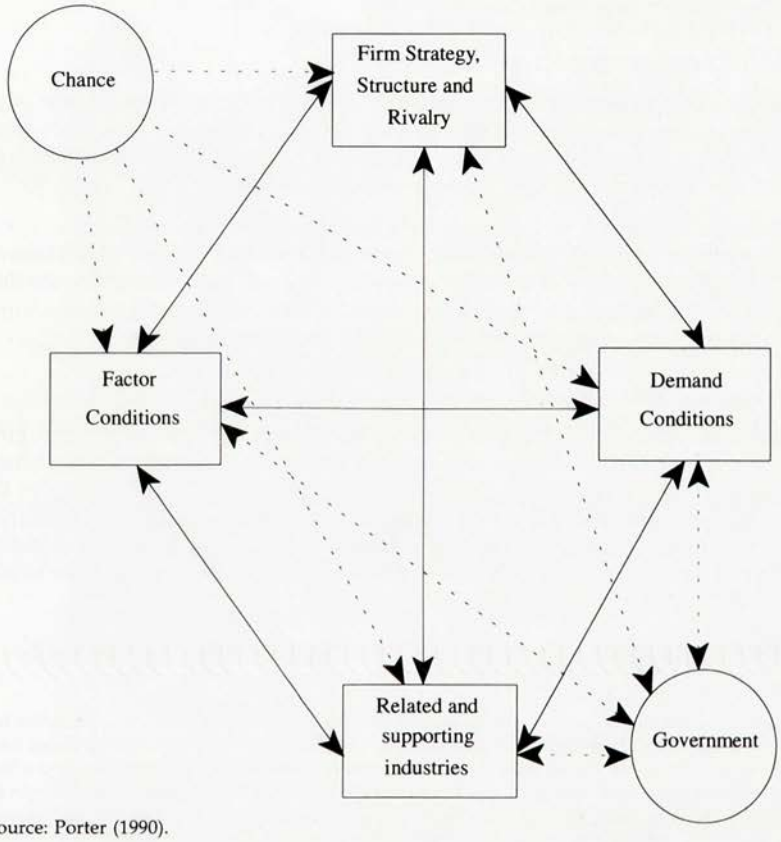
5.2.2 Porter's diamond framework

Porter's *The Competitive Advantage of Nations* deals with the following question: "Why do some firms, based in some nations, innovate more than others?" (p. 20). To answer this question, he directs his attention to the elements in national business environments that determine the innovativeness of firms.

The core of Porter's book is a dynamic analysis of the way firms improve their competitive position by constantly upgrading their products, production processes and resources. Porter gives a historical account of how competitiveness has grown throughout history by the interaction of four determinants in the business environment, which are influenced by two influencing factors. This system is called the diamond of national competitiveness (see figure 5.1).

The elements of the diamond influence the process of innovation at the firm level. Each element will now be discussed separately. Next to a discussion of these elements some of the main criticisms on Porter's framework will be discussed and propositions will be advanced as to the relation between the determinants and organizational innovation. It should be noted that Porter does not see the determinants and influencing factors as a collection of separate elements. Instead he points to many interactions between them. The core is however in the determinants.

Figure 5.1 The Diamond Framework



Source: Porter (1990).

Factor conditions

Firstly, innovativeness is influenced by factor conditions. Porter distinguishes two kinds of production factors: basic and advanced. Basic production factors are e.g. natural resources and labour. More important for the sustainability of competitiveness are the advanced factor conditions. These are factor conditions that have required considerable effort to build. Infrastructure, knowledge and an educated workforce (as opposed to the mere availability of people mentioned as a basic factor condition) are examples of this. These advanced factor conditions are difficult to imitate and often take decades to construct. Therefore a country possessing them has a lasting advantage, provided that it does not stop maintaining and developing them.

Usually the availability of factor conditions stimulates innovativeness. There are however also instances in which a shortage of factor conditions has created a competitive advantage. An example of this is the case in which firms have had to compete around a shortage of resources in their environment and in doing so found considerably better methods of production. Using these methods firms may be able to beat the competition.

PROPOSITIONS ON FACTOR CONDITIONS

There is no reason to assume that this determinant works out differently for organizational innovation. Selective scarcity may stimulate organizational innovation. When resources are abundant there is no need for a firm to change, when all resources are scarce there may be no possibility to change.

Pertaining to advanced factor conditions, Grandori (1993) pointed at the role of information technology. Child (1987), Huber (1990) and Zenger and Hesterly (1993) claim that the use of information technology will make hierarchy obsolete and lead to a disintegration of the value chain. A well-developed telematics infrastructure may therefore strengthen the networked paradigm.

Firm strategy, structure and rivalry

The second factor determining innovativeness lies in the behavior of firms. Firm strategy and structure may or may not be geared to innovation and change. Important in the way strategies and structures are shaped is the rivalry in the home base. According to Porter international competition usually is no substitute for a lack of competition in the home base itself[1]. Indeed, he found domestic rivalry to be the most important factor stimulating innovations, as in order to stay ahead of their competitors firms will innovate.

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[1] Porter does not provide an explanation for this result. An explanation may lie in the fact that competition for resources is important. When there is fierce rivalry in the home base, resources will become scarcer and more expensive. This will force firms in the home base to innovate in order to make more efficient use of those resources. When competition in the home base is lacking, firms do not have this incentive. Strong international competition cannot fully remedy this, as international competitors draw their resources form a different home base and therefore do not influence resource scarcity in home bases of other firms.

The elements of strategy and structure are inside-out elements in Porter's framework (Van den Bosch and Warmerdam, 1995). Firms are not only influenced by the determinants in the business environment, but can also influence their environment by means of their strategy. In the diamond deterministic aspects are combined with strategic choice elements. In this thesis one strategic choice, viz. the choice for organizational innovation, is studied in relation to environmental determinants.

PROPOSITIONS ON FIRM STRATEGY, STRUCTURE AND RIVALRY

Strategy and structure have been discussed in chapters 1, 3, and 4. The interrelationship between strategy and structure has been clearly established in literature (starting with Chandler, 1962). The role existing organizational structures play in organizational innovation has been discussed in chapter 4. Existing structures act as a reference point for organizational innovation. There is path dependence: history matters.

As to the role of competition, Lazonick's competitive uncertainty discussed in section 3.3.5 has made clear that competition can influence the reconfiguration of the value chains of firms. Moreover, Nelson stated that "Monopoly, or tight oligopoly with strong barriers to entry, can be seen as a serious economic problem ..... because they are unlikely to generate the variety of new routines, and the attendant shifts in resource allocation on which economic progress depends" (Nelson, 1991, p. 72). Following from this last statement and from the observation made in chapter 4 that routines are important to organizational innovation, the proposition can be put forth that competition stimulates organizational innovation.

Related and supporting industries

The third determinant is the presence of developed networks of suppliers, distributors or otherwise related industries, like specialized banks or service firms. Often innovations are developed in such networks, rather than by one single firm. Also interfirm relations may stimulate the diffusion of innovations between different firms and provide rapid access to information located at different places in the network.

In a more elaborate form the determinant of related and supporting industries can be found back in Porter's concept of clusters. The cluster concept refers to the presence of related and supporting industries in a certain industry as a whole, whereas related and supporting industries as a determinant are connected to a specific product within that industry. It could be stated that clusters are one level of analysis higher than related and supporting industries, but the concepts overlap to a large degree.

PROPOSITION ON RELATED AND SUPPORTING INDUSTRIES

Embeddedness in a cluster of related and supporting industries works out positively for *technological* innovation, but it is questionable whether this is always the case for *organizational* innovation. Long-term interorganizational relationships may inhibit organizational innovation, because when such relationships have

developed, organizational innovations may require not just a change in one firm, but in two. Section 5.3 will study this problem more extensively leading to the following proposition: the presence of long-term interorganizational relations (in related and supporting industries) does not enhance the process of reconfiguring the value chain both within and between firms.

Demand conditions

The fourth and final determinant of national competitiveness is formed by the nature of demand faced by firms. Size of the home market is of less importance than its quality. Sophisticated and demanding consumers are an impetus for firms to innovate, whereas easy-to-please, non-critical customers may slow down the innovative process, no matter how many of them there are. One thing to be noted in relation to the international dimension of country competitiveness, is that buyer needs in a home base must be anticipatory of needs in other countries, as national idiosyncrasies rarely come to conquer the world.

PROPOSITION ON DEMAND CONDITIONS

There are various reasons to assume that changes in demand are an important cause of organizational innovation. Section 5.4 will elaborate on this point and show that there is ground for formulating the next proposition: Other things being equal, increasing volatility of demand will lead to a diminishing use of organization-like linkages, to the benefit of market-like linkages in the configuration of the value chain.

For completeness also the influencing factors defined by Porter will be discussed. As, according to Porter, they have no direct effect on innovation, no propositions will be defined pertaining to organizational innovation. The influencing factors are:

Government

Government's role in creating competitive advantage is an important one. Although Porter maintains that governments cannot create a competitive advantage on their own, their role in stimulating and challenging business can be considerable. Porter points to a plethora of measures taken by governments that influence competitive advantage. These measures never influence competitive advantage directly, but are mainly aimed at the determinants. Governments, for instance, can set quality standards and thereby upgrade demand.

Van den Bosch and De Man (1994) have criticized Porter's view on government on three grounds. Firstly, they point to the fact that Porter has not incorporated local and regional governments in his discussion of government's role, but has limited himself to national government. Secondly, there is a shift in governmental policy from macro policy making towards policy directed at meso- and micro-levels (Branscomb, 1992; Ostry, 1990), which Porter does not account for. The more government will play a role on these lower levels, the more it will become intertwined with the diamond and the less clear it will be that government should be an influencing factor in the diamond and not a determinant. Thirdly, Porter does not relate the role of government to the industry life cycle. Porter does claim

that in different stages of national competitive development, government plays a different role. Yet, the same effect can also be observed with regard to different phases of the industry life cycle. A government may be very active in the early phases of development, diminish in influence when the industry matures and may come back to play an important role in restructuring the industry in the decline phase. Incorporating these extensions in the Porter framework, would contribute to a more balanced understanding of the impact of government on competitiveness.

Chance

The other influencing factor is the element of chance. Chance elements like breakthrough technologies, wars or sudden shifts in demand, can give opportunities for one nation's industries to supplant another's. It must however be noticed that the chance event only gives the opportunity for change. It is the way firms react to it that will determine the final outcome.

Some critiques and extensions, as far as not mentioned above, of Porter's diamond model have been assembled in table 5.1.

Table 5.1 Critiques and extensions of Porter's diamond

Van den Bosch and Van Prooijen (1992a)
Van den Bosch and Van Prooijen extend Porter's analysis of culture as a determinant of competitive advantage. They find that culture has an impact on every determinant of the diamond.
Dunning (1992)
Dunning adds transnational business activity (TBA) as an influencing factor to the diamond. He consistently works out the influence of TBA on every determinant.
Grant (1991b)
In an encompassing discussion by Grant, one of the drawbacks of the diamond pointed at, is the vagueness and broadness of some of the determinants. This limits the clarity of the framework.
Jacobs and De Jong (1992)
An important extension of the Porter model is given by Jacobs and De Jong with regard to the geographical scope of the framework. They make a distinction between the geographic scale of the production network and the geographic scale of the market. They show that Porter's notion of clusters can include crossborder clusters.
Rugman (1992)
Rugman directs his critique a.o. to the geographical level at which the diamond has to be applied. He defends a so-called "double-diamond" approach (see also Rugman and D'Cruz, 1993) to study Canadian competitiveness. As Porter and Armstrong (1992) point out, this approach fails to distinguish between the geographic locus of competitive advantage and the geographic scope of competition. Jacobs and De Jong's framework offers a better solution to this problem.

Source: based on the indicated literature.

5.2.3 The diamond and innovation theory: demand and related and supporting industries

The four determinants described in the preceding paragraph have ample relations to theory. Firm strategy, structure and rivalry is incorporated in literature on strategy (e.g. Porter, 1980; Chandler, 1990) and Industrial Organization (e.g. Bain, 1968; Scherer, 1980). The importance of home demand for national competitiveness has been pointed out by Linder (1961) and Vernon (1966). Rosenberg (1982) and Von Hippel (1988) suggested that demand can play a major role in the innovative process. Literature on the influence of related and supporting industries is e.g. Hirschman (1958), Lundvall (1988), Jacobs and De Man eds. (1995) and again Von Hippel (1988). Factor conditions have been subject of many analyses (e.g. Denison, 1970), yet in the context of innovation their impact has rarely been looked into.

Another source of inspiration for Porter was Ergas (1984). Ergas already defined demand, technological opportunity (defined as access to personnel, and links between industry and science) and industrial structure (competition, cooperation, entry of new firms) as factors determining innovative performance. On the level of the determinants this is rather similar to Porter (1990a). Technological opportunity is related to the determinant factor conditions; cooperation from the factor industrial structure is part of Porter's related and supporting industries, as are the links between industry and science. Ergas thereby is probably one of the first to assemble different competitiveness enhancing factors in one "checklist".

Already some propositions have been defined in the preceding section as to the influence of the diamond on organizational innovation. In the following sections two determinants will be further analysed on this point: demand and related and supporting industries. The first reason for choosing these is that, as was shown above, they have the strongest background in research into technological innovation. That's why, in order to see whether these factors can also encompass organizational innovation, they are of specific interest because they can show whether the literature on technological innovation is also applicable to organizational innovation. The second reason is that the preliminary propositions related to these determinants point to contrasting results: demand is supposed to enhance organizational innovation, related and supporting industries have been identified as possibly inhibitive. It will be interesting to point at some differences and similarities between these two possibly conflicting determinants of organizational innovation.

5.3 *Related and supporting industries: the influence of clustering on organizational innovation*[2]

5.3.1 Introduction

The increasing role of interorganizational collaboration has been identified as one of the major trends in business today (Grandori, 1993). Firms which have developed a competence in building interorganizational structures may have a sustainable competitive advantage over those that don't. Networks (Jarillo, 1988), regional conglomerations (Best, 1990) and strategic alliances (Hamel, 1991) are only some of the multitude of forms of interfirm cooperation. Porter (1990a), elaborating on his notion of related and supporting industries, has developed the concept of clusters of related firms and institutions to provide for the broad range of possible interorganizational relations. Even though various definitions of the cluster concept have been developed (Jacobs, 1995 gives an overview), the emphasis has mostly been on geographically concentrated interfirm relations and their influence on technological innovation.

It is widely accepted that clusters have an influence on *technological* innovation in two ways. Firstly, clusters are innovative: the relations between different firms and between firms and consumers stimulate the development of new products, production processes and other technologies. Secondly, technological innovations diffuse faster within clusters. The strong competition and swift dissemination of information in clusters are the root causes of this effect. This was already known to Marshall who stated: "Good work is rightly appreciated, inventions and improvements in machinery, in processes and the general organization of the business have their merits promptly discussed; if one man starts a new idea it is taken up by others and combined with suggestions of their own; and thus becomes the source of yet more new ideas" (Marshall, 1890, p. 332).

The question researched here is whether clusters stimulate organizational innovation, like they stimulate technological innovation. The quote from Marshall seems to suggest that clusters do have an impact on organizational innovation (if this is what Marshall meant by "general organization"), at least as far as the diffusion of them is concerned. As the present focus is on the emergence of organizational innovations, the diffusion question will not be subject to elaborate discussion. Instead, the next subsections will deal with the effect of interorganizational relations on the emergence of new organizational forms.

In order to tackle this problem, firstly the organizational aspects of clusters will have to be defined. The way in which interfirm relations play a role in organizing production in a cluster is discussed in section 5.3.2. This discussion not only makes clear that clusters consist of many different interorganizational relations, it will also lay the foundation for the discussion of the organizational innovativeness of clusters. Special attention will be given to long-term interorganizational relationships in section 5.3.3.

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2 This section is based on De Man (1994b).

5.3.2 Clusters: relevant organizational aspects

The most noticeable organizational feature of a cluster is the wide and pluriform range of interorganizational relations. Three types of interorganizational relationships can be distinguished. Foss and Eriksen (1995), drawing on game theory, distinguished between cooperative and non-cooperative relationships in clusters, depending on the fact whether firms work together in creating new resources and capabilities or whether they don't. Within cooperative relationships, some will be short-term and others long-term. Lorange and Roos (1992, p. 10) for instance point to the time for which a strategic alliance is formed as one of its basic characteristics. Some alliances are temporary, aimed at reaching a specific goal and once that is reached the alliance is dissolved. Other alliances aim at a relation for the long-term and do not have a specified lifetime or a goal, the fulfillment of which entails the obsolescence of the alliance. Ibarra (1992, p. 181) also distinguishes "enduring, stable relationships" from "the more fluid constellations of relationships". Hence, there are 3 interorganizational relationships in clusters (table 5.2):

1. Long-term relationships
2. Short-term relationships
3. Non-cooperative relationships.

Table 5.2 Interorganizational relationships in clusters

	Long-term	Short-term
Cooperative	1	2
Non-cooperative	3	

Source: De Man, 1994b.

Long-term relationships

The first kind of relationships are especially characteristic of clusters and are closely related to Porter's "related and supporting industries". Characteristic of these relations is their intertwinedness (Håkansson and Johanson, 1993, p. 39/40). In the course of time there will be a building up and intensification of linkages between the firms involved in the relationship. Firms get tuned to one another and become related on different activities in the value chain.

One important qualification is that the organizational skills required to manage such interorganizational relationships are considerable. Firms possessing them may have an important competitive advantage. Firms not possessing them and entering into such relations may undermine their competitive positions. Reich and Mankin (1986) issue a warning in this respect, so do Hamel (1991) and Commandeur (1994, p. 100) who provides an overview of drawbacks of long-term cooperation.

In section 5.3.3 the characteristics of these relationships and their organizational innovativeness will be under more detailed scrutiny. It will be shown that there

is reason to assume that these relationships can form an inhibiting factor for organizational innovation.

Short-term relationships

Next to long-term relationships, there are various short-term relationships in clusters as well. These can consist of simple deliveries, the provision of less important parts for the manufacturing of a good, the use of management consultancy etc. In these relationships there can be a lot of dynamism: firms can make use of different suppliers and may shift suppliers as well (Jacobs, 1995). Hence, there is no ongoing contact between the firms, but irregular contact.

The fact that there is no certainty in short-term relationships for a supplier that he can continue to deliver goods in the future, is a strong impetus for him to deliver quality at reasonable cost and thereby contribute to the competitive advantage of its client and the cluster. These forms of collaboration play a role in maintaining the overall efficiency of the cluster, but will seldom lead to important innovatory technological breakthroughs. The reason for this is that technological innovation requires long-term interaction between cooperating firms (Oerlemans and Meeus, 1995).

The organizational innovativeness of this kind of relationships is unclear. As these relationships will be more competitive than long-term relationships, they may stimulate organizational innovation. The competition in these short-term relationships may lie in the bargaining power of the suppliers (one of the five competitive forces identified by Porter (1980)). The attempts of suppliers to appropriate some of the surplus of the client is a form of competition.

On the other hand, the presence of short-term interorganizational relationships may inhibit organizational innovation for the same reasons as in the case of long-term relations (see section 5.3.3). Despite the fact that the relations are only for the short-term, the upheaval an innovation causes for short-term suppliers may still be prohibitive. The influence of a network of short-term relations on organizational innovation is therefore unclear.

Non-cooperative relationships

A third feature of clusters is of interest. Organizing clusters does not necessarily mean that there has to be a deliberate coordination of firm activities in which the firms are in actual contact with each other. Coordination by means of other non-deliberate and non-cooperative mechanisms can play a role as well. Non-cooperative relationships do not require considerable interaction between firms (the communication of price may often be sufficient), but may be enhanced by the geographical concentration of a cluster. They are not necessarily antagonistic.

First of all the presence of a large group of firms in a similar industry can give rise to the growth of supporting industries or specific resources with which no direct relation has to be maintained, but of which the advantages are nevertheless clear. Specialized schools and dedicated infrastructure are examples. These can contribute to the organization of production in a cluster, without the direct involvement of individual firms.

Rules of conduct in an industry can also develop without cooperation, and help to organize the industry (Foss and Eriksen, 1995). Similar examples include knowledge spill-over, benefits of standardization and employees changing companies and the culture of the region in which the cluster is based. This coordination by means of non-cooperative relations may not seem to be specifically organizational, but in fact does play a role in the organization of production in clusters. Indeed these elements of what may be called non-deliberate or non-planned (Foss and Eriksen, 1995) organization have often been claimed to be of great importance in the spatial organization of clusters (You and Wilkinson, 1994). Deliberate attempts to reap the benefits of these mechanisms can be found in the fashion of creating parks for related firms (industrial parks, science parks, Distriparks etc.).

In section 5.2.2 the proposition has been advanced that competition stimulates innovation. As the competitive element in non-cooperative relationships is considerable and may even be enhanced by the geographical concentration of firms, they will, if the proposition on competition (section 5.2.2) holds, enhance organizational innovation.

As Miles and Snow (1992) point out non-cooperative relations may become cooperative ones, when hollowing-out occurs. If a variety of specialized firms is present in a cluster, firms will sooner resort to using suppliers. They will eliminate those activities from their value chains, which can be satisfactorily performed by other firms in the cluster. In this way non-cooperative relations can stimulate organizational innovation as well[3], by strengthening the networked paradigm.

Table 5.3 Organizational aspects of clusters

Relationship	Characteristic
Long-term	• cooperation: is elaborate and takes place on several parts of the value chain; the firms are intertwined • limit organizational innovation (see 5.3.3)
Short-term	• cooperation: limited, on few parts of the value chain and temporary • effect on organizational innovation uncertain
Non-cooperative	• cooperation: none or non-deliberate coordination • competitive, and thereby innovation enhancing

Source: see text.

Table 5.3 summarizes the organizational aspects of clusters along the specified dimensions of long-term, short-term and non-cooperative relationships. As has been pointed out in the previous section, especially the presence of long-term relationships, is seen as an impetus for technological innovation. These also

[3] Miles and Snow do not believe this is a positive tendency. It may lead to hollow corporations, which may end up having no capabilities themselves.

possess the most interesting organizational characteristics in terms of activities and linkages. For this reason the next section will focus on these long-term relationships. It will be shown that though the level of technological innovation may be high in these interorganizational relations, their organizational innovativeness may be lower.

5.3.3 Organizational innovativeness of long-term relationships; proposition and attribute-table

The previous section has shown the relevance of long-term interorganizational relations for clusters. In this section evidence will be reviewed to support the proposition that long-term relationships work against organizational innovation. Next to the well-established idea that networks stimulate technological innovation, this may be one drawback of networking. As will be shown below, the proposition is not a completely new one, but summarizes the work of some authors in a growing stream of literature, in which next to benefits some drawbacks of networks are formulated (Bianchi and Gualtieri, 1990; Buchko, 1992; Grabher, 1993a,b; Håkansson and Johanson, 1992, 1993; Tushman and Romanelli, 1990; Wassenberg, 1995).

Miles and Snow (1992) have described two possible drawbacks of networks. The first one is that networks can lead to hollowing out of value chains when a firm decides to contract out more of its activities to the network. The second disadvantage they point at is that parties may become overdependent on each other, thus limiting the possibility to break the relationship. This "can constrain the primary strength of the dynamic network – its ability to efficiently allocate member firms, uncoupling and recoupling them with minimum cost and minimum loss of operating time" (Miles and Snow, 1992, p. 67). The drawback of networks described below is related to the latter idea: changing the relation between firms in networks can be a difficult task. The focus is a bit different though: Miles and Snow have in mind the difficulty of breaking relationships. Here the argument is made that in continuing relationships change can be impeded as well.

Long-term relationships as in related an supporting industries have been identified as technologically innovative, but from an organizational viewpoint embeddedness in a network of interorganizational relations may have some drawbacks. In literature on networks for instance, the proposition has been advanced that change in networks is unlikely to occur and that networks display a strong tendency towards inertia. In this regard Tushman and Romanelli (1990, p. 145), whose description of a network is equivalent to Porter's (1990a) definition of clusters, observe:

> "As webs of interdependent relationships with buyers, suppliers and financial backers strengthen, and as commitments to internal participants and external evaluating agents are elaborated into institutionalized patterns of culture, norms, and ideologies; the organization develops inertia, a resistance to all but incremental change."

Similarly, Håkansson and Johanson (1992, p. 34) state:

> "Changes of the network must be accepted by at least large parts of the network. Therefore all changes will be marginal and closely related to the past."

As organizational innovation is a subcategory of change, it is interesting to look at the reasons which have been provided to support the claim of limited change in networks and see if these claims also apply to organizational innovation in firms with long-term interorganizational relationships. It will be especially interesting to see whether in the case of organizational innovation (change towards a *new* way of organizing), these reasons are of more importance than in the case of "normal" organizational change (change to *known* or *standard* ways of operating). In order to analyse the impact of long-term relations table 5.4 gives an overview of attributes of long-term relations which inhibit change in long-term interorganizational relationships. Grabher (1993a, p. 26) pointed to the fruitfulness of studying factors that foster lock-in in networks in a more systematic way. Table 5.4 brings together some arguments pertaining to this.

Table 5.4 Attributes of long-term interorganizational relations inhibiting change

- Lock-in because of externalities in intertwined relations
  - costs fall on other firms than the innovator
  - other impediments
- Entrenched routines
- Independence

Source: see text.

Externalities

First of all organizational innovation inside a company can be effected by the presence of related and supporting industries. Intra-organizational innovation can be limited, because the implementation of a new organizational form may have consequences for organizations outside the innovating firm. When for instance a firm wants to change its production process, this may require its suppliers to change their way of working as well. Håkansson and Johanson (1992, p. 31) formulate this effect as an externality "...changes are associated with costs of adjustment which are not, however, necessarily born by those performing the activities". The more a firm is embedded in a network, the more interfirm linkages between activities there are, and the sooner this effect of lock-in because of externalities will occur. Firms may thus lose the ability to dictate their own future (Powell, 1990, p. 305). As intertwinedness is one of the characteristics of long-term relationships, this point is of particular interest in this case.

This does not mean that long-term relations are irrational, as Håkansson and Johanson rightly state (1993, p. 39). The idea put forth here is that next to the known advantages of networks there can also be drawbacks attached to them. The claim is not that networks are negative in general, but that they work out negatively in the specific situation of organizational innovation. Håkansson and Johanson however do not distinguish these various forms of innovation (empirical research into Håkansson's framework has focused exclusively on technological

innovation (e.g. Oerlemans and Meeus, 1995)). In the case of organizational innovation the drawback of externalities may be particularly relevant because it is more difficult to contain its effect to a small part of a company (see Teece, 1980 and table 2.1). As organizational innovation will always involve several activities and linkages, externalities will occur sooner than in technological innovation.

Related to the previous point, the relationship between firms can become more difficult to change, because more than one firm is involved. A change in the linkages between firms, does not only require a change of routine in cooperating, but often also a change of routine in the cooperating firms themselves. As hierarchies are difficult to change (Williamson, 1975, p. 121; Mariotti and Cainarca, 1986), a change in a relationship between two hierarchies may be even more difficult to accomplish.

The possibility for cooperating firms to change their routines may be limited because of other impediments as well, for example when they lack the capability to work according to a new system. A new organizational form may require a flexible production process or additional activities in the value chain. If a firm in a network does not possess the ability to adjust to the requirements of the new form, the implementation of a new organizational form can be delayed. Of course other impediments for example in the environment of the cooperating firms may cause a similar barrier to innovation.

Next to these inhibiting factors there may also be stimulating factors. For instance, in interorganizational relations ideas can come from two sides, so that organizational problems may be solved (and perceived) quicker. In literature on organizational innovation this effect has not been discussed, whereas for technological innovation it is wellknown (Oerlemans and Meeus, 1995).

In short, externalities refer to the phenomenon that intra-organizational change will have interorganizational consequences the more companies are intertwined. These consequences can refer to costs (another company has certain costs connected to the change and as a consequence is not willing to implement changes) and to other impediments (the other company is unable to work with the change).

Entrenched routines

Reasons for entrenchment of routines can be found in organization theory, especially in DiMaggio and Powell's (1983) concept of isomorphism and Hannan and Freeman's (1977) concept of inertia. These concepts overlap to a considerable degree.

Coercive isomorphism has already been discussed above. One form of isomorphism identified by DiMaggio and Powell (1983) that according to Buchko (1992) is of interest in interorganizational relations, is normative isomorphism. The development of a network and increasing formalization of relationships create a way of working in a network that may become the standard way of operating.

Buchko relates his views to the concept of linkages and activities, defined in chapter 2: "As firms within an organizational network interact with one another,

over time there develop specific mechanisms for the coordination of activities among firms within the network" (Buchko, 1992, p. 11) and "...to the extent that such linkages are codified, formalized, or form the taken-for-granted assumptions of a complex interfirm network, organizations will experience increased pressure for conformity and higher barriers to transformation" (Buchko, 1992, p. 23). So linkages between activities of different firms may become a powerful force for conformity and isomorphism and prevent firms from engaging in alternative ways of performing activities that may be seen as lying outside the norms of conduct. As innovation by definition is a change away from established norms and away from isomorphism, the conformitive pressures (grounded in historically developed routines of cooperation) to be overcome by an innovation can be substantial.

This latter historical constraint on change has also been defined by Hannan and Freeman (1977), in their discussion of inertia and bears a strong resemblance to Nelson and Winter's double-edged concept of routines: the history of firms on the one hand provides a justification for the present way of working and on the other hand precludes a consideration of alternative ways of working (Hannan and Freeman, 1977, p. 931). Whereas Hannan and Freeman identify this mechanism on an intra-organizational basis, Buchko (1992) applies it to inter-organizational relations as well.

This phenomenon of lock-in (Kogut, 1991; Dosi and Kogut, 1993) in relationships because of entrenchment of routines, has been identified by Bianchi and Gualtieri (1990, p. 101) in the case of the restructuring of the organization of production in the Third Italy. They find that the social rules which have developed in industrial districts inhibit change towards a new (in this case larger scale) organizational model. Imai (1989) points to a similar effect in Japanese networks, where the historical process by which the networks have come about, limit organizational change to slow and gradual adjustments. Both the speed and extent of organizational innovation are limited in this way by entrenched routines.

As an illustration the other forms of inertial pressure identified by Hannan and Freeman (1977) have been assembled in table 5.5. Summarizing these paragraphs, entrenched routines refer to the difficulty of breaking through standard patterns of behavior. They become manifest when behavior is continued despite attempts to change it.

Table 5.5 Pressures toward inertia

Internal pressures	External pressures
• Difficulty of transferring assets	• Legal and fiscal barriers
• Constraints on information	• Constraints on information
• Political constraints	• Legitimacy constraints
• Historical constraints	• Collective rationality (a successful adaptation of one firm is not necessarily successful for another)

Source: based on Hannan and Freeman, 1977, pp. 931-932.

Independence

An example of independence between firms in long-term relations is given by Best (1990, p. 206-207). He puts forward the idea that when clusters have come to full development and a considerable equality among the constituent firms of the cluster is present (as in the case of the Third Italy), it will be hard for a cluster to restructure itself. The absence of a managerial hierarchy (a formal power structure as Commandeur (1994, p. 102) calls it) which is able to design, guide, coordinate or even dictate interorganizational change, may be prohibitive in this regard. Daft (1978, p. 208) already found that high centralization was a requirement for implementing administrative innovations. As in many long-term relations there is no central authority, there is a considerable degree of independence and hence change may be a difficult process.

The consortia in the Third Italy (Best, 1990), provide an example of an organizational innovation in relationships with independence. The reasons why they have come into being are also pointed at by Best. From the outside-in perspective these are government intervention and intense competition in the districts. From the inside-out perspective he identifies lack of resources of individual firms to do the activities performed by the consortia themselves and the will to maintain sufficient capabilities in order not to be reduced to subcontractors and maintain independence (see Best, 1990, p. 225). Independence was maintained despite a lack of resources by means of consortia. What this means, is that the absence of a hierarchy in egalitarian networks does not eliminate the possibility for organizational innovation. Instead, it is just one of the counteracting forces. Other determinants, both in the business environment and inside firms may tip the balance the other way (see the systemic nature of Porter's diamond: the mutual influence of the determinants is very important).

Ruigrok and Van Tulder (1993) distinguish several degrees of dependence from the independence discussed above to interdependence and dependence. Not much research has shed light on these latter two. Hence, for independence it is concluded that organizational innovation can be difficult because of the absence of hierarchy.

Importance of these factors for organizational innovation

Some theoretical reasons supporting the view that change in interorganizational relationships is a difficult task, have been discussed (see table 5.4 for an overview). These are also applicable to organizational change in general. The question is whether the identified forces also hold in the case of organizational innovation. As organizational innovation is a subset of organizational change, it can be concluded that this is indeed the case. Buchko's (1992) research was explicitly concerned with strategic transformation, and as organizational innovation has been defined as a strategic transformation in chapter 2, his views certainly apply to this subject.

As for the other considerations presented, there is a possibility that in organizational innovation the identified problems will be magnified. The differences between reorganization and organizational innovation identified in table 2.7 can

shed some light on this. For example, the legitimacy (Hannan and Freeman, 1977) of innovations is always questioned. If change from one organizational structure to another known organizational structure is difficult in long-term relations, than certainly a change from an organizational structure to an organizational innovation is a more complicated matter, for the characteristics of the organizational innovation are not known precisely in advance and therefore there is considerable insecurity with regard to the benefits to be obtained. Moreover, because of the novelty of organizational innovation, a trial and error process (see chapter 4) of searching for solutions to problems connected to the new organizational form, can usually not be avoided. Such an experimental trial and error process requires ongoing interaction which is more difficult to realize between than within firms.

Also, there is no example of how the intended organizational form works in practice, which may legitimize the change. The inclination to accept a new form of organizing will be enhanced by the presence of firms which have proven the effectivity of the new form. As in the case of innovation, no such precursors exist, the effectivity of the new form and the legitimacy of change will be questioned.

Hence, three specific aspects that distinguish organizational innovation from reorganization, strengthen the effect of the barriers to change in interorganizational relationships discussed above. These are insecurity with regard to the benefits, the need for experimentation and the lack of legitimacy (see section 2.3.6).

The question is how serious the drawback of possible lower innovativeness in long-term relationships is. Aldrich (1979, p. 199) claims that for individual firms in a network the necessity to change may be limited. The reason for this is that other companies in a network can absorb possible shocks. This claim, however, only holds when there are no externalities to the changes that those other firms have to make. When this is not the case, Aldrich's contention does not hold. Moreover, if each firm in a network reasons this way, no change at all will occur.

The discussion in Chapter 1 on the competitive impact of organizational innovation has shown, that the strategic implications of organizational innovations are important. A limit on the degree of organizational innovativeness can therefore be an important drawback of interorganizational relations. If on the other hand an organizational innovation in which more than one organization is involved, comes into being it can bring a sustainable competitive advantage, for it will not be easily imitated.

All this of course does not mean that organizational innovation in long-term interfirm relations is impossible. The foregoing merely shows that there are extra complications in interfirm organizational innovations as compared to intra-organizational innovations. The relative strength of the different influencing forces (outside-in and inside-out) determines the outcome of the innovative process.

Conclusion

Concluding, the proposition seems to be warranted that both intra- and interorganizational innovations can be effected by the existence of long-term interorganizational relations in clusters. Embeddedness in an elaborate network of such

interorganizational relations, next to limiting the options for change of the interorganizational relations themselves, may also hinder the organizational innovativeness of individual firms. There seems to be a trade-off between the high level of technological innovativeness of interorganizational relations and a lower level of organizational innovativeness. Whereas technologies flow easily through established organizational forms, changing the forms may be a more complicated matter. Theory predicts that organizational innovation as opposed to technological innovation is not enhanced by the presence of long-term relations in related and supporting industries.

The following proposition can be advanced:

> The presence of long-term interorganizational relations does not enhance the process of value chain reconfiguration both within and between firms. The reason lies in the following attributes of long-term relationships: externalities, entrenched routines and independence.

The proposition advanced is not a general statement on the disadvantages of networks, but a specific one for a specific situation and a specific kind of innovation. Whether this drawback of long-term relations outweighs the known and proven benefits of networks for technological innovation as shown in among others Porter (1990a) can not be ascertained on the basis of this proposition, but requires further theoretical and empirical research.

When the different attributes of longevity of the relationship (externalities, entrenched routines, dependence) are related to the attributes of organizational innovativeness (form, speed, extent) the following relations can be hypothesized (table 5.6):

- building on the work of various authors it can be stated that because of externalities organizational innovation can be limited. The costs for other firms associated with the implementation of the innovation may limit the will of these firms to cooperate. Firms may also be unable to work with a new organizational form. Hence the minuses in the boxes relating externalities to speed and extent;
- Buchko (1992) and Imai (1989) discuss entrenched routines as a barrier to transformation. Entrenched routines are hypothesized to limit the speed and extent of organizational innovation because changing an existing way of working may difficult, if not impossible;
- based on Best (1990) and Daft (1978) independence is hypothesized to limit the speed and extent of organizational innovation, because the absence of hierarchy in that case hinders the ability of one firm to guide or dictate change.

Neither of the authors mentioned, with the exception of Imai (1989), distinguish between the speed and extent of the innovation. They refer e.g. to barriers to transformation (Buchko, 1992). These barriers can either limit speed or extent of the innovation, hence here the boxes are filled in accordingly.

Table 5.6 *Theoretical attribute-table on the influence of long-term relations on organizational innovativeness*

	Externalities	Entrenched routines	Independence
Form			
Speed	–	–	–
Extent	–	–	–

– = the independent variable influences the dependent variable negatively.

Source: see text.

5.4 *The influence of demand on organizational innovation*

5.4.1 Introduction

The influence of demand conditions on various aspects of firms is widely accepted. Indeed, this would be stating the obvious if in the case of organizational innovation there would not be a lack of well-structured analyses of what aspects of demand are relevant. The *how* and *why* questions of the influence of demand on organizational innovation have not been posed. It is the aim of this section to bring together some ideas on the role of demand, that can be traced throughout the literature. This will emanate in a proposition.

5.4.2 Demand: relevant attributes for organizational innovation

Porter (1990a) distinguishes the quantity of demand (size and pattern of growth) from the quality of demand (nature of buyer needs). In relation to organizational innovation changes in these two kinds of demand have been identified by different authors (for example Volberda (1992) for the flexible form) as being of relevance in the emergence of new organizational forms, but most emphasis has been on the role of changes in the latter. The quantity of demand is usually regarded as a short-term factor providing the initial impetus for change, whereas changes in the nature of demand are considered to be long-term and lasting developments, influencing the way in which value chains are reconfigured.

A third element of demand pointed at by Porter is the internationalization of domestic demand. When a firm creates a certain innovation for a specific domestic demand, the firm will be able to profit even more from this innovation if the domestic demand anticipates the demand in other countries. The firm is then able to exploit its innovation in more than one market. In the literature so far this element of demand has not yet been discussed for organizational innovation. As the aim of this section is first of all to create some overview in the existing literature on the subject of demand and organizational innovation, the internationalization of demand will not be discussed here. This does not mean that it is without relevance: it can certainly be true that organizational innovations are modified or implemented by managers in order to profit from further internationalization of domestic demand. Whether and how this may influence the form of

the innovation is a question that will be left for further research. Here the focus will be on the elements of quantitative and qualitative developments of demand.

Pertaining to short-term, quantitative changes in demand, Child (1987, p. 34) discusses the role of demand risk in the choice of organizational forms. He defines demand risk predominantly in terms of fluctuating demand, for instance a collapse of the quantity of demand in recessions. Quantitative shifts, according to Child, will (among other things) lead to an increased use of subcontracting and less vertical integration.

Piore and Sabel (1984) emphasize the role of long-term, qualitative changes of demand. They claim that a similar pressure away from strictly hierarchical organizational structures as identified by Child, is caused by the breaking-up of mass markets. Increasing product differentiation in their view lessens the effectivity of hierarchical and unitary forms of organization. As Amin (1993, p. 282) summarizes this viewpoint "the irreversible growth in recent decades of consumer sovereignty, market volatility, and shortened product lifecycles, requires production to be organized on an extremely flexible basis" and "the market is said to require decentralized coordination and control".

Empirically, Chandler (1962) identifies both short-term and long-term changes as important in organizational innovation. Yet, the importance of the long-term changes seems to override that of the short-term. Short-term changes provided the initial shock that made firms look for different markets, which strategy of diversification required a new organizational form. DuPont for instance lost a large part of its market because of anti-trust policies (Chandler, 1962, p. 79) and the possibility of overcapacity made DuPont look for different markets. Likewise, Chandler (1962, p. 302) points to shocks in the quantity of demand for Sears (decline of demand from farmers), the Standard Oil Company (facing swiftly growing demand) and General Motors (also facing growing demand).

The real organizational difficulty for these firms, was not dealing with these initial changes. Instead it were the problems that arose from the reaction to these shocks (that is the strategy of diversification), that ultimately were solved by an organizational innovation. This strategy of diversification meant that firms faced different markets. "The wants of different customers varied, and demand and taste fluctuated differently in different markets. Such changing market demands and the actions of competitors brought a growing differentiating of the manufacture and procurement of raw materials for the various product lines" (p. 393). It was this long-term development of increasing differentiation demanded by customers, that eventually made existing organizational structures obsolete and required the divisional form to cope with. This form enabled firms "to meet both changing short-term market demands and long-term market trends" (p. 385). In short: the shock made firms perceive the need for changes, while the long-term trends steered the direction of change.

Likewise, Cusumano (1988, p. 31) defined an interplay of short-term and long-term trends which influenced the emergence of the Just-in-Time system. The short-term shock was the disappearance of the military market in Japan, which required Japanese firms to shift their production process from buses and trucks

towards passenger cars. Simultaneously, there was a tendency towards more variety, styles and model changes in passenger cars which represented a long-term trend. These two changes made that Toyota, frustrated with the level of obsolete inventory left by the short-term shock and to be expected by the long-term trend, sought to reduce inventory and embarked on a trajectory of organizational innovation that has become known as the Just-in-Time system (see the next chapter).

Hence, both short-term and long-term demand changes can play a role in organizational innovation. Based on the cases given above it may be concluded that especially the long-term trends are of interest in shaping organizational forms, but that short-term shocks serve as a trigger in pointing firms to the necessity of organizational innovation. Most emphasis in the literature has been on qualitative, long-term changes in demand.

The long-term changes that have been identified for the last decades are differentiation and fragmentation. Piore and Sabel (1984, p. 189) discuss the trend to diversity. It is their claim that mass markets are breaking up, but that this trend is not so much initiated by consumers, but by the firms themselves which have actively pursued differentiation strategies. This is a more important tendency in their view, than the one pointed at by Best (1990, p. 264), who identified the rising level of incomes as the main source of differentiation of demand. This, Best claims, is in its turn a pressure for decentralization of production. Likewise, Powell (1990, p. 319), points to shortening product life cycles connected to differentiation, as an impetus for the growing use of network organizations. What ever the exact reasons for increasing differentiation, there seems to be agreement that such a trend exists.

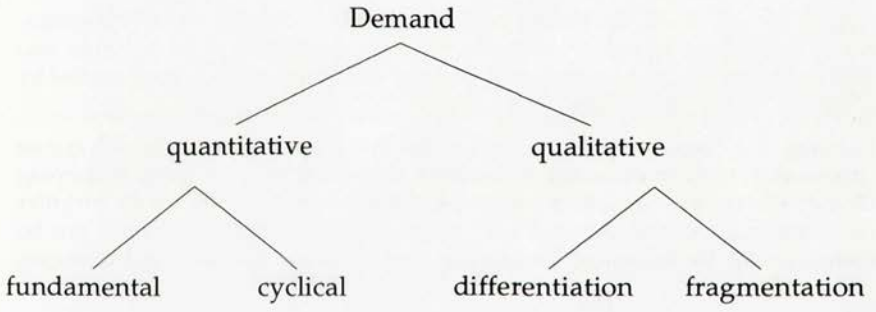
Williams et al. (1987) attack Piore and Sabel's thesis of the breaking-up of mass markets. They claim that a more important trend is to be found in fragmentation: trade is breaking up mass markets in individual countries. The area of trade has widened and hence producers are no longer the only sellers in a national market, leading to a loss of market share in their respective home bases. This trend however can be compensated by these firms when they start to export themselves. If they do so they may still be able to produce on a massive scale, without having to resort to product differentiation.

According to Miles and Snow (1984) both trends, differentiation and fragmentation, have had their impact on the emergence of organizational forms. Table 1.2 has shown different product-market strategies, which correspond with different organizational forms. The tendency towards differentiation can be traced in their description of products, which started out as custom made in the 19th century, became increasingly standardized in the course of that century, and are expected to swing back to becoming designed for individual consumers in the near future. Fragmentation can be traced in their view of markets, being local/regional in 1800 and developing to global and changing in the course of the 1990's. Winch (1992, p. 18-19) relates his view on the development of organizational forms to the characteristics of markets (becoming more global and less regulated) and the wishes of consumers. Organizational forms are said to be designed "to respond" (p. 18) to the wishes of this differentiation and fragmentation.

Naturally these trends are not general ones in practice. In some industries fragmentation and differentiation may have been the rule for a long time. In others the extent to which differentiation occurs is limited. In again other industries, like perhaps cyclical ones, the influence of short-term trends may by far outweigh the long-term trends. This may be part of the explanation, why different organizational paradigms can co-exist (section 3.3.4 pointed to the alleged sequentiality of paradigms without the provision of the possibility of their co-existence as a drawback of Best (1990)). In non-turbulent markets strict unitary ways of organizing may be superior. With this qualification we can arrive to the following conclusions.

Both long-term market trends (qualitative changes which for the last decades of the twentieth century are claimed to be differentiation (tailoring products to specific needs) and fragmentation) and short-term developments (quantitative shocks) have an impact on organizational innovation (figure 5.2 gives an overview of these attributes of demand). The quantitative shocks can be structural (permanently higher or lower demand) or cyclical (temporary fluctuations in the level of demand). From Chandler's work, it can be observed that demand shocks may make clear the need for change to management, while long-term trends steer the direction of change. Following Rosenberg's (1982) theory, it is not sufficient to point to demand conditions to explain innovations. Rather changes in demand must be looked for as an explanatory factor. The question is in what direction these changes steer the development of new organizational forms, and what mechanisms are of relevance in this.

Figure 5.2 Attributes of demand



5.4.3 The influence of demand on organizational innovation; proposition and attribute-table

Compare the next two statements:

> "But in many trades the ever-growing variety of commodities, and those rapid changes of fashion which now extend their baneful influence through almost every rank of society, weight the balance even more heavily against the small dealer, for he cannot keep a sufficient stock to offer much variety of choice, and if he tries to follow any movement of fashion closely, a larger proportion of his stock will be left stranded by the receding tide than in the case of a large

> shopkeeper. Again in some branches of the clothing and furniture and other trades the increasing cheapness of machine-made goods is leading people to buy ready-made things from a large store instead of having them made to order by some small maker and dealer in their neighbourhood" (Marshall, 1890, p. 347).

and:

> "The efficiency of the H-mode of coordination may become problematical, however, when diverse consumers' tastes come to demand a variety of products, when demands shift in a volatile fashion from one variety to another, and when the need to deliver ordered products without delay becomes imperative for gaining a competitive edge" (Aoki, 1990, p. 4).

Exactly one century separates these statements. The first one presages the rise of big business, the second one its decline. Yet it seems that both identify the same mechanism (fashion) as being responsible for the emergence of new but different organizational paradigms. The apparent contradiction can of course easily be reconciled by pointing to the fact that there are considerable qualitative differences between fashion in the 1890's and fashion in the 1990's. The fact that fashion is no longer considered to be "baneful" may hint in that direction. More importantly however, fashion in Marshall's terminology lead to the standardization of goods, as can be established by the benefit of hindsight and as the last sentence in the quotation may imply, whereas Aoki refers to the customization of goods (compare with Miles and Snow's ideas on developments in standardization and customization of products discussed in the previous section). Marshall also stresses the efficiency of production, whereas Aoki stresses the role of product innovation (see the discussion of static efficiency versus dynamic improvement in chapter 1).

Both statements claim the existence of a relation between demand and organizational form. Even though this relation has been established in the previous two statements, the mechanisms relating demand and form have only been studied by a limited amount of authors.

Mariotti and Cainarca (1986, p. 355) study this subject form a transaction cost perspective. In their view fully integrated plants will have difficulty in keeping the balance between demand variations and their product mix. "With irregular final demand the transactional advantages of full vertical integration can be compromised by increasing production inefficiencies" (Mariotti and Cainarca, 1986, p. 355).

Child (1987) and Best (1990) point to resources and capabilities as an important determinant in this process. Shifting customer preferences can make resources, skills and capacities obsolete. The use of subcontracting and cooperative agreements can reduce the risk of being stuck in one strategic territory (Child, 1987, p. 37). Likewise, Best (1990, p. 263) refers to the advantages of vertical specialization, which can reduce the risk of a company being stuck with a technology, process or product.

Chandler (1962) makes a similar link to resources, but includes internal organizational problems and a change in strategy as a consequence of demand changes and a cause of organizational innovation. The demand shocks discussed in the

previous section, forced firms to find new ways of using their existing resources (Chandler, 1962, p. 302). This they did by differentiating their products. This change in strategy meant that firms came to face different markets, leading to internal organizational problems, because it became hard to identify where the responsibility for different product lines in different markets lay. The organizational innovation of the division solved this by making managers of divisions responsible for the coordination of activities for separate product lines (p. 393). This takes care of the short-term allocation of resources. The long-term allocation (deciding between expansion, maintenance and contraction of firm resources in different areas) was done by the head office. Thus, activities were split between head office and division.

In Chandler's view then, shifting demand has caused firms in the beginning of this century to look for new ways of using their resources (that is: shifting strategy). This they did by diversification, which meant they had to face different markets with different demands. The problem of coordinating the allocation of resources to meet these different demands, was solved by the organizational innovation of the divisional form.

Based on the observations made above, a general reasoning might be the following. The more varied demand, the more activities will gain independence and the more interfirm linkages will become of interest. The reason for this is that firms will want to avoid the risk of having obsolete resources and capabilities in the face of shifting demand. Also, for a firm to be an effective player in increasingly turbulent markets it will have to concentrate on those product market combinations in which it can obtain a competitive advantage. Hence, they will not only want to reduce the risk of obsolescence in some areas, but also upgrade their capabilities and resources in other ones, in order to be able to meet increased difficulties of the specific segments served and lay the foundation for flexibility and product differentiation (Commandeur, 1994, p. 117). There will therefore be a tendency towards increased specialization on core activities.

This means that firms will tend to prefer cooperation in those activities that are non-core, and bring their core activities closer to the market. Hence, there will be an increase of interfirm cooperation and a lessening of hierarchical patterns within firms. In the terminology developed by Imai and Itami (1984): *organization-like principles* are replaced by *market-like principles*. In short: the networked paradigm is better suited to deal with unstable and changing demand. Examples of this trend can be found in the organizational trajectories identified in the networked paradigm in table 4.5. Porter's (1990a) description of the organization of Italian firms as not hierarchical and contracting out important parts of their production process (p. 443 and 445), can be related to this as well. It so happens that the firms he described in this way, face a demand in which design (p. 434) and fashion (p. 440) are of overriding importance. Yet, Porter did not make that connection between demand and organizational form which confirms the idea that Porter's attention for organizational innovation is limited.

Concluding, the following proposition can be advanced:

> Changes in demand stimulate changes in the value chain. The relevant attributes of demand are fundamental and cyclical changes in the quantity demanded and fragmentation and differentiation as qualitative changes of demand. Increased volatility of demand will lead to an increased use of market-like linkages over organization-like linkages in the value chain.

As stated in the proposition, increasing volatility of demand (both quantitative and qualitative) will lead to a diminishing use of organization-like (intrafirm, hierarchical) linkages, to the benefit of market-like (interfirm and non-hierarchical) linkages in the configuration of the value system. If this latter proposition holds, than in differentiated markets the organization of production will develop towards flatter organizations and networks. The proposition is somewhat counter-intuitive as increasing turbulence would intuitively be answered with attempts to increase control mechanisms instead of diminishing it.

The proposition is a more specific form of Hodgson's (1988, p. 263) claim that internal structural variety may match the variety from outside, as according to the proposition the variety in the value system will augment. On an even more general level the proposition could be seen as an application of Ashby's law of requisite variety (Ashby, 1958, p. 207). Yet, even though Hodgon's statement and the advanced proposition reflect Ashby's law it would be a mistake to claim that they are identical. Ashby's law is mathematically firmly grounded in a well-defined, strictly numerical situation, whereas in the proposition given above this is far from being the case.

Most importantly, according to Ashby (p. 245), the law may not be applicable when the quantity of control is limited. When the range of possible outcomes is larger than the range of control mechanisms the law will not hold. Usually in social and economic situations, this is the case. Ashby (p. 245) claims that in such situations it might be better to focus on a few parameters instead of trying to control the entire situation. Nevertheless, even though the proposition is not a direct translation of the law of requisite variety, the inspiration taken from Ashby's work will be clear.

Summarizing the discussion, table 5.7 presents the attribute-table of demand:

- among others Chandler (1962) pointed to fundamental changes in the quantity of demand, which speed up the process of organizational innovation, hence a plus links fundamental changes to the speed of development of a new organizational form;
- Child (1987) referred to cyclical changes, which influence the form because they steer the organization in the direction of diminished vertical integration. So the form of the organizational innovation is determined by cyclical changes in demand, accordingly a "Y" has been entered in table 5.7;
- a number of authors have discussed the influence of differentiation (Best (1990), Mariotti and Cainarca (1986), Powell (1990)) and fragmentation (Miles and Snow (1984) and Winch (1992)) on the form of the innovation. The relative shift in the direction of market-like linkages is caused by an increased influence of these two attributes of demand.

Table 5.7 *Theoretical attribute-table on the influence of demand on organizational innovativeness*

	Fundamental	Cyclical	Differentiation	Fragmentation
Form		Y	Y	Y
Speed	+			
Extent				

Y = Yes, the independent variable influences the dependent variable
+ = the independent variable influences the dependent variable positively

Source: see text.

5.5 *Conclusion*

In this chapter a beginning has been made with developing an outside-in approach of organizational innovation. Porter's diamond framework has been used to identify key factors in the business environment, which might be of influence on the emergence of new organizational forms. Two of these factors have been studied in depth based on their relevance for innovation theory: long-term interorganizational relations and demand. It can be concluded, based on a review of literature that both have an impact on organizational innovation, albeit in a different way. Frequent demand changes stimulate organizational innovation, whereas the presence of long-term ties with other firms is an extra complication for the implementation of a new organizational form.

Table 5.8 *Overview of the hypothesized impact of demand and long-term relations on organizational innovation*

	Long-term Relations	Demand Conditions
Whether	Yes, long-term relations influence organizational innovation	Yes, demand changes have an impact on organizational innovation
Why	Because of the presence of externalities, entrenched routines and independence	Because of the effect on resources and capabilities (these may become obsolete and must be kept up-to-date)
How	Negatively: long-term relations limit the speed and extent of organizational innovation	Positively: changes in demand stimulate reconfigurations of the value chain

Source: see text.

In table 5.8 an overview and summary is given of the influence of demand and long-term relationships on organizational innovativeness. This has been done along the lines laid out in section 5.1, where the question was asked *whether* these determinants influence organizational innovativeness, *why* they influence it and *how* they influence it. Based on the analysis of two determinants of Porter's

diamond, organizational innovation can be described as being subject to many counteracting forces in the business environment: some stimulating, some inhibiting. Just like in Porter's framework, which factor turns the scale is an empirical question.

6

Existing empirical evidence on the propositions

6.1 *Introduction*

In this chapter existing empirical material will be reviewed connected to the propositions developed in chapters 4 and 5 (assembled in table 6.1). As the several chapters so far have shown, there are quite some descriptions of new organizational forms available. Most of them however have the drawback that they are only aimed at describing the forms and not at analyzing the process of development which lies behind them (they are static instead of dynamic analyses). Literature which can be used for corroborating the propositions is still relatively scarce. In the empirical chapters 7 and 8 new cases on organizational innovation will be described with the tools developed in the previous chapters. The terminology of routines, activities and linkages will be applied to the various cases and the outside-in perspective will be discussed as well. The current chapter will review existing empirical studies into organizational innovation in as far as they relate to the propositions summarized in table 6.1. These studies will also be related to the concepts developed in the previous chapters.

The method followed is again the method of the attribute-tables, which was also used in the previous chapters. The attribute-tables will now contain entries based on empirical research of the propositions. In chapter 9 the empirical attribute-tables will be confronted with the theoretical attribute-tables.

The following sections are split up according to the propositions: section 6.2 discusses path dependence, section 6.3 discusses long-term relations and section 6.4 gives an overview of authors who have studied demand side factors and their impact on organizational form. Each section will end by summarizing the results in an attribute-table. Some good case analyses have been published recently that after some analysis along the lines laid down in chapter 4, show the path dependence of organizational forms. On the influence of networks and demand on organizational innovation only a limited amount of research has been undertaken. Some indications on the tenability of the propositions can however be found.

Table 6.1 Overview of the propositions

Path dependence
The process by which organizational innovations come about is path dependent, in that new organizational forms to a large extent build on their precursors. The reason for this lies in such firm specific attributes of path dependence as dynamic routines, capabilities and resources.
Long-term interorganizational relations
The presence of long-term interorganizational relations does not enhance the process of value chain reconfiguration both within and between firms. The reason lies in the following attributes of long-term relationships: externalities, entrenched routines and independence.
Demand
Changes in demand stimulate changes in the value chain. The relevant attributes of demand are fundamental and cyclical changes in the quantity demanded and fragmentation and differentiation as qualitative changes of demand. Increased volatility of demand will lead to an increased use of market-like linkages over organization-like linkages in the value chain.

Source: see chapters 4 and 5.

6.2 *Path dependence in organizational innovation*

6.2.1 Toyota: Cusumano's account of the emergence of JIT

The phenomenon of path dependence of a trajectory will now be illustrated for the case of the Just-in-Time system (from now on abbreviated as JIT). The JIT-case also shows the gradual evolvement of a trajectory belonging to one paradigm into a trajectory belonging to another one. JIT namely, evolved from the mass production of cars in the unitary paradigm towards the networked paradigm. The dynamic routines of the process will be defined in order to show how repeated similar changes direct the process of reconfiguration of the value chain.

Cusumano's account of the emergence of the Just-in-Time system in Toyota will be used (Cusumano, 1988). His history of JIT will be interpreted with the tools developed in the previous chapters and the terminology of organizational innovation and dynamic routines will be applied to his case description. A Toyota manager, Taiichi Ohno, started the system in 1948 with an organizational innovation: he introduced a pull system in the production process of cars. In the pull system parts are not pushed along a production line according to a master schedule, instead a worker has to retrieve work-in-process from the previous station. In the push system work-in-process was offered to the next station regardless of the fact whether the next station was ready to receive it. This led to inventories. In the pull system on the other hand, the worker at a station determines whether the previous station can deliver work-in-process to him. The pull system was an innovation in car manufacturing, but other sectors had already been working with this routine for some time: Ohno knew about the system from an article on aircraft production and supermarkets (Cusumano, 1988, p. 34).

Different organizational innovations can be distinguished in the course of development of the JIT system, sometimes connected with technological innovations. In table 6.2 those innovations are listed that were organizational or had specific organizational consequences. The only technological innovations in the table pertain to the synchronization of parts of the production process and the lowering of change-over times of stamping presses.

Table 6.2 The trajectory of JIT inside Toyota

1947	• Workers operate two machines instead of one
1948	• Introduction pull system in the machining shop
1949	• Quality inspection on the line • Workers operate 3 to 4 machines
1950	• Pull system extended to marketing • Synchronizing engine and transmission machining • Indicator lights introduced on engine lines
1953	• Introduction kanban inside machining shop
1955	• Synchronizing body and final assembly shops • Controls on parts deliveries • Introduction line stop button
1957	• Indicator lights on all production lines
1961	• Introduction kanban to some suppliers
1962	• Introduction kanban in entire company • Lowering change-over times
1963	• Workers operate five machines
1965	• Introduction kanban to all suppliers
1971	• Workers put on assembly line where and when needed • Lowering change-over times
1973	• Suppliers linked directly to assembly line

Source: based on Cusumano (1988, pp. 34-35).

The most important organizational innovation was the gradual introduction of the kanban and pull system throughout the company's value chain and value system. In 1948, 1949, 1950, 1953, 1961, 1962, 1965 and 1973 parts of this system were implemented. The gradual evolution of the system will be clear: it took Toyota 25 years before it was completed. The impact of the environment on these developments is clearly discernable: in 1948 the collapse of the military market (demand) and the high level of inflation induced Ohno to lower the level of inventory. Furthermore, in 1950 financial difficulties prompted Toyota to extend the pull concept to marketing by limiting production to orders received.

In terms of the value chain the main changes are: an elimination of the stock in Toyota's value chain, the introduction of a new coordination mechanism called kanban, integration of the quality control activity with the production activity. These changes were not limited to the firm, but in the course of time were

implemented in the relation with suppliers as well. Hence the JIT-system is a mixture of changes in activities and linkages in the value system.

This evolution can easily be rephrased in terms of static and dynamic routines (the latter ones are summarized in table 6.3; also see chapter 4 for a discussion of the routine concept). In this case, problem solving was done by replicating the successful kanban (pull) routine. The dynamic routine which determines the reconfiguration of activities and linkages, can be described as "introduce kanban"; the static (lower order) routine was kanban: "the use of paper tags to signal processing operations or parts production" (Cusumano, 1988, p. 35). The "kanban" routine was used internally in the 1950's, in the early 1960's it was introduced by Toyota to some outside suppliers (1961) and in the entire company (1962). Finally, halfway the 1960's all outside suppliers implemented the kanban routine. In the late 1960's the subsidiaries followed.

Table 6.3 Dynamic routines in the trajectory of JIT

- Introduce kanban
  (1948, 1950, 1953, 1961, 1962, 1965, 1973)
- Synchronize parts of the production process
  (1950, 1955)
- Enrich jobs
  (1947, 1949, 1950, 1955, 1957, 1963, 1971)

Source: based on Cusumano (1988).

Another dynamic routine, synchronization of parts of the production process in order to reduce inventory, is not discussed in any great detail by Cusumano. It did require coordination of different activities and consequently had some organizational aspects connected to it. In how far technological innovations were used in this process remains unclear in Cusumano's account. Whether this is a completely separate routine is the question: in order to eradicate inventory in the kanban system synchronizing parts of the production process seems to be a necessity.

A third dynamic routine can be found in the flexibilization of job assignments by means of job enrichment. From 1947 till 1971 the constraints on job assignments were gradually loosened, as workers had to be able to work at more than one machine. The influence of demand in creating this routine is noticeable: workers had to operate several machines "because demand was low" (p. 34). In terms of the value chain, this might be interpreted as a standardization of labour (a linkage) leading to integration of activities: everybody had to be able to do the same job, so that the boundaries of separate activities became less marked. Connected to this, the use of indicator lights and the introduction of a line-stop button, are a delegation of authority (a linkage, see table 2.4) to workers on the production line. Because of the simplicity of the technologies used, they can hardly be called technological innovations. The key idea behind them is of an organizational nature: the identification and solution of problems should be done as close to the production line as possible.

Table 6.2 gives two examples of the creation of activities in the value chain in 1949 and 1955. The use of quality control on the line and even before assembly of cars begins, are original innovations: they were not yet present in the pull concept in aircraft production and supermarkets which inspired Ohno.

Finally, the main technological innovation described by Cusumano was the reduction of stamping-press changeover times for dies in 1962 and 1973, which was achieved by automation. Next to that this reduction in time was achieved by some organizational innovations as for example the creation of teams specialized in setting-up (p. 35). So, in fact this was a mixture of technology and organization.

One of the main features of the development of JIT is the use of dynamic routines (see table 6.3). Most innovations implemented seem to be part of a pattern: similar changes in the value chain reoccur. This application of the concepts of routines and trajectories to an organizational innovation, makes clear that the JIT form emerged gradually, by means of routinely implementing similar changes in static routines. This confirms the idea that the concepts of routines and trajectories can be applied to organizational innovation. It is however only with the benefit of hindsight that JIT can be defined as a separate trajectory. As the time it took to develop the system was longer than 25 years, it is implausible to assume that the key characteristics of the JIT form were already clear at the beginning of this trajectory. The number of changes is so large that it is improbable that they have all been planned a quarter of a century in advance. Instead, the form seems to have emerged slowly.

Diffusion of JIT

An interesting pattern can also be found in the diffusion of the form (summarized in table 6.4). The pattern of diffusion largely confirms the pattern sketched in chapter 1: a rather slow diffusion inside Japan, and the diffusion outside Japan does not start until a very late date. Moreover, Cusumano states that none of the adopting firms were as effective as Toyota in implementing the JIT-system, among others because of the adaptations made to the system. Nissan for example always put more emphasis on computerization than Toyota did.

Table 6.4 The diffusion of JIT and Kanban

1962	• Introduction kanban in entire Toyota-company
end 50's/ early 60's	• Nissan starts implementing JIT-like systems
late 60's	• Kanban implemented in Toyota subsidiaries and affiliates
mid 70's	• Mazda starts to implement the system
late 70's	• Nissan starts implementing kanban with suppliers
1982	• U.S. companies start experimenting with a limited just-in-time concept

Source: Cusumano (1988, p. 36).

The example of JIT shows the path dependence in the development of organizational innovations. It is clear that there is both continuity and discontinuity in the

development of the form: on the one hand Toyota did not opt for a technological approach to innovating in the production process but stuck to the traditional assembly line idea and built on that. After a short flirtation with higher levels of automation in the beginning of the 1990's, Toyota soon reverted to lower levels of technological innovation in improving its production line (The Economist, 1995a), because the scope for further development was limited. On the other hand, the traditional assembly line system was so much improved upon in the course of time that the system today is completely different from what it was in the 1950's: the differences on the level of the dynamic routines show that JIT is a new trajectory (also see table 4.3).

Conclusion

The case developed by Cusumano on the emergence of JIT illustrates how organizational innovation can be described as a path dependent process in which dynamic routines are used, as described in chapter 4. In the process both continuity and discontinuity can be observed.

In the case of JIT the dynamic routines influenced the form of the innovation. The introduction of kanban for example altered the form of the linkages between the activities. The extent of the innovation is influenced positively by the repeated application of the dynamic routines. This becomes evident in table 6.3 which shows how similar dynamic routines were applied over a number of years, thus increasing the number of changes in the value chain. On various points developments in the environment have stimulated these routines, so that the characterization of organizational innovation as not only a historically contingent but also a context dependent process (see section 3.2) is confirmed by this case.

6.2.2 ABB: Bartlett and Ghoshal look beyond the M-form

Another form of path dependence can be found in the development of the M-form towards the N-form (Networked-form) in the case of ABB. Lazonick (1991, p. 261) claimed that the formation of the M-form itself can also best be understood as a path dependent process in which the M-form emerges out of its predecessors. According to Bartlett and Ghoshal (1993) the M-form in its turn has led to another organizational innovation which has been most drastically developed by ABB. Different terms have been coined for this organizational form: federated enterprise, N-form and transnational are terms which all refer to the form implemented by ABB.

Table 6.5 summarizes the continuity and discontinuity of the ABB organization structure in terms of activities and linkages. Bartlett and Ghoshal (1993) describe the new organizational form of ABB as emerging form the M-form. "Some of the structural elements on which Barnevik (ABB's CEO) built ABB's new organization follow the design principles of the classic M-form" (p. 26).

These principles include the use of market like linkages. The divisions or units are evaluated on their performance as if they are separate companies. For example, in ABB every separate company is responsible for its complete balance sheet. Likewise, in the M-form separate divisions may be evaluated on their ROI.

Another linkage which remains is the vertical flow of information supporting the hierarchy in the firm. In ABB a computer system fulfills this function. The creation of reliable vertical information flows was a key issue in the M-form as well.

Table 6.5 *Beyond the M-Form: continuity and discontinuity in the configuration of activities and linkages in the M-form and ABB*

Continuity	
Linkages • Use of market linkages (p. 28) • Reliable information flows (p. 26)	
Activities • No functional form at headquarters (p. 26) • Decentralization (p. 26) • Divisions in a matrix form (p. 27)	
Discontinuity	
M-form	ABB
Linkages • Hierarchy; rules; on average 8 layers of management • Emphasis on vertical communication	*Linkages* • Embedded performance standards (p. 31); policy bible (p. 31); 3 management layers (p. 28) (E) • Horizontal communication as well: information technology links everybody (p. 33); personal networks, teams, task forces, committees (p. 34, 35) (H)
Activities • Activities grouped in independent divisions with sufficient capabilities to serve a market independently • R&D centralized • Resource allocation centralized; core activity of management is allocation of resources	*Activities* • Activities grouped in small entities with insufficient capabilities (p. 35) (H) • R&D decentralized (p. 28) (E) • Financial independence of the units; core activity of management is the management of information flows (p. 32) (E)

Source: based on Bartlett en Ghoshal (1993). (E) refers to linkages and activities showing the extent of decentralization and delegation; (H) refers to horizontal integration.

Pertaining to activities there is a continuity between the ABB structure and the M-form on three levels (see table 6.5):

- like the M-form ABB does not divide its activities according to the functional area to which they belong. Instead, the move away from the functional form is continued.

- the M-form is characterized by a large extent of decentralization of assets, as is ABB's form. The independence of units (divisions) is an example of this. Bartlett and Ghoshal however find that the extent to which this principle is implemented in ABB is higher than in the traditional M-form (more on this below).
- ABB uses a matrix, which form is not used in the M-form, but according to Bartlett and Ghoshal in ABB this form is "simply a more complex form of the same basic divisionalized model described by Chandler" (p. 27).

The differences between ABB's structure and the M-form are summarized by Bartlett and Ghoshal in two points:

- the extent of decentralization of assets and the extent of delegation of responsibilities are higher (p. 27);
- there is an emphasis on horizontal integration (p. 33).

As will be clear from the aspects discussed under the heading of continuity, only the latter difference is completely new. Bartlett and Ghoshal acknowledge the first point was already present in the M-form and that the difference is indeed only a matter of extent: ABB was far more radical than the M-form in decentralizing and delegating. The principle however remained the same. In chapter 4's terminology these two differences can be interpreted as dynamic routines. Reallocating assets and responsibilities to lower levels is the first dynamic routine and the implementation of mechanisms which enhance horizontal integration is the second one.

The main points of difference between the M-form and ABB have been split up in the lower part of table 6.5 according to the linkages and activities in which they become clear. The extent of delegation of control becomes evident in the creation of linkages based not on hierarchy but on embedded values. More than top management dictating events, managers at the lower level are expected to evaluate decisions based on values which are laid down in the policy bible. These embedded performance standards allow the number of management layers to be cut to three.

Next to linkages aimed at vertical communication, horizontal integration is achieved by a number of linkages for horizontal communication. These linkages (involving the static routines of communicating by means of information technology and various discussion groups to coordinate activities) aim at transferring knowledge and integrating capabilities across business activities. Contrary to this, in the M-form horizontal integration was achieved (if at all) by top management.

Horizontal integration is connected to the way in which activities are grouped. These have been divided in such a way that each separate entity can never develop all its required capabilities itself. It therefore always needs to resort to other parts of the company in order to be able to function satisfactorily. This gives a strong impetus to horizontal integration. It is also different from divisionalization in the M-form: in the M-form a division was defined by the fact that it could itself provide all the necessary knowledge and resources for its product-markets. Whereas most of the changes between the M-form and ABB are a matter of extent, the division of resources and capabilities is completely opposite in the two cases.

The extent of decentralization of activities becomes clear in the last two reallocations of activities: R&D and financial responsibilities. Both these activities have been decentralized to the individual units. Management's core activity is no longer the allocation of resources, but has become the management of information flows.

The development of ABB's organizational form is a continuation of the M-form as well as a departure from it. It has many originalities (especially the emphasis on horizontal integration and the radicality of decentralization and delegation) that allow it to be called an organizational innovation, as Bartlett and Ghoshal make clear. "What we hope to show, however, is that while each of the elements of the new model can be obtained through adjustments of emphasis within the M-form organization, taken together they imply a management system that is substantially different from the system described by Chandler, Bower and Cyert and March" (p. 25, Bartlett and Ghoshal base their description of the M-form on Chandler, Bower and Cyert and March). The words "adjustments of emphasis" refer to the routine-like behaviour and continuity in the transition from the M-form to the ABB-structure.

Conclusion

Like in the case of JIT presented in section 6.2.1, the description of the emergence of a new organizational structure in ABB given by Bartlett and Ghoshal (1993) corroborates the proposition that the process of organizational innovation is path dependent in that it exhibits both continuity and discontinuity. An analysis of the M-form and the ABB organization structure shows that despite the fact that the time passed between their original conception is about 60 years, there are some clear similarities between the forms. As far as there are differences, these are for a large part explained by the fact that they are caused by continued and reinforced application of the dynamic routines of decentralization and delegation, which were introduced with the M-form. The M-form structure in many ways acted as a point of departure for the changes made in ABB. This, once more, does not mean that ABB has not brought forth an innovation. The differences with the classic M-form are still clearly identifiable and the reinforced application of the M-form's dynamic routines influenced the extent of the organizational innovation developed in ABB positively.

As to the role of resources an capabilities, the idea that these should be divided over various units shaped the organizational form as well. The effect on speed and extent of resources and capabilities cannot be ascertained in this case.

The analysis presented in table 6.5 also shows the usefulness of the value chain analysis developed in chapter 2. Activities and linkages have been identified and differences among the M-form and the ABB-form can be seen right away.

6.2.3 Path dependence in interorganizational relations

Next to path dependence on the intra-organizational level, there can also be path dependence in the way interorganizational relations are restructured. Imai (1989) described the development of networks in Japan as such a path dependent

process. He identifies three forms of interfirm relations in Japan which succeeded each other in the course of time: the Zaibatsu, the Business Group and the Network Industrial Organization. One of the main characteristics of the development of these interfirm relations is that in the course of time the linkages between these firms loosened: in the zaibatsu, companies controlled other companies by stock ownership and assigning directors whereas in the network industrial organization interfirm relations are characterized by more voluntary cooperation (p. 143).

Imai stresses the point that the three mentioned forms emerged out of each other in an evolutionary way: the zaibatsu organization determined the way the business group was organized and the business group in its turn to a large extent laid the foundations for the network industrial organization. Imai calls the process of restructuring the boundaries of the firm "self-organization". He emphasizes the path dependence in the process of self-organization when he states: "Self-organization proceeds within a framework or structure which has already been established, and the characteristics of this structure influence the nature of the self-organization. Although the transition from zaibatsu to business groups was brought about by the intentional dissolution of the zaibatsu, the subsequent process of forming business groups included a considerable element of self-organization. However, the direction and extent of self-organization was still influenced by the traditional structure inherited from the zaibatsu." (Imai, 1989, p. 145). "...when self-organization progresses within a certain structure, the scope of the structure is broadened and the structure itself changes until soon a new structure is established. Self-organization then begins again with the new structure as its initial framework. To put this in abstract terms, the writer (Imai, APdM) conceives the process of "structure → self-organizing → structure" to be the organizational evolutionary process" (Imai, 1989, p. 146).

This analysis of path dependence of organizational innovation in interfirm relations is grounded in Imai's empirical analysis of the development of interfirm cooperation in Japan since the Meiji Restoration. The continuity and discontinuity in this development is illustrated empirically by Imai's description of the evolution of the three interorganizational forms.

Another example of path dependence in interorganizational forms can be found in Pennings and Harianto (1992) with regard to the organizational form firms use in implementing technological innovations. Pennings and Harianto found that previous experiences determined the way this implementation was organized. Firms with extensive prior networking experiences were more likely to innovate with strategic partners. The authors conclude that some firms seem to have developed organizational "design skills" (similar to routines) in the course of their development, that influence the way activities are organized in a way that cannot be explained by means of technological or environmental requirements (p. 377): "the range of design options is not only dictated by technological or environmental requirements, but also by the repertoire of design skills which firms have accumulated". Some firms seem to have developed a routine of solving problems by means of interorganizational innovations, even though an intra-organizational solution might have been used as well.

Conclusion

This section has given two examples of path dependence in the development of interorganizational forms. They show that path dependence is not only present in intra-organizational relations, but on the interfirm level as well. Reference is only made to the form of the innovation, and not to the speed and extent of its implementation. Apart from the design skills mentioned by Pennings and Harianto (1992), no reference is made to dynamic routines. Capabilities and resources were not mentioned at all.

6.2.4 Attribute-table on path dependence

In table 6.6 the conclusions of the various studies have been summarized in the attribute-table:

- the relation between routines and form was established in the JIT- and ABB-cases, in which the dynamic routines determined the reconfiguration of the value chain. The ABB case showed that the radical application of existing routines led to a far-reaching organizational innovation: this is a connection between dynamic routines and extent. Also the repeated application of dynamic routines in Toyota, led to a system of car production that radically differed from existing practice and thus influenced the extent of the organizational innovation. Hence, dynamic routines indeed influence the form of the innovation (hence the "Y" in the box relating these attributes) and increases the extent of the innovation (which justifies the "+" in the box relating dynamic routines to extent).
- an example of how capabilities determine organizational form is given in the ABB case, where the specific division of units was determined by the capabilities (therefore a "Y" has been entered in the specific box). No influence of capabilities on the speed and extent of the innovation was found.
- as to resources, it is clear that these influence the organizational form: the financial difficulties of Toyota prompted it to extend the pull concept to marketing. It was not possible to clearly establish the influence of resources on speed and extent.

Table 6.6 Attribute-table of path dependence based on existing empirical material

	Dynamic Routines	Capabilities	Resources
Form	Y	Y	Y
Speed			
Extent	+		

Y = Yes, the independent variable influences the dependent variable
+ = the independent variable influences the dependent one positively

Source: see text.

6.3 *Long-term interfirm relations and their effect on organizational innovation*

Long-term interorganizational relations are part of networks of firms. So far the study into networks has mainly focussed on kinds of networks, their organizational characteristics and their role in technological innovation. Research on the drawbacks of networks is of a relatively recent date, as was shown in chapter 5.

The proposition developed in chapter 5 defines a possible drawback of networks. In table 6.7 some empirical research is presented which relates to this proposition. However, not all of the authors mentioned specifically focus on the longevity of interorganizational relations as a separate force in organizational innovation. Buchko (1992) comes closest to this subject, but he has not limited his study to organizational innovation and studies strategic change in general.

Bianchi and Gualtieri (1990) find an example of entrenched routines in the industrial district of Emilia-Romagna. The organization of production in Emilia-Romagna has been stabilized on the basis of social rules, which are not changeable in the short run. The social linkage which has developed in the course of decades thus hinders swift change to new forms of production, which according to Bianchi and Gualtieri are required for the Emilian district to respond adequately to a changing environment.

Table 6.7 Research on the influence of networks on organizational innovation

Author	Finding
Bianchi and Gualtieri (1990, p. 101)	Social rules hinder speedy adaptation of organizational form
Buchko (1992)	Firms depending on networks are less likely to indicate an intent to strategic transformation
Daft (1978, p. 208)	Organizational innovation requires centralization
Grabher (1993b, p. 261)	Different forms of lock-in in the Ruhr area are caused by long-term relations

Source: as indicated.

Buchko (1992) is one of the first to research the possibility of strategic change in networks with the aim to find out whether this kind of change (which Buchko explicitly relates to a.o. changes in organizational form) is inhibited by the presence of interorganizational relations. Based on the theory of isomorphism Buchko develops some hypotheses which are confirmed by means of a large scale empirical study (p. 14). One of them deals with externalities: "The greater the professional network ties among firms within an interorganizational network, the greater the barrier to strategic transformation and the less likely firms will be to indicate an intention to change strategy" (p. 14). This result is an example of externalities: the empirical material shows that the more firms are intertwined (Buchko measures the number of linkages) the lower the intention to implement strategic changes. Buchko's work has two disadvantages: it is not confined to

organizational innovation only, and it measures intentions to change, not real changes. Although his work points in the direction of confirming the proposition on long-term relationships, because of these two disadvantages it will not be used to fill in the attribute-table.

Daft (1978) shows that organizational innovations are easier implemented when there is a high level of centralization. This indirectly confirms the propositions about independence (see table 5.4). In case of independence, centralization is low and thus organizational innovation is made more difficult. An important qualification is that Daft's finding emanates from research within individual firms and hence may not necessarily be applicable to situations in which more than one firm is involved. Nonetheless, his research can be taken as an indication that independence (low centralization) limits organizational innovation.

Grabher (1993b, p. 261) presents several empirical examples of the way routines can become entrenched in long-term relationships. Grabher refers to this as the weakness of strong ties. His case study of developments in the German Ruhr-area identified a.o. personal connections which developed in long-term relations as an obstacle to change in general. "Personal ties of long standing resulted in mutual orientations involving a common language regarding technical matters, contracting rules, and knowledge on which the parties could draw in communicating with one another... This unchallenged groupthink interpretation prevented a reorganization of the regional economy in an early period of decline, when the region was still well equipped with resources for innovation" (p. 262). Grabher concludes that the long-term relations worked out positively in a stable situation as in that case they reduced transaction costs, but in a situation of change the lock-in in long-term relations hindered change.

Conclusion

Looking over these studies, it will be clear that the evidence of the proposition on the influence of long-term interorganizational relations on innovativeness is scant. Several authors have hinted at the possibility that there may be a negative influence, but detailed studies specifically focussed on the issue are almost absent. Bianchi and Gualtieri's study for instance only touched at this subject in the margin of analyses dealing with other topics. Moreover, the distinction between long- and short-term interorganizational relations is not always explicitly made. Yet, the findings of the various authors can be related to the concepts used in chapter 5. The studies assembled in table 6.7 cover the two aspects of speed and extent of organizational innovativeness: Bianchi and Gualtieri focus on speed while Daft's and Grabher's work mainly refers to the extent of organizational innovation.

Only three boxes of the attribute-table in table 6.8 can be filled in (also see table 6.7):

- Bianchi and Gualtieri (1990) discuss speed in relation to entrenched routines and find that these slow down the process of renewal. The relation between entrenched routines and speed is negative;

- Grabher (1993) relates entrenched routines to the extent of organizational innovation and finds that they limit the number of changes made. The relation between entrenched routines and extent is negative;
- Daft (1978) finds that centralization is needed for organizational innovation so that independence (meaning low centralization) has a negative effect on extent.

Table 6.8 Attribute-table of long-term relations based on existing empirical material

	Externalities	Entrenched routines	Independence
Form			
Speed		–	
Extent		–	–

– = the independent variable influences the dependent variable negatively

Source: see text.

6.4 *Demand and its effect on organizational innovation*

Even though demand is frequently recognized as one of the most important elements in the business environment also with regard to innovation, there is a limited amount of detailed analyses of the influence of demand changes on organizational innovation. The available studies, however, give similar results. In chapter 5 Chandler's detailed case studies were used to formulate the proposition that increased turbulence on the demand side leads to an increased use of market-like linkages in the configuration of the value chain. In table 6.9 Chandler's other main findings are summarized.

Table 6.9 also shows some research in which the relation between demand and organizational form has been explicitly incorporated. Best for instance in enumerating the determinants of the success of the decentralized mode of production in industrial districts states that "A third pressure for decentralization comes from the demand side" (Best, 1990, p. 264). He continues to observe that "Small geographically dispersed firms are more able to respond to fragmented demand by supplying tailor-made products". He qualifies this finding however, by limiting his claim to the primary activities in the value chain. Best is not able to conclude whether the support activities as "strategic planning, marketing, distribution, R&D, design, and managing supplier networks" (p. 264) also exhibit this tendency towards decentralization[1]. Nonetheless Best's opinion provides some empirical underpinning for the thesis that product differentiation leads to an increased use of market-like linkages or, put differently, differentiation leads to form changes.

[1] Research by Lorenzoni and Baden-Fuller (1995) into the strategic center model of organization suggests that these activities are often centralized.

Table 6.9 Research on the influence of demand on organizational innovation

Author	Finding
Best (1990, p. 264)	Demand is a pressure for decentralization
Chandler (1962)	Quantitative shocks initiate change; qualitative developments direct organizational innovation as well
Imai (1989, p. 129)	"severe depression acts as a trigger for organizational change"
Mariotti and Cainarca (1986, p. 368)	Fashion leads to deverticalization
Powell (1987, p. 78)	Demand changes lead to decomposition of large integrated firms and the rise of smaller ones

Source: as indicated.

Imai (1989) focusses on quantitative shifts in demand as a trigger for organizational change in Japanese networks. He identifies the Meiji Restoration, the period of postwar reconstruction and the oil crisis as major causes of shifts in demand. These three historical events initiated a trajectory of organizational development which eventually led to the rise of the three forms of interorganizational relations discussed in section 6.2.3: respectively the Zaibatsu, the Business Group and the Network Industrial Organization. This research result is analogical to the Chandler approach to quantitative shifts in demand: demand shocks speed up the process of organizational innovation.

Mariotti and Cainarca (1986) have researched developments on a larger scale in the Italian textile-clothing industry. They research shifts in the organizational structure of the thirty largest Italian firms in this industry from a transaction cost perspective over the period 1971-1981. Specifically they look at the extent at which quality and fashion policies are adopted by these firms and at the volatility of final demand. Their conclusion is summarized as follows: "With irregular final demand the transactional advantage of full vertical integration can be compromised by increasing production inefficiencies" and hence under certain circumstances "disintegration can improve economic efficiency" (p. 355). When quality and fashion policies are implemented Mariotti and Cainarca expect to find a low level of internal vertical integration. Their research results confirm this proposition (p. 368):

- all firms which dropped out of the top thirty between 1971 and 1981 were vertically integrated, and unable to follow the shifts in demand;
- new entries in the top thirty mainly occurred in the less vertically integrated categories;
- and internal transformations in firms which remained among the thirty largest firms were exclusively oriented toward diversification and vertical disintegration.

The conclusion drawn from this is that "The structural evolution of the cotton industry confirms the relation between deverticalization, environmental turbulence

and adoption of quality/fashion policies" (p. 368). As deverticalization means an increased use of market-like linkages this finding largely confirms the proposition that increased demand turbulence leads to a clear shift from organization-like to market-like linkages. This corroborates the proposition that demand influences the form and extent of the organizational innovation.

Finally, Powell (1987) identifies trends in demand, especially the trend in favour of diversity. The effect of qualitative shifts on organizational form is a "decomposition of large integrated firms and the rise of smaller specialized organizations and new hybrid forms" (p. 78). Again this finding (though presented more as a casual empirical observation than as the result of in-depth analysis) corroborates the proposition in a general way.

Even though the empirical material presented corroborates the proposition to a large extent, some further research is needed. First of all, most of the authors discussed (except for Mariotti and Cainarca) make their observations about demand and organizational innovation in the margin. Secondly, the detail of the analyses is limited. For instance the trends of fragmentation and differentiation are not always separated, but simply lumped together under the heading of increased "turbulence" or "diversity". Thirdly, the effect of demand on capabilities and resources is not clearly established, except for Best's and Mariotti and Cainarca's research. Further research may suggest whether this relation (described in section 5.4.3) holds. Finally, the attribute-table will show that there are still many gaps to fill in, especially pertaining to quantitative changes and fragmentation of demand.

Conclusion

In table 6.10 the attribute-table for demand is presented, based on the discussion given. The number of empty boxes shows that there is ample room for further research in this field. Empirical studies have found support for the following relationships:

- Chandler (1962) and Imai (1989) pointed to fundamental demand shocks as speeding up the process of organizational innovation;
- Best (1990) and Mariotti and Cainarca (1986) showed that differentiation has an impact on the form of the new organizational structure as well as on the extent of organizational innovation. Increasing differentiation leads to an increased use of market-like linkages in various parts of the value system.

Table 6.10 Attribute-table of demand based on existing empirical material

	Fundamental	Cyclical	Differentiation	Fragmentation
Form			Y	
Speed	+			
Extent			+	

Y = Yes, the independent variable influences the dependent variable
+ = The independent variable influences the dependent variable positively

Source: see text.

6.5 *Conclusion*

The review of empirical studies into the propositions shows that a limited amount of empirical work has been done in the field of organizational innovation. This becomes evident in the many empty boxes which had to be filled in in the attribute tables. Some of the empirical material presented points in the direction of support for the propositions, but this finding must be qualified by the fact that the level of detail of most studies is too limited to reach a definite conclusion. Most studies, for example, do not analyse organizational developments at the level of activities and linkages.

Summarizing the main conclusions on the individual propositions:

- path dependence has been found by several authors, both on an intra- and an interfirm level. Dynamic routines, capabilities and resources were found to play a role in organizational innovation, as predicted.
- the longevity of interorganizational relations and its effect on organizational innovations has rarely been studied separately. Some studies can be related to the attributes of long-term relations and research on networks has started to look at the drawbacks of them as far as innovative behavior in general is concerned. Organizational innovation is however seldom a separate subject in these studies. To the extent that it has been studied, parts of the proposition are confirmed.
- likewise on demand, the evidence is not detailed enough to connect it to all the attributes of demand proposed in chapter 5. General trends in organizational innovation in relation to demand changes have been found, which are in agreement with (or at least do not contradict) the proposition. Yet, this is mainly so for differentiation. The effect of the other attributes of demand on organizational innovativeness has not been researched.

In conclusion, there is a need for detailed studies into the propositions. The next chapters will provide two cases in which detailed analyses are given of the determinants of path dependence, long-term relations and demand. An attempt will be made to fill in the attribute-tables empirically, based on these cases. Each of the chapters will mainly focus on one outside-in determinant: chapter 7 will look especially at interorganizational relations while chapter 8 will focus predominantly on demand conditions. Aspects of path dependence will be traced in both cases.

7

Case 1: The Fokker-case[1]

7.1 *Introduction*

Fokker Aircraft is a Dutch producer of aircraft in the size class of 50-100 seats. Similar to other aircraft producers Fokker encountered severe problems in the beginning of the 1990's due to a fall in demand. The financial position deteriorated rapidly among other things because an inventory of finished airplanes put severe pressure on Fokker's balance sheet and because the low dollar exchange rate annihilated the firm's profitability. One of the reactions to the company's crisis was the introduction of a pull system in aircraft manufacturing, called AtO (Assembly-to-Order). This new organizational system was in essence a more radical application of the process of lead time reduction initiated by Fokker to reduce its work-in-process inventories in the 1980s. This chapter will analyse the organizational innovation of the AtO-system. Attention will be paid to its history (viz. lead time reduction as a precursor; the nature of the financial crisis), the various goals it had to reconcile (lower work-in-process, lower number of white tails, lower production times) and the impact of demand and Fokker's network on the organizational innovation.

That the search for solving Fokker's problems was directed towards the organization was indeed a break of routine for Fokker. Traditionally, Fokker was technology-oriented and tended to pay less attention to the organization of the firm and its production process. That this focus on technology had to be balanced by a focus on organization was publicly recognized in 1995, when the member of the board responsible for production and engineering, J.C. Kroon, stated that the technological lead of Fokker was insufficient for it to maintain its competitive

[1] This case is based on interviews, company documents and designated literature; see Exhibit I and II at the end of this chapter for an overview of the first two sources. The case was presented to a group of Fokker managers and the facts were checked by Fokker. The interpretation is the author's responsibility. Special thanks are due to Mr. Gerard Pronk of Fokker, for his recommendations and comments on the final version of this chapter.

position and that considerable improvements could be made in Fokker's way of organizing: "There is still a tremendous amount to be earned there"[2]. According to Mr. Kroon outsourcing to low wage countries and aiming at a technological lead are no viable strategies for a smaller aircraft producer: the first strategy has quite large set-up costs and proved to have limited success in other cases, and the second strategy is expensive with a limited chance of success. A smart organization on the other hand can lead to cost savings and faster product development: "By integrating design, engineering and manufacturing in one process, the teething troubles are eradicated in advance while productivity is immediately higher than before", says Kroon.

Mr. Kroon limited his ideas on organization mainly to the internal organization of the firm. He mentions "making use of shorter communication lines in order to tie the thinkers to the doers. The design process and the production process must be tuned". Relations with the network of suppliers however, are important as well. The AtO-system focusses specifically on these relations: it required a new way of working with suppliers and a reorganization of the relation with them. As such the AtO-system is a precursor of the shifting emphasis on organization advocated by Mr. Kroon.

The Fokker-case is predominantly used to build theory based on the hypothesis on long-term interorganizational relations put forth in chapter 5, but some of the other elements of organizational innovation can be traced in this case as well. Section 7.2 will give some general background, section 7.3 will describe the organizational innovation: the reconfigurations in the value chain and the competitive advantage it brings. Several elements of path dependence are discussed there as well. These are analysed and table 7.5 gives the attribute-table on path dependence for the situation of Fokker. Section 7.4 will analyse the influence of long-term interorganizational relations on the innovation process by first describing them and next relating them to the concepts developed in chapter 5 (table 7.15 presents the attribute-table). Finally section 7.5 will explore the influence of demand conditions on organizational innovation culminating in the third attribute-table, table 7.16.

7.2 *The Fokker company: recent developments*

The Fokker aircraft company (founded in 1919) is a producer of two short and medium haul airplanes (the Fokker 100 (a smaller version of which is called the Fokker 70) and Fokker 50). It is also a supplier to the space and military aircraft market. Until 1993 the Dutch state was the majority shareholder of Fokker, as a consequence of the considerable financial help Fokker had received in order to finance the simultaneous development of the Fokker 100 and Fokker 50 in the 1980's. The funding provided by the government was given under the condition that in the near future, Fokker was to look for a partner which could provide the financial backing required to work in the highly volatile aircraft industry. This partner was found in 1993: the German firm DASA, part of the Daimler-Benz

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2 Financieel Dagblad, 31 January 1995; translation by the author.

group, after a long and often emotional round of negotiations obtained 51% of the Fokker shares, with the agreement that the 22% left in hands of the Dutch state would be transferred to DASA in 1995. The remaining 27% are traded on the stock exchange (Wassenberg, 1995). During the negotiations with DASA, Fokker's financial position deteriorated (see table 7.1 for turnover and profit figures) principally as a result of the collapse of demand for new planes and the decision taken in the 1980's to install production capacity for a very large number of planes. The capital invested by DASA in Fokker and a combined new capital injection in the course of 1994 by DASA and the Dutch state, could not prevent that in February 1995 the fourth major reorganization of Fokker in four years was announced. After this reorganization, the number of employees, which in 1990 amounted to 13,314 people, will be reduced to 6,700 in 1996[3].

Table 7.1 Turnover and profits Fokker (in million guilders)

Year	Turnover	Net profits
1985	1,339	33
1986	1,403	19
1987	1,056	-107
1988	2,055	13
1989	2,799	42
1990	3,202	83
1991	3,813	77
1992	4,083	20
1993	3,698	-460
1994	2,348	-450 *

* including a one time revenue of 427 mln. from a sale and leaseback construction.

Source: annual reports Fokker.

The most prestigious of Fokker's products is the Fokker 100 aircraft. In 1983 the project to build this plane was announced. November 30th 1986 the first test flight was done, followed by the first delivery (to Swissair) on February 29th 1988, after considerable delay. Production capacity aimed for an eventual production of 67 planes a year. This rather high number was to a large degree inspired by a mega-order of American Airlines in 1989. In 1990 this aim was still maintained: "Considerable investments are made in the production companies to enable a production volume of 67 Fokker 100's from the year 1993 onwards" (Annual report, 1990). This estimate proved to be too optimistic. In 1991 the annual report stated that the recession, exacerbated by the Gulf War, had substantially reduced the number of orders. In 1992 a reduction of production volume to 40 planes a year in 1995 was announced, followed by the annunciation of another reduction to 30 in the annual report of 1993. Meanwhile the number of white tails (airplanes

3 NRC-Handelsblad, January 27th 1995.

which have not been sold or leased) had increased dramatically to 24 (see table 7.2). Table 7.2 presents orders, numbers produced and delivered of the Fokker 100. The numbers actually delivered have lagged constantly beyond the number produced until 1993. Early 1993 it became clear that Fokker was heading towards a financial disaster:

- it was impossible to finance the growing number of white tails;
- the fixed costs emanating from the strategy to produce large numbers of planes were too high to be recovered by the low level of planes produced;
- airplane prices had diminished because of the fierce competition in a shrinking market, with the direct competitors Boeing and British Aerospace. The fact that airlines changed to leasing instead of buying aircraft and that the exchange rate of the dollar continued its decline against the guilder, aggravated the situation.

Table 7.2 Orders, numbers produced and delivered Fokker Jetline

Year	Orders	Production	Deliveries	Number of white tails
1983-1988	73	12	11	1
1989	99	26	24	3
1990	33	32	28	7
1991	10	60	50	17
1992	18	53	46	24
1993	52	47	66	5
1994	29	29	34	0

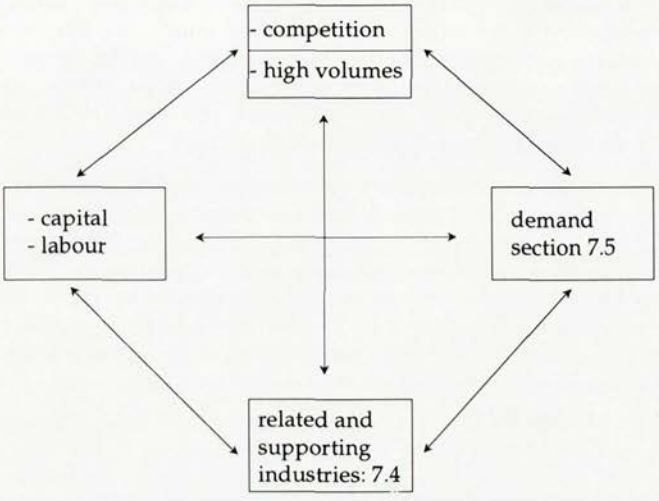
Source: Fokker (number of orders is net, that means inclusive cancellations and exclusive options; since 1993 Fokker's Jetline also offers the Fokker 70; first delivery and production of the Fokker 70 took place in 1994).

One of the reactions to these problems was an organizational innovation in the assembly line of the Fokker 100. In 1992 the annual report already hinted at a study to be undertaken into the possibility to introduce a flexible production system mainly to reduce the number of white tails: "A study will be conducted into the possibility of completing planes only in the case when they have been sold" (Annual Report 1992, p. 6). The situation deteriorated so dramatically in the course of that year, that Fokker was forced to introduce this flexible system in 1993; it became known as the Assembly-to-Order system or AtO. As table 7.2 shows, in this year the number of aircraft delivered surpassed the number of aircraft produced leading to a substantial reduction of white tails in the course of 1993. In 1994 the last Fokker 100 white tails were sold.

The implementation of AtO however was an onerous task. AtO required a number of substantial organizational innovations, especially in relation to Fokker's suppliers. In the terminology of chapter 4, Fokker is organized along the lines of the networked paradigm, as are all other aircraft manufacturers. The introduction of a major new way of building airplanes will have important consequences for Fokker's suppliers so that for a study of the influence of interfirm relations on

organizational innovation, Fokker is an interesting case (see section 7.4). The role of demand is worth noting as well (section 7.5), because not only the quantity of demand plays a role, but there are many qualitative developments in demand which had an impact on AtO as well. Some other factors in the diamond influencing the AtO-system have been incorporated in figure 7.1. Pertaining to the supply of labour: because of the low number of orders, there was an abundant amount of free man hours available when the AtO-system was introduced. Even though this was a drain on Fokker's finances, it also enabled Fokker to experiment with the new system: if anything went wrong there was enough personnel available to work on solving the problem. Capital shortage, fierce competition and the strategy to produce high volumes have been discussed above. The strategy of producing high volumes is an inside-out factor and has therefore been depicted separately in the lower part of the determinant firm strategy, structure and rivalry (cf. Van den Bosch and Warmerdam, 1995).

Figure 7.1 Determinants of Porter's diamond influencing AtO



The success of AtO in reducing the number of white tails, led to substantial cost savings, but Fokker's problems were far from over. Demand remained low, some parts of the company still produced inefficiently, the companies overall structure was intransparent and the exchange rate of the dollar (in which Fokker is paid) against the guilder (the currency in which Fokker calculates) reached a very unfavourable point in 1993 and 1994. These factors led to further losses and restructurings in 1995. Despite the low number of orders in 1994, the Fokker 70 and Fokker 100 still had a combined market share in 1993 and 1994 of 50 percent (Annual report 1994, p. 9). The period studied below is 1988-1994 and the study is limited to the Fokker 100 assembly line. The introduction of AtO took place in the early 1990's, but some earlier history is required to paint a clear picture of the dynamics taking place inside Fokker.

7.3 *Organizational innovation in Fokker: the AtO-system*

This section describes organizational innovations in the production of the Fokker 100 aircraft. The main focus will be on the implementation of the Assembly-to-Order system (AtO) in the assembly line of the Fokker 100 (and Fokker 70), which is a pull system: the assembly of planes is not finished unless there is a client for the machine. More specifically, attention will be paid to the way the relationship with suppliers is managed in this system, by means of the organizational innovation of the "Strategic Supplier Meeting" (SSM). In order to understand what led up to the AtO-system and how it was possible to implement it, the story starts with a discussion of lead time reduction in the Fokker 100 programme. Lead time reduction broke the ground for the implementation of AtO.

7.3.1 Prologue: reduction of lead times and other developments leading up to the AtO-system

Whenever a new aircraft programme is launched (as the Fokker 100), the first priority is to assure the product is of high quality. Once this goal is attained, attention is directed at the reliability of deliveries. Finally, the aircraft manufacturer can look towards control of his production process, first by focussing on cost control and consequently and finally by reducing lead times. Hence, reduction of lead times is a sign of maturity of the production process. In 1988 Fokker made a start with reducing the lead time of the Fokker 100.

The most important reason for lead time reduction, was the reduction of capital invested in work-in-process (the reasons for lead time reduction are summarized in table 7.3). The financial burden of work-in-process on the assembly line is considerable, as many expensive parts as wings and engines are built in there. The shorter the time needed for assembly, the shorter Fokker has its capital tied up in work-in-process. A second way of reducing the work-in-process inventory was found in building in the most expensive parts of the airplane at a later stage of the assembly line.

Secondly, lead-time reduction is necessary to obtain flexibility in the specification of the aircraft, which can differ substantially according to the wishes of the customer. The shorter the time needed to build a plane, the better customer specific wishes can be realized. This ability to incorporate customer wishes fastly and cheaply, is called specification flexibility.

The third and final reason for lead-time reduction lay in limitations of space. Originally the lead time of the assembly line was budgetted at 140 days. It became clear however, that with the planned production of 67 planes a year the capacity of the production halls would be insufficient. In order to remedy this, it was decided that lead time reduction should not stop at 140 days but should continue to drop as far as possible. A short lead time would reduce the extra investments in new halls and machines Fokker needed to realize the high production volume.

Table 7.3 Reasons for Fokker to reduce lead times

• Reduce the cost of work-in-process
• Enhancing the specification flexibility
• Limitations of space

Source: based on Fokker document "Doorlooptijd-reductie eindlijn".

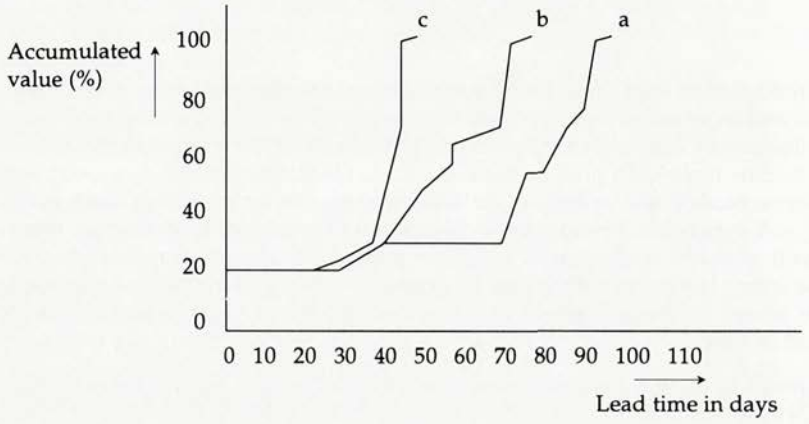
The reduction of lead time is a dynamic routine consisting of a mix of organizational and technological innovations. An example of the first is executing activities simultaneously instead of consecutively; an example of the latter is the introduction of new tooling. In practice the reduction of lead time was an application of the same routine (e.g. searching for activities that can be done simultaneously) over and over again. It was more a cumulation of relatively small changes, than a result of major reconfigurations of the production process. Suppliers had to make some changes in their ways of working as well, e.g. the design of parts had to be altered or the delivery of some subassemblies had to take place at a later period of time.

The result of these actions is shown in figure 7.2. The lead time of the assembly line which was 222 days in the beginning of the Fokker 100 programme and budgetted at 140 days, amounted to only 80 days at the end of 1994, while a further reduction to 56 days is the goal. Such a lead time should make it possible to have a total delivery time of four months (including the preparatory work). This reduction of lead times is shown along the horizontal axis of the figure. Vertically the amount of value invested in the plane is shown. The figure shows that the larger jumps in value are now taken at the end of the assembly process (see the nearly vertical line c in figure 7.2), instead of the more gradual build-up in value that was planned for originally (line a). In this way payments to suppliers can take place later and the time that capital is tied up in the assembly process is reduced.

The reduction of lead times was well under way when in 1991 the demand for airplanes collapsed. In the wake of the Gulf War (1991), there was a sharp reduction in air travel which was one of the causes of this effect. For Fokker this resulted in a crisis situation, as Fokker built up an inventory of 24 finished Fokker 100's which could not be sold (in the aircraft industry these are called "white tails" because they are not painted in the colours of an airline that is going to use them). Because of the high level of production a further increase in the amount of white tails was to be expected. As Fokker was unable to finance this inventory, it ran into acute financial problems. This was aggravated by the fact that the financial position of airlines was such that they could no longer finance the production of airplanes up front, as was customary. In this connection the shift towards leasing instead of buying aircraft enhanced the financial squeeze as well. In the search for cost savings, the costs of work-in-process and the capital invested in it, continued to be the most important problem. A third problem, that already had been emerging for some time, was that those airlines that did order planes required shorter times to delivery. This posed problems for the speed with which Fokker could react to market demand and for the specification-flexibility.

Normally, this first problem would have been met by the inventory of white tails which enables speedy delivery, but the shortage of capital made this solution unfeasible. Hence, another strategy was devised.

Figure 7.2 Lead time reduction in Fokker Aircraft



Source: Fokker document Doorlooptijdreductie eindlijn, p. 10.

7.3.2 AtO: implementation inside Fokker and attribute-table on path dependence

This situation was one of the reasons why Fokker implemented the Assembly-to-Order system early 1993. The system is an attempt to deal with the three problems mentioned (see table 7.4).

Table 7.4 Reasons for Fokker to implement AtO

- Reduce the capital in and cost of work in process (financial problems)
- Reduce number of white tails (demand collapsed)
- Reducing production time:
  - enhance specification flexibility
  - shorter delivery time

Source: based on the Fokker document "Assembly-to-Order binnen de Fokker Jetline".

In Fokker internally the AtO-system was implemented by the introduction of what is called an "uncoupling point" in the assembly-line. After this point, planes are no longer assembled further, until there is a buyer for the plane. In practice the uncoupling point is the moment when the plane's fuselage is finished. If there is a buyer for the plane than the fuselage is moved down the assembly line; if there is not, it is stored. The result is that no white tails are built and thus a considerable financial saving is achieved. Furthermore, the uncoupling point is chosen in such a way that, depending on the exact configuration of the final

plane, between 60 and 80 percent of the plane's value is added after the uncoupling point. This value mainly consists of parts delivered by suppliers: engines, wings, avionics, etc. By postponing the addition of value, the cost of work-in-process is lowered considerably, as is the capital invested in it.

For the AtO-system to be a success, the assembly time after the uncoupling point must be short enough to allow delivery within the time period demanded by the client. The realized lead time reduction contributed to Fokker's ability to do so. In order to secure the specification flexibility an AtO standard options list has been developed, which contains those client specific options that can be built in after the uncoupling point. This enables Fokker to construct a rather standard configuration before the uncoupling point and build in client wishes later. Hence, the AtO-list coordinates the client demands with Fokker's production process and can be seen as a new linkage in the value system. Formerly client requests either had to be given early in the production process (leading to long delivery times) or had to be built in in a white tail (this altering of white tails lead to extra costs for Fokker, as this meant that some parts of the white tail had to be removed or replaced). The AtO-list is still being extended and the aim is to build in as many client specific items as possible, as late as possible. Perhaps even more important is that the AtO-system also enables Fokker to vary its production quantity faster than before. Thus, a faster reaction to market demand is possible (this will be shown later in figure 7.3).

Before turning to the relationship with suppliers (which is one of the most important keys to the functioning of the AtO-system), there are three issues internal to Fokker that merit some extra attention: the role of labour, the role of lead time reduction and the sudden implementation of AtO.

As to labour, fluctuations in the level of activity that result from the introduction of Assembly-to-Order make it difficult to ensure that there is enough work at all times for all personnel. Because the number of orders determines the workload, some flexibility in the number of people occupied is unavoidable. This labour flexibility can be external or internal. Externally, Fokker has negotiated a system of flexible working hours with the unions. There are now possibilities for working longer or shorter hours, without increased costs. More interesting from an organizational innovation point of view, is that a contract has been made with the airline KLM to exchange personnel. Fokker personnel can work on the maintenance of the Fokker 100's and Boeings owned by KLM and KLM-personnel can work on the Fokker 100 assembly line. In this way some smoothing of the fluctuations in the demand for labour can be realized, by means of linking the value chains of KLM and Fokker (Boekholt (1995) observed that these types of interfirm linkages are relatively rare in the Dutch aviation cluster). Internal labour flexibility is being introduced by teaching people to work on different parts of the assembly line. Fokker increasingly turns to working with multifunctional employees. This enhances the breaking down of functional barriers and makes it possible for one man to perform different activities on the assembly line. Whereas formerly different people were needed to coordinate these activities, now they can be done by one individual.

Another point worth noticing is the role of lead time reduction. In the AtO-system a plane must be assembled in a short time. The dynamic routine of lead time reduction developed in the years preceding the introduction of the AtO-system, was one of the reasons why Fokker was able to introduce AtO. Without this dynamic routine implementing the AtO-system would have been much more difficult. Notice however, that one of the original aims of lead time reduction has lost its relevance completely. The original aim was to realize a high level of production while keeping the investments low, while now a low level of production is facilitated by the lower lead times. Concluding, the existing dynamic routine made the organizational innovation possible, but it was not known beforehand that it would have this effect. With the benefit of hindsight it can be concluded that the two other aims of lead time reduction (specification flexibility and lower work-in-process) are the cause of this effect. Moreover, in many ways AtO is the radicalization of lead time reduction: e.g. where with lead time reduction expensive parts are built in as late as possible, with AtO they are not built in at all.

So the dynamic routine of lead time reduction was used for something different than it was originally meant for. This "messy" characteristic of organizational innovation (that was described by Chandler and has been discussed in chapter 4) becomes even more clear when the implementation of the AtO-system is studied. The system was introduced under the pressure of a crisis. In practice this meant that the AtO-system has been introduced almost from one day to the next. As a manager of the Fokker 100 programme put it: "Under the pressure of time we pulled on the handbrakes". " It has been learning by doing, but sooner or later we would have had to do so anyhow". Another manager even claimed that the pressure of time speeded things up. "If we would have had the time, it wouldn't have succeeded", because if all the implications of the system were thought through in the beginning, the overwhelming amount of difficulty and organizational disruption to be expected would have scared people away from implementing the AtO-system. So instead of planning the system, it simply was implemented and formalized later on. In fact this was the only way to do it, as all consequences of the system could not have been known in advance. Search for the right solution was a necessity. Formalization in a structure of consultative bodies deciding on which plane fuselages to store and which to finish and how, came later: it followed what happened in practice; it did not dictate practice[4]. The structure gradually emerged to what it is today.

Attribute-table on path dependence and organizational innovation in Fokker

So far the case shows that AtO was less a static structure than a developing trajectory. The lead time reduction which started long before AtO, played a role in it as well. The history of AtO dates back to a time before its implementation: AtO is a continuation and a radicalization of lead time reduction. One of the latest

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[4] A comparison between the descriptions given of the AtO-process in the documents "Assembly-to-Order binnen de Fokker Jetline" (January 1994) and "AtO-beslisstructuren" (May 1994) shows some of these changes: the descriptions follow practice.

additions is the internal flexibilization of labour, which was still under way early 1995.

When the facts of the case are filled in in the attribute-table on path dependence, table 7.5 is the result. The dynamic routine of lead time reduction influenced all three attributes of organizational innovation:

- it influenced the form of AtO, because AtO was to a large extent the radicalization of lead time reduction. In AtO the object is still to reduce lead times and to lower work-in-process by means of performing some activities later (especially building in expensive parts);
- next, speedy implementation was secured because of the existing low lead times resulting from the dynamic routine of lead time reduction;
- and finally the low lead times made it possible to be so radical that the uncoupling point could be chosen early in the assembly line. The decision to introduce a pull system entailed a major reconfiguration of the value chain.

Pertaining to resources and capabilities, no clear conclusion is possible in this case.

Table 7.5 Attribute-table on path dependence in Fokker's AtO-system

	Dynamic Routines	Capabilities	Resources
Form	Y		
Speed	+		
Extent	+		

Y = Yes, the independent variable influences the dependent variable
+ = the independent variable influences the dependent variable positively

Source: see text.

7.3.3 AtO: consequences of its implementation outside Fokker

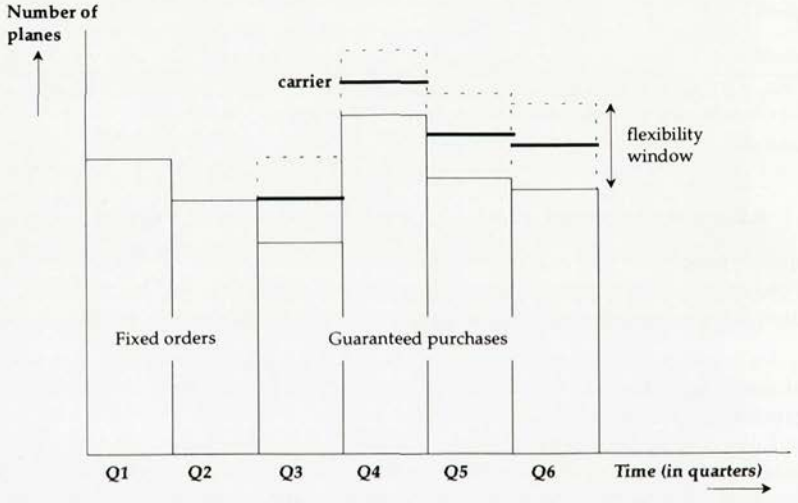
A similar process of trial and error describes the developments in the relationship of Fokker with its suppliers. Here only a general discussion will be provided; in section 7.4 the relationship with two suppliers will be studied in depth.

The AtO-system has important consequences for suppliers. First of all they were confronted with the building-up of an inventory of subassemblies in their own organization, because Fokker no longer produced according to the expected schedules. The 60-80% of value of the aircraft that is added after the uncoupling point consists mainly of subassemblies produced by suppliers (e.g. engines, wings, avionics, etc.). It were these products that now ended up in the suppliers' stock. Moreover, Fokker rearranged its payment schedules. Whereas previously Fokker would finance these subassemblies beforehand, with the implementation of AtO

suppliers are not paid until the subassemblies are really needed at the assembly line[5]. So suppliers are confronted with a logistic and a financial aspect of AtO.

The logistic aspect is dealt with via the organizational innovation of the Strategic Supplier Meeting (SSM), which aims at coordinating Fokker's fluctuating production schedules with the suppliers. Previously, the relationship with the suppliers was coordinated by means of a contractual linkage and long-term planning. The introduction of AtO made this situation untenable and the contractual linkage was abolished. It was replaced by the quarterly SSM meeting of 10 major suppliers, that are most affected by the AtO-system. In the SSM the suppliers are informed about the planned production in the next quarters and the sales cases (possible aircraft sales in the coming time). Based on this information an estimated production is given (the "carrier"). Production is allowed to fluctuate around this carrier with a maximum of 25% (the "flexibility window"). Figure 7.3 depicts this: for the present quarter and the next one (Q1 and Q2) production is fixed. For the four quarters after that, the system with carrier and flexibility window operates. By means of this system the suppliers are able to make a planning, although not such a good one as before AtO was introduced. It will however be clear that quite some flexibility in the production quantity of planes can be achieved by means of this system. Specification flexibility is not incorporated in this picture, except for the fact that the shorter planning horizon improves specification flexibility.

Figure 7.3 Production planning in the SSM



Source: adapted from the Fokker document Trapped between supplier and buyer.

5 Company document "Assembly-to-Order binnen de Fokker Jetline".

The old contract was relinquished as it was impossible to foresee all eventualities. The contractual linkage has been replaced by the SSM. The uncertainty surrounding the implementation of the AtO system required such a drastic move. As one manager stated it: "We have no contracts for AtO, as we are still looking for the precise form of the system. It takes some experimenting". Exactly like the implementation of AtO internally, the coordination with suppliers required a trial and error search for the right solutions.

With the SSM the level of information exchange between Fokker and its suppliers has increased substantially. In the old situation it would have been unthinkable to discuss sales cases with the suppliers[6]. The shift in the relationship is quite drastic. The aim is to sever the slightly competitive relationship with the suppliers and to replace it with cooperation. Fokker was the first aircraft manufacturer to implement such a system with its suppliers. Several other consequences for suppliers will be discussed in section 7.4, where their position will be considered in more detail.

7.3.4 Overview of organizational innovations in the value chain

Based on the foregoing discussion, table 7.6 summarizes the major organizational innovations introduced in the assembly of the Fokker 100 aircraft. The value chain perspective developed in chapter 2 has been used. The core of the Assembly-to-Order system lies in the uncoupling point (leading to a new inventory of fuselages and the elimination of white tail inventory) and the SSM. Some connected innovations can be found in table 7.6 as well: the integration of activities by multifunctionality, parallel performing of activities for lead time reduction, the AtO-standard options list for coordination with clients and the labour contract with KLM. Graphically, the changes are depicted in figure 7.4. The core elements are the introduction of the uncoupling point, which entails the elimination of white tail inventory and alterations, and the SSM, aimed at coordinating the relation with suppliers. When the innovations in table 7.6 are divided according to their intra- and interorganizational nature, all innovations in activities are intra-organizational and all innovations in the linkages are interorganizational. This is a coincidence: of course there are many relations between the innovations in activities and the innovations in linkages. The introduction of the uncoupling point for example, required intensified communication in the SSM.

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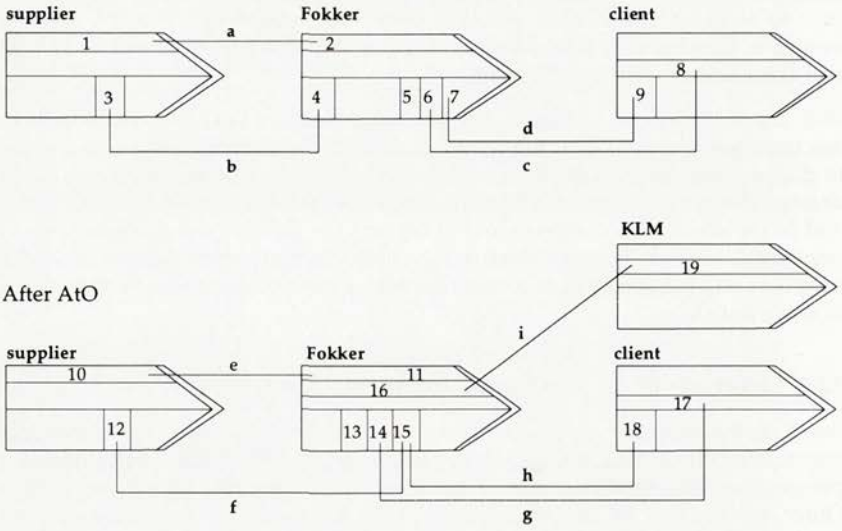
6 Most suppliers have contacts with other aircraft manufacturers as well. The risk of sales information falling in their hands through the suppliers is not imaginary. The names of potential clients are not disclosed; only the size of the possible order and the country/region they come from are given.

Figure 7.4 Main organizational innovations in the value system



LEGEND FIGURE 7.4

Activities

1. planning supplier
2. planning Fokker
3. production process supplier
4. inbound logistics Fokker
5. inventory white tails
6. sales
7. alterations white tails
8. procurement client
9. inbound logistics client
10. planning supplier
11. planning Fokker
12. inventory supplier
13. inventory fuselages (uncoupling point)
14. sales
15. assembly
16. human resource management Fokker
17. procurement client
18. inbound logistics client
19. human resource management KLM

Linkages

a. contract
b. delivery from supplier
c. order
d. delivery to client
e. SSM
f. delivery from supplier
g. order
h. delivery to client
i. agreement personnel exchange

Table 7.6 General overview of organizational innovations connected to the implementation of the AtO-system in Fokker (upto 1994)

Activities

- Introduction of the uncoupling point: inventory of fuselages (creation); related to this there is a reallocation: sales come before assembly instead of after
- Elimination of white tail inventory
- Elimination of white tail alterations
- Integration of activities through multifunctionality of employees
- Lead time reduction a.o. by performing activities parallel (reallocation and integration)

Linkages

- Strategic Supplier Meeting:
  - carrier and flexibility window instead of contract
  - parts delivered when needed, not according to long-term plan/cash-on-delivery
- List with AtO standard options
- Contract with KLM to exchange personnel

Source: based on interviews and company documents.

7.3.5 The organizational innovation and competitive advantage

The effects of the organizational innovations assembled in table 7.6, on competitive advantage are given in table 7.7. The AtO-system has increased the possibility for building in client specific options in a later phase of the production process: specification flexibility has augmented. Similarly the flexibility window makes it easier to react to quantitative changes in market demand. It allows Fokker to react swiftly when demand fluctuates: demands can be met faster in an upswing and overproduction is reduced when demand falls. Of course this only holds when production is below maximum capacity. Once maximum capacity is reached there is no upward volume flexibility. Specification flexibility however, remains in that case. The reduction of invested capital in white tails and work-in-process is substantial. Interest savings for the latter have been calculated by Fokker to amount to 75% per plane[7]. These consequences of AtO can also be traced in the annual report. Table 7.8 shows that in 1992 there was a considerable growth in work-in-process, followed by a sharp decline in 1993. The rise of work-in-process in 1992 "is predominantly caused by a smaller amount of planes delivered than produced in the Fokker 50 and Fokker 100 programme" (Annual Report, 1992). The decline in the following year is, among other things, "a consequence of the fact that more Fokker 100 planes were delivered than produced" (Annual Report, 1993). In other words: the number of white tails diminished in 1993[8]. Next to this

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7 Fokker document "Het FEBS in een veranderende omgeving", p. 3.

8 Of course when work is put at a standstill the same effect would have been achieved, but in that case the other advantages of the AtO-system (viz. volume and specification flexibility) would not have been realized.

cost saving on work-in-process, the prepayments on goods to be received (which predominantly consist of goods for the Fokker 100 programme), also showed a significant decline in 1993 because as part of AtO the agreements about these prepayments were altered as well (see also table 7.8). On the negative side, the system increases the cost of labour on the assembly line by about 10%. The interest savings more than compensate this: there is a substantial net cost saving.

Table 7.7 Effects of AtO on competitive advantage

ADVANTAGES	
Flexibility	**Cost**
• Increased specification flexibility, with shorter delivery time • Increased volume flexibility (from 5-10% a year to 25% a quarter) as long as capacity is not fully used	• Reduction of capital invested in number of white tails and work in process (estimated cost savings amount to 75%) • No costs of white tail alterations • Other payment schedules suppliers (cash-on-delivery)
DISADVANTAGES	
• Higher labour costs on the assembly line (10%)	

Source: based on interviews and the Fokker document "Assembly-to-Order binnen de Fokker Jetline".

Table 7.8 Work-in-Process and Prepayments for goods to be received, in millions of guilders

	1991	1992	1993
Work-in-Process	2.729	3.556	2.814
Prepayments	447	459	353

Source: annual reports Fokker.

The sustainability of the system is not easy to judge beforehand. In table 7.9 the characteristics of sustainability of table 1.4 have been related to some elements of the AtO-system. Imitation of AtO is inhibited by the fact that lead time reduction has a long history and the lead Fokker has, cannot easily be caught up with by competitors. Secondly, the learning that has taken place in the last years (both inside the company and externally, with the suppliers) contains tacit knowledge (causal ambiguity). Thirdly, as figure 7.4 has shown, there is a large number of new and advanced relationships in the value system. AtO is socially complex. It requires many simultaneous and consecutive changes in the value system, like new work schedules, multifunctionality etc. Moreover, AtO is not easily substituted. The alternative of white tails allows volume flexibility, but it is more expensive and specification flexibility is lower. As to tradeability, it is no problem to transfer AtO to another company as far as geography is concerned, but there are considerable systemic interdependencies. The effects on first and second tier suppliers, makes that the system cannot be "sold" (transferred) from only Fokker to another company: the innovations and learning of other firms of the Fokker

network will have to be part of a transfer of the AtO-system as well. Likewise, for the firm adopting AtO, these systemic interdependencies are relevant too: it will have to involve its own network in the implementation. Pertaining to lock-in, the organizational disruption caused by AtO was enormous. This has not been discussed yet, but a high price was paid in terms of frustration and stress. The effort to get everybody to cooperate and to overcome the unexpected problems has taken its toll on the organization and its people. Piecemeal change, finally, is difficult in that AtO cannot be contained to a small part of the organization. There was some experimenting inside the Fokker assembly line before AtO was definitely introduced, but in order to reap the full benefit of it, suppliers had to be involved as well.

It is not easy to trace where the competitors stand. End of 1994, the biggest competitor British Aerospace had not implemented an AtO-system; Boeing (also a direct competitor) and Saab do have a similar system, but Saab has no advanced mechanism for coordination with its suppliers. Boeing introduced its pull system in the early 1990s (The Economist, 1995b). Pull systems are not widely used in aircraft manufacturing. Fokker and Boeing are the frontrunners.

Table 7.9 The sustainability of AtO

Characteristics of Sustainability	Application to AtO
Imitability	
• unique historical conditions • causal ambiguity • social complexity	• lead time reduction • learning • many simultaneous/consecutive changes, new work schedules etc.
Substitutability	• limited
Tradeability	
• geographical immobility • systemic interdependencies	• not applicable • effects on first and second tier
Lock-in of imitators	
• set up cost and organizational disruption • feasibility of piecemeal change	• considerable: high prices in terms of stress, frustration etc. • change cannot be conained to one company

Source: the attributes of sustainability can be found in table 1.4.

7.3.6 Discussion

This section has described the background, reasons and form of an important organizational innovation in Fokker Aircraft: the AtO-system. Some points are worth noticing, before turning to a detailed discussion of some aspects of the system. First of all the importance of search and trial and error in organizational innovation has become clear. This does not mean that the goals have shifted. Some of them have remained rather constant: lowering work-in-process and

enhancing specification flexibility have figured among the goals consistently. Furthermore, different routines, especially those of lead time reduction have been applied over and over again. Hence, in some respects the AtO-system is not so much a breaking away from lead time reduction as it is its radicalization. For instance, where in the period of lead time reduction expensive parts were not built in till late, in the AtO-system they are not built in at all in the absence of a client. This example also makes clear how much lead time reduction has prepared the ground for AtO. The capability of lead time reduction was a prerequisite for it. Hence, some inside-out characteristics fit in rather well with the ideas developed in chapter 4 (see table 7.5). More important in this case are however the outside-in characteristics notably the influence of the network and demand.

7.4 *Long-term interorganizational relationships and AtO*

7.4.1 Introduction

The conjecture in chapter 5 was that the presence of long-term interorganizational relations would inhibit organizational innovation. Fokker's network of suppliers abounds with such relationships. The high cost of developing a new airplane make it impossible for a single company to carry the risk and investments on its own. The complete network of Fokker includes a few hundred suppliers. The major ones are the partners and major vendors. Together these are the 10 suppliers that form the Strategic Suppliers Meeting. The partners are Deutsche Airbus (DA) and Shorts. They participate in the Fokker 100 programma at their own risk: they must recoup their fixed costs themselves and share in the development costs of the Fokker 100. The 8 major vendors include a.o. Grumman, Rolls Royce, Dowty and Honeywell. Their involvement in the programme is usually less than the partners' in that they have less Fokker-specific machinery, tooling and design investments.

The next two sections will describe two cases in more detail: the relationship with Shorts, a company in Northern Ireland that builds the wings for the Fokker 100, and Grumman a U.S. company that builds the engine-casings. The organizational innovations in these relationships will be described and the factors stimulating and inhibiting their cooperation in the AtO-system will be analysed. An overview of the factors stimulating/inhibiting organizational innovation in the Fokker network will be given and related to the theoretical considerations discussed in chapter 5.

7.4.2 Shorts

Fokker's relationship with wing manufacturer Shorts dates from the sixties, when Shorts joined in an earlier Fokker programme, the successful Fokker 28. As one of the two partners in the Fokker 100 programme, Shorts develops wings for the Fokker 100 completely by itself based on specifications given by Fokker with regard to interfaces, aerodynamics and weight. This way of operating is common in aircraft manufacturing and has been taken very far by e.g. Boeing (Sanchez and Mahoney, 1994). The fact that Shorts is responsible for the development of the wings, entails that Shorts also is the owner of drawings and tooling. Consequent-

ly, Fokker is tied to Shorts for a long period of time as breaking-up the relation would require Fokker or the partner replacing Shorts, to buy up the drawings and tooling. This requires a substantial financial investment. Moreover, a possible new partner will not be able to take over the part of the learning curve Shorts has gone through. A change of partner would therefore mean that in the beginning cost would be higher and delivery irregular. This is not an imaginary disadvantage as learning curves in aircraft manufacturing are known to be quite steep. Here the fact that Shorts and Fokker's operations are geared to one another (Fokker makes up 30% of Shorts' turnover) plays a role as well: with a new supplier Fokker has to start from scratch. Finally, the product support of the Fokker 28 programme still runs through Shorts: a severing of the link in the Fokker 100 programme would certainly have its consequences on that.

Table 7.10 Intertwinedness Fokker and Shorts

• Shorts possesses Fokker-specific tooling and drawing
• Learning Shorts not transferable to other parties
• Operations geared to each other
• Shorts still supports previous Fokker-programme

Source: based on interviews.

In short (as table 7.10 makes clear): in the course of time the firms have become increasingly intertwined. This has as a consequence that a change in Fokker, often has many implications for Shorts as well. This certainly is the case with the AtO-system as a chronological overview of Shorts' involvement in the Fokker 100 programme will make clear:

- 1985-1989. In the first phase of the Fokker 100 programme Shorts had some difficulty with the required high production speed. Also it lacked control over its recurring costs. The British government had subsidized these costs, which lessened the necessity for Shorts to maintain the capability to reduce them. Fokker aided Shorts in bringing this capability back to life. Likewise, Fokker advised Shorts on the reduction of lead times. As a palliative unfinished wings were transported to Fokker and completed by a third party. A maze of deliberation structures came into existence as a result of the help Shorts received.
- 1990. The relationship with Shorts had been normalized: Shorts was capable of delivering complete wings on time. It still worked on lead time reduction independently and even moved ahead of Fokker in this respect. As a consequence of this the price of wings could be lowered.
- 1993. The decision is taken to implement the AtO-system. The deliberation structures dating from the first years of the Fokker 100 programme are replaced by a multi-functional group, mainly aimed at discussing general policy issues.

  Concerning AtO, Shorts' management was prepared to work with Fokker as Shorts agreed that prediction of market demand was fundamentally impossible, so that other ways of dealing with cyclical demand had to be invented. Even though the willingness of Shorts was not lacking, the ability of Shorts to work

with AtO was limited. The main problem is that the short-term volume flexibility of Shorts is low. That is why Shorts always has to produce at the high end of the flexibility window. If Fokker's production is lower than that, a stock of wings is created.

Essentially there are two reason why Shorts is not able to work flexibly. The first one is technological: implementing an AtO-like system in Shorts is difficult. There is no point after the assembly of a wing has begun at which an uncoupling point can be introduced. Moreover, there is no economic reason for Shorts to do so, as the build up of costs of a wing is rather gradual. Unlike the case of an airplane, there are no abrupt changes in value added which may provide ground for uncoupling. A second problem lies in Shorts' environment. The unions are not prepared to cooperate with the external flexibility of labour needed in an AtO-system.

The limited flexibility of Shorts has as a consequence that the costs of the Fokker 100 are not as low as would be theoretically possible, because of the costs connected to having an inventory of wings. Moreover, there are some coordination problems connected to this storing of wings, as fuselage and wings are built in combination. If Fokker decides to store a fuselage, while Shorts decides to finish the assembly of a wing, a mismatch may occur when at a later date the fuselage's specification is changed as result of a customer's request. To alleviate this mismatch Fokker has created a new activity, viz. detecting and alleviating differences in fuselage and wing. The costs of this are paid for by Fokker. In reality this problem is not so big, as the wing is one of the most standard components of a plane.

- 1994. Even though Shorts' volume flexibility is not yet perfect, the mentioned organizational innovations of an inventory of wings and the tuning of wing and fuselage, allow Shorts to work according to AtO-norms. The most important current problem is the specification flexibility. Shorts' quite long lead time reduces its ability to build in client specific parts. A further lead time reduction with 50% is planned and may alleviate this problem. Fortunately the number of client specific parts that may be built into the wing is limited to only 5. Currently, Fokker tries to deal with this problem by taking over some of Shorts' activities. For instance, certain moving parts of the wing can be painted in different shades of grey and white, upon customer request. As painting usually occurs rather late in the production process, Shorts did not always know in what colour to deliver the wing. In order to avoid the use of the wrong colour of paint, the painting of these parts is now done by Fokker. Fokker would like to realize such transfers of activities with other suppliers as well. Usually however suppliers are not keen on doing so, as it reduces their workload. Another way of coping with the AtO-standard options list, is that Shorts has introduced a simple manual system which describes the way the standard options should be constructed in the wing. This way of working allows Shorts to achieve some specification flexibility as well. Even though this system may seem rather primitive, it works quite well. Some other suppliers, including the other partner DA, have not installed such systems because they object to working with standard options.

  Finally, in October 1994 a "low cost flexibility"-meeting has been installed, in which DA, Shorts and Fokker discuss possibilities for improvement of the

production process and knowledge is transferred among the three. It is possible for instance that one partner helps the other in implementing new flexible production arrangements.

An important factor improving Shorts' ability to cooperate was that Shorts was taken over by Bombardier. Bombardier has invested heavily in Shorts' technological capabilities and thus contributed to the transition to new ways of working.

Table 7.11 contains the organizational changes in the relation with Shorts in terms of the value chain. Figure 7.5 depicts this graphically. All innovations in activities are intra-organizational, excluding the reallocation of wing painting. All linkages are of an interorganizational nature, accept for Shorts' internal system for dealing with standard options.

Table 7.11 Organizational innovations in the relation Fokker-Shorts

Activities

- Creation of activities:
  - inventory of finished wings (in case the Fokker production is lower than the maximum allowed by the flexibility window)
  - tuning the wing-fuselage configuration at Fokker
- Reallocation of activities:
  - transfer of painting of parts of the wing
- Diverse changes in activities connected to lead time reduction by Shorts

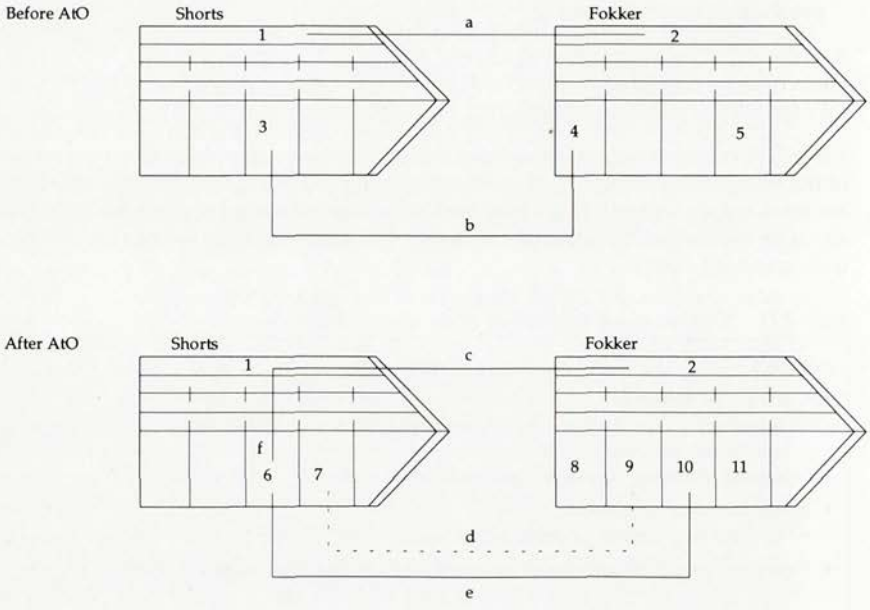
Linkages

- Multifunctional deliberation structure
- Strategic Supplier Meeting
- Low cost flexibility meeting
- Shorts' system for dealing with standard options

Source: based on interviews and company documents.

Some general tendencies can be found. First of all meetings to transfer knowledge have been created repeatedly. The first meetings were held in the 1980's and formalized in the multifunctional group. In 1994 next to this bilateral structure the trilateral structure of the low cost flexibility meeting has been introduced. This together with the SSM, seems to imply a trajectory of linkage renewal in the direction of increased knowledge- and information-sharing in the relationship between Fokker and Shorts. The advantages of such information-sharing and knowledge transfer have received widespread attention (Lorenzoni and Baden-Fuller, 1995). The changes in activities seem to be more reactive. They are responses to specific problems which were not foreseen. The relationship between the two companies is not a static but an evolving one. The desired situation can be approached by further organizational innovations.

Figure 7.5 Organizational innovations in the relation Shorts-Fokker



LEGEND FIGURE 7.5

Activities

1. planning Shorts
2. planning Fokker
3. assembly wing
4. inbound logistics Fokker
5. alterations wing
6. assembly wing (partly)
7. inventory wings (optional)
8. inventory fuselages
9. tuning wing-fuselage (optional)
10. assembly
11. paint wing parts

Linkages

a. contract/long-term planning
b. delivery of complete wing
c. SSM
d. delivery from inventory (optional)
e. delivery wing with loose parts
f. AtO-standard options list

In general Shorts is willing to cooperate with the AtO-system. This is an important advantage as the relationship between Fokker and Shorts is very strong: the fate of the one company is inextricably intertwined with the fate of the other company. The result of these strong ties between Fokker and Shorts was that the AtO-system did not stop at Fokker's firm boundary, but had repercussions for Shorts as well. In practice this meant that the introduction of a new way of cooperating between the two firms became necessary. The full benefits of AtO cannot be reaped by Fokker until the interorganizational relationships function smoothly as well. To accomplish this, an array of other organizational innovations (inside Shorts and in the relation between Fokker and Shorts) has been intro-

duced. This confirms the description given in chapter 4 of organizational innovation as a messy process of search and trial and error along a trajectory of development, in which one innovation (AtO) gives rise to others.

7.4.3 Grumman

Grumman, which makes the protective plates around the engines, has been involved in the Fokker 100 programme since its start halfway the 1980s. Grumman was intensively involved in the design of the parts it had to construct. In the course of time it has built up a collection of knowledge and patents of which it is not clear whether the ownerships lies with Fokker or Grumman. This situation leads to lock-in of the relationship: unclarity over the ownership of knowledge complicates a possible break in the relationship.

With the introduction of the AtO-system the relation between Fokker and Grumman has come under severe pressure. There are several reasons why the relation with Grumman was not easy to change (table 7.12). Most importantly, the patterns of behavior that had been developed in the past were hard to break. Grumman and Fokker have a history of tough negotiating about contracts, prices and deliveries. From both sides the relationship was characterized more by antagonism and competition than by cooperation. The AtO-system however is aimed at the latter. Fokker and Grumman were not able to make this reversal in the relationship. Grumman did not agree to break the existing contract and is the only supplier that falls back on it in case of problems. "It takes a considerable effort to switch to more open cooperation", one of the managers remarked about the relationship with Grumman. As was noticed before, the contracts with other suppliers have been dissolved.

Next, Grumman has a low strategic stake in Fokker. Fokker makes up only 3-4% percent of Grumman's turnover. Moreover Grumman's position in negotiating is strong, because of the difficulty of breaking the relationship and the limited amount of competitors Grumman has. Both points limit Fokker's possibility to change supplier.

Finally, there are some differences in the industries in which both companies work which do not enhance their mutual understanding. Grumman mainly works in the defense-industry and has limited knowledge of the civil market. An example is that Grumman is not familiar with the problem of cyclical demand. A similar problem occurs in Fokker's relation with DA. DA has always worked as a supplier and it has never had direct contact with companies in which the problems were so clear. This in contrast to other suppliers who knew from their own experience could understand the necessity of giving up long-term planning and working according to AtO. Hence, the attitude of the firms vis-à-vis the AtO-system is influenced by their own history and industry background.

Another industry difference is that the financial way of working in the defense-industry differs from that in the civil market. Companies in the defense industry, working with governments, have always been able to obtain more lenient financial conditions from their customers. When Fokker introduced new financial conditions for its suppliers, it was Grumman that had most difficulty in accepting

that. Previously, Fokker would finance the production of parts provided by Grumman, whereas under the AtO-system suppliers are not paid until the part is used in the assembly line. Prepayments have been replaced by "cash-on-delivery", as airlines have stopped making prepayments to Fokker as well. Grumman did not accept this, because of its focus on cashflow management. Under pressure it has agreed to a lower level of prepayments than before, so that part of the financial risk of market fluctuations is now shared with Fokker.

After Fokker had given Grumman free advice on the reduction of lead times, Grumman did not pass on the financial benefits this brought it. As far as the logistics is concerned, Grumman builds up an inventory out of which on Fokker's request deliveries take place. Internal flexibilization enables Grumman to follow AtO to a satisfying extent. Grumman also takes part in the SSM.

Table 7.12 Factors impeding the implementation of the complete AtO-system in the relation Grumman-Fokker

- Entrenched routines:
  - sticking to the contract
- Industry differences:
  - no cyclicity in defense-industry
  - strong cashflow management at Grumman
- Independence of Grumman:
  - Fokker is a minor client
  - few alternatives for Fokker

Source: based on interviews.

An interesting fact is that Grumman's suppliers have had to change their way of working as well in order to meet the logistic conditions of AtO. As a consequence the shocks in demand are now absorbed throughout the entire network: part of it is dealt with by Fokker, part is absorbed by Grumman and part is absorbed by Grumman's suppliers. Formerly the burden fell on Fokker exclusively, currently Fokker is able to pass on part of it to the rest of the value system: the AtO-system has external effects beyond the first tier suppliers into the second tier. The innovation in the linkages are all interorganizational; the creation of an inventory is intra-organizational.

Table 7.13 Organizational innovations in the relation Fokker-Grumman

Activities

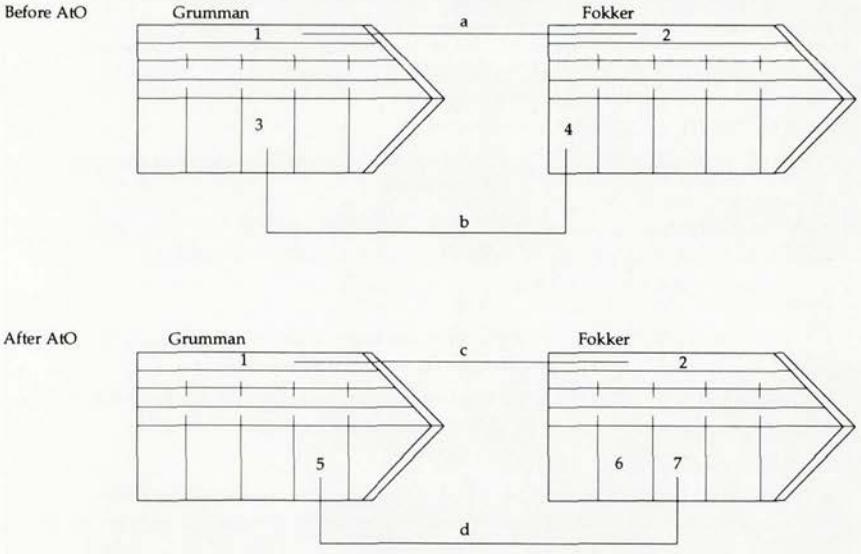
- Inventory of parts

Linkages

- SSM, but contract is maintained
- New financial linkage partly implemented
- Flexibility in second tier

Source: based on interviews.

Figure 7.6 Organizational innovations in the relation Grumman-Fokker



LEGEND FIGURE 7.6

Activities

1. planning Grumman
2. planning Fokker
3. production process Grumman
4. inbound logistics Fokker
5. inventory plates
6. inventory fuselages
7. assembly Fokker 100

Linkages

a. contract
b. delivery plates
c. SSM (limited)
d. delivery plates

Table 7.13 gives an overview of the organizational innovations implemented by Grumman (see also figure 7.6). Briefly: the logistics are not optimal but Grumman is able to work according to AtO. The financial aspect of AtO has however not been accepted by Grumman so that the benefits for Fokker (and the entire Fokker 100 programme) have remained limited.

7.4.4 Evaluation: long-term relationships and organizational innovation

If the AtO-system is to realize its full potential a cooperative attitude from the current suppliers is a prerequisite. If a supplier is not willing to cooperate or not capable of doing so, the cost of switching to another supplier will be prohibitive. As a result Fokker will be locked in a suboptimal situation.

Table 7.14 Factors inhibiting cooperation with suppliers

Factors inhibiting cooperation	Examples
Externalities	
Costs:	
• loss of beneficial position	• Vendors less protected from demand fluctuations (higher stock) • No prepayments to vendors • Loss of position extends to second tier
Impediments:	
• internal obstacle	• Shortage of vendor's knowledge of lead time reduction and flexibilization
• external obstacle	• Unions unwilling to accept labour flexibility at Shorts
Entrenched routines	
• normative isomorphism	• Sticking to contracts
Independence	
• absence of hierarchy	• All suppliers are independent companies
• low strategic dependence	• Low percentage of turnover comes from sales to Fokker
Industry environment	
• differences in industry	• Grumman operates mainly in defense industry • Lack of affinity with civil market

Source: see text.

The two cases presented describe two long-term relations with firms of which one is willing to cooperate, but is (temporarily) limited in its possibilities and the other firm may be able to cooperate but is less willing to. Consequently the potential benefits are not yet realized to the extent possible. Based on table 5.4, table 7.14 summarizes the factors inhibiting smooth cooperation with suppliers in the AtO-system.

Externalities

First of all, externalities are clearly present. The strong connection between Fokker and its suppliers is the cause of the fact that the effects of AtO are not limited to Fokker alone, but have important repercussions for the suppliers as well. They are forced to make organizational changes. Hence, the distinguishing characteristic of externalities that cost and benefits do not fall in the same organization is present and not only with regard to the costs incurred by the suppliers of changing the organization, but also by the loss of other beneficial positions. The main point in this regard is that whereas formerly the suppliers were to a large extent shielded

from fluctuations in market demand both financially and logistically, currently they are exposed to them. Pertaining to externalities there is one more interesting point worth noting: the externality is not limited to the first tier of suppliers, but affects the second tier as well, as the case of Grumman shows. This may further complicate the situation. Suppliers also face a shorter planning horizon. To remedy this and to lessen the burden of the AtO-system on the suppliers' organization, Fokker installed the SSM.

Next, there may be other impediments inhibiting firms to cooperate. Both Grumman and Shorts did not possess the capabilities to implement a way of working in their organizations that could deal with AtO. The implementation of an organizational innovation is therefore not just dependent on the will of suppliers, but also on the question whether those suppliers possess the required know-how and resources to deal with it. More flexible firms, as the firms delivering the avionics, had no problems with AtO at all. The cure for the impediments to change was found in the transfer of knowledge about flexibilization and lead time reduction from Fokker to the suppliers.

Another obstacle hampering the ability of suppliers to implement AtO, was found in the business environment. In the case of Shorts, the unions were unwilling to accept the further flexibilization of labour, which was required to deal with the expected increased fluctuation of production.

Entrenched routines

As discussed in section 5.3.3 entrenched routines are caused by isomorphism and inertia. The Fokker case shows that normative isomorphism plays an important part in the relation Fokker has with Grumman. Precisely as was shown in section 5.3.3, the interaction over time has created a way of working from which it is difficult to break away. A rather antagonistic relationship developed between Fokker and Grumman. Replacing this with a more open and non-contractual relationship proved to be impossible at short notice. Grumman's reaction when changes have to be made is the same as it was in the past: Grumman takes the conditions of the contract as a point of departure. It is not possible to explain this by other variables than the history of the relationship: Grumman is the only party which has not accepted some of the major elements of the AtO-system.

Independence

That the absence of hierarchy has slowed down the implementation of the AtO-system is made clear in the relationship with Grumman. When Grumman appeared to have a negative attitude towards the AtO-system, there were no means to force Grumman to comply. Instead lengthy negotiations were needed to entice Grumman to accept relatively small changes. With regard to other suppliers this problem has occurred as well (for example with the partner DA). On the other hand firms that are more dependent on Fokker have been more willing to cooperate (30% of Shorts' turnover depends on Fokker, compared with 3-4% for Grumman). The less dependent on Fokker firms are, the less amenable they are to give up their beneficial position and the harder they will defend the status quo.

Industry environment

Related to normative isomorphism but important enough to be mentioned separately, is that Grumman's norms and ways of working are determined by the norms in its own industry. The norm in the defense-industry with regard to strict cashflow management is different from the norm in the civil aircraft industry; in addition, Grumman has never had direct contact with the market but has always worked as a supplier to other firms. These differences in norms hinder mutual understanding. Hence, normative isomorphism has two sides to it: on the one hand replacing old norms by new ones is difficult (a longitudinal element surrounding norms). On the other hand dissimilarity in norms can thwart cooperation between firms coming from different industries (a cross-sectional element).

7.4.5 Attribute-table on long-term relations and organizational innovation in Fokker

Looking at this analysis in more detail, the attribute-table on long-term relations (table 7.15) summarizes the findings:

- externalities influence all three attributes of organizational innovation. The form of the innovation is influenced because the SSM is aimed at mitigating the effects of AtO on the suppliers; also inventories of finished products come into existence in the suppliers's value chain. The speed with which the innovations were implemented was lowered by impediments as the lack of flexibility of Shorts. It takes some time before Shorts will be able to work with the system fully. The extent of the organizational innovation was influenced negatively as well: in neither of the cases of Shorts and Grumman the AtO system was completely implemented, because they were not prepared to give up their beneficial positions completely. Grumman, for example, has not accepted the new financial linkage of AtO (see figure 7.6);
- no effect of entrenched routines on the form of the innovation was found. Entrenched routines did influence the speed negatively: it took some time before Grumman was willing to make some changes in the contract. When these changes were made, they were limited. For the larger part Grumman remained with the old contract; hence the minus in the box relating entrenched routines to extent. The entrenched routines of working according to contracts and long-term planning proved hard to change, as Grumman always took the old contract as point of departure when changes had to be negotiated;
- independence was not found to influence the form of the innovation but in the case of Grumman it certainly influenced the speed of implementation negatively. Lengthy negotiations about the contract were needed between Grumman and Fokker. The absence of a centralized power dictating change, does not stimulate the implementation of an organizational innovation in long-term relations. Grumman was not only independent formally, it was also de facto independent in that its financial dependence on Fokker is low: only 3-4% of its turnover depends on Fokker. Compared to Shorts, which is a partner in the Fokker 100 programme and realizes 30% of its turnover from Fokker,

Grumman's dependence on Fokker is very low and thus it can afford to be less disposed to cooperate with AtO.

Table 7.15 Attribute-table on the influence of long-term relations on Fokker's AtO-system

	Externalities	Entrenched routines	Independence
Form	Y	N	N
Speed	–	–	–
Extent	–	–	

Y = Yes, the dependent variable influences the independent variable
N = No, the dependent variable does not influence the independent variable
– = the dependent variable influences the independent variable negatively

Source: see text.

The presence of extensive, long-term interfirm relations has slowed down and limited the implementation of the AtO-system. To translate Fokker's internal planning to the external parties the Strategic Supplier Meeting has been devised as part of the AtO-system. *The attribute-table shows that at various places the form of the organizational innovation is influenced by the suppliers, while the speed and extent of its implementation is in most cases negatively determined by the presence of long-term relationships.* Externalities, absence of hierarchy, and entrenched routines can all be traced in the cases, thereby largely confirming the hypothesis that long-term relations may have a negative impact on organizational innovation. Especially externalities seem to be interesting in this connection (see table 7.14). One other variable which was found to play a role is the industry background of the firms concerned. When both firms work in a similar industry, organizational innovation is easier than when the industry backgrounds differ.

Because of those inhibiting factors the AtO-system has been implemented only partly, despite the pressing reasons (demand shocks, financial crises) for implementing it. The competitive advantages of a shorter reaction time to market changes, increased specification flexibility and lower costs, had in 1994 not (yet?) materialized to the extent possible even though important progress was made. The trajectory of development was however not finished at that date: the system was still evolving. On the positive side, the complexity of dealing with suppliers will make the benefits obtained so far, harder to replicate for competitors.

7.5 *Demand and AtO*

7.5.1 Introduction

Some aspects of demand are present in this case, especially the role of cyclical demand and differentiation. These two attributes will be looked into in this section. As to quantitative developments in demand, these have been discussed quite elaborately at various places above. That is why section 7.5.2 will give only a brief overview of quantitative developments in demand. In section 7.5.3

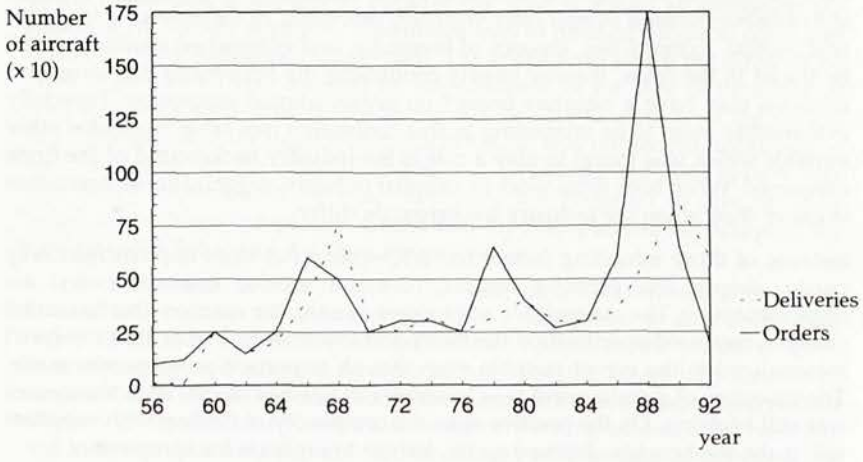
qualitative changes and their effect on organizational innovation will be analysed. The attribute-table on demand can be found in 7.5.4.

7.5.2 Quantitative demand

The role of changes in the quantity of demand has been amply discussed above. This will not be repeated here. It will be clear that the demand shock in the early 1990's was the trigger for the implementation of the AtO-system in Fokker. The goal of the implementation of AtO is: "to improve control on the effect of the changing pattern of market demand on the required capacity (in man hours and money) inside the enterprise"[9].

Next to that the AtO-system takes into account the cyclical nature of demand for Jet aircraft. In fact the flexibility-window, which allows production to deviate from the carrier is present exclusively to deal with changes in the quantity of demand. The cyclical nature of demand for airplanes is illustrated in figure 7.7. Demand peaked in the years 1965, 1978 and 1989. The corresponding deliveries took place three years later.

Figure 7.7 Business cycles in jet aircraft manufacturing



Source: Fokker document Trapped between supplier and buyer.

The flexibility-window has two advantages in such a cyclical market. First of all if demand increases, it enables Fokker to raise its production more swiftly. When demand decreases Fokker is not stuck with an old production schedule based on higher demand, but is able to lower its production, thus preventing the expensive

9 Company document "Assembly-to-Order in de Fokker Jetline", p. 3, translated from Dutch by the author.

build up of a stock of white tails. Concluding, quantitative demand not only induced the organizational innovation (because of the collapse of demand), but also influenced the form of the innovation: the flexibility-window is an attempt to cope with the uncertainty of cyclical swings. It increased quantitative flexibility from 5-10% a year to 25% per quarter. This can be described as a shift from a linkage with organization-like characteristics (long-term planning), towards a linkage in which the movements of the market are incorporated.

7.5.3 Qualitative demand

Two qualitative changes can be traced in the demand Fokker has faced. First of all time-based competition (Stalk, 1988) has made an entrance in aircraft manufacturing. As Fokker lacked the capital to finance an inventory of white tails out of which speedy deliverances could be made, another way had to be found to deliver in a relatively short time. The "four months" AtO-plane provided the solution. As on average an airline needs six months for its own set-up (e.g. training pilots etc.) the delivery time is preferably less than that. Hence, time based competition has played a role in AtO from the start. A second qualitative change is one that is of specific importance in the long run: namely fashion changes in aircraft interiors. Although these changes are not too fast, over the entire length of an aircraft-programme they do have an important impact. Firstly, the influence of time will be discussed, next the role of fashion will be studied.

TIME

The shorter delivery times demanded by the market are specifically troublesome for those parts of the plane that are client specific. Non client specific parts can largely be built and put in an inventory (like aircraft fuselages). There are only three standard forms of aircraft fuselages (called the export configurations A, B, and X, which differ with regard to the kind of door they have). Optional features however come in a variety of forms and can only be added to the aircraft when the client has formulated his wishes.

A list of AtO standard options has been developed to deal with the problem of having to build in the client specific options at a late stage in the production process. The list gives an overview of those options that can be built in after the uncoupling point. An information system provides all the necessary information for building in the chosen options. The list is still being extended as a.o. technological redesign of the options and further client wishes combine to increase Fokker's ability to deal with the phenomenon of building in options after the uncoupling point.

The AtO standard options list is an illustration of the remarks made in chapter 5 about the role of demand in organizational innovation. A qualitative shift in demand is the cause of the replacement of an organization-like linkage (dictated by the standard production process of aircraft) by a market-like linkage. The AtO standard options list is a market-like linkage because clients can directly pick options from the list and in this way influence the production process. The construction of the aircraft is dictated by clients' wishes to a larger degree than before. In one minor case (painting wing parts) the customer was better served

by temporarily bringing the activity to Fokker but the overall picture confirms the proposition.

FASHION: THE CASE OF C&D[10]

As aircraft programmes run for some decades, changes in style and taste can be expected. This is especially true for the interior of a plane, as it is one of the parts which is most subject to client wishes. Most sensitive to client demands are the galley, the colours used and the length of the centersection. Even though the fashion changes in the design are not so frequent, during the lifetime of a programme they do have an important impact. Next to that there are client specific wishes that have to be built in in the interior so that some differentiation between clients occurs. The AtO-goal of enhancing specification flexibility is clearly a result of this demand for differentiation.

The requirements of fashion, combined with the element of shorter delivery times, has led Fokker to decide to stop with the own production of interiors in 1994 and buy them from an American company called C&D instead. The costs connected to following fashion were thus too high. Again, an organization-like linkage (building the interiors inside Fokker) is replaced by a linkage with market characteristics (a contract with C&D).

An internal Fokker-report "Make or buy policy and vertical integration" found that interiors were an important bottleneck in the production of the Fokker 100 aircraft. The production lead time was too long. Usually clients had to give the specifications of the interior 16 months before the aircraft was delivered. With the increasing pressure for shorter delivery times this situation was unacceptable. Of course, Fokker also found that the long lead time was troublesome for the AtO-system. With such a long time between specification and delivery AtO would not be able to work and the idea of a four months plane would be illusory.

Moreover, changes after the 16 months period were extremely expensive: things as simple as replacing a coathook could cost thousands of guilders. Larger scale redesigns of interiors were even more cumbersome, with lead times of up to 18 months from design till construction. The Fokker-report concluded "Our interiors do not keep up flexibly with fashion trends" (p. 12). The causes of this situation lie in rigid drawing structures (which cause minor changes to absorb a lot of time and cost, which could not be spread out over high production volumes), design capabilities which are behind the times and out-of-date production techniques. Hence Fokker found that there was a "lack of cost effective state-of-the-art production technology and progressive product definitions" (p. 16).

Reason for these old fashioned capabilities and techniques is that Fokker designs an interior only once a decade. Consequently, hardly any learning and innovation in design and production takes place. When a demanding (possible) customer (SAS) wanted the standard yellowish interior which was fashionable in the early 1980s to be replaced with a white one, this took 1600 hours of development and

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[10] The case on C&D is based on the Fokker-report "Make or Buy-beleid en vertikale integratie" and interviews.

drawing-office activities. When Fokker tried to incorporate white as the standard colour in all aircraft, the cost was too high and capacity too low to put this idea into practice.

Based on this analysis, Fokker decided to contract out the production of the interior. The firm C&D acquired the contract and is now largely responsible for the interiors. Some styling and assembly activities are still being done by Fokker, but in essence C&D has system responsibility. As C&D works for several aircraft manufacturers it has kept up with production technology. Moreover, C&D's design capabilities are well-developed as it designs a new interior annually.

The benefits of contracting-out are considerable. Costs can be reduced by 35%; depending on the exact specifications, lead times for the interiors are 3-6 months where Fokker itself took 8-15 months for comparable specifications. So the requirement of shorter delivery times is also met.

7.5.4 Conclusions and attribute-table on demand

Most organizational innovations discussed have been induced by demand. Both quantitative and qualitative changes in demand have influenced Fokker's organization, as is shown in table 7.16 which presents the attribute-table on demand:

- regarding cyclical changes, the drop in demand forced Fokker to implement the AtO-system fastly (speed is positively influenced). As part of that system, the flexibility-window allows Fokker to react better to the demand cycle in the aircraft industry. Hence, quantitative changes also influenced the form of the organizational innovation. The depth of the demand crisis influenced the extent of the innovation as well: AtO is a major reconfiguration of the value system.
- in relation to differentiation, AtO also allowed Fokker to react to the demand for shorter delivery times. In order to organize for shorter delivery times, two organizational innovations are of relevance: the AtO standard options list and the contracting-out of the interior. The latter was not only needed to reduce delivery times, but was also induced by fashion. So, differentiation influences the form and the extent of organizational innovation. The C&D case also corroborates the findings in chapter 5 on qualitative changes in demand. Both fashion and the demand for shorter delivery times have induced Fokker to replace an organization-like linkage by a market-like linkage[11]. The reason for this is that Fokker was unable to keep up the investments in its capabilities (e.g. design) and resources (e.g. technology). An effect of differentiation on speed was not found: the trend towards differentiation existed already for quite some time before the innovations were implemented.

[11] The transfer of painting of wings in the Shorts case seems to follow a different direction. This is however a temporary thing, once Shorts has reduced its lead time sufficiently this activity may return to Shorts.

Table 7.16 Attribute-table on demand and Fokker

	Fundamental	Cyclical	Differentiation	Fragmentation
Form		Y	Y	
Speed		+		
Extent		+	+	

Y = Yes, the independent variable influences the dependent variable
\+ = the independent variable influences the dependent variable positively

Source: see text.

7.6 *Summary and conclusion*

At various places in the foregoing chapter the different propositions of chapter 5 have been corroborated or extended. The conclusions will not be repeated here in detail. They can be found at the separate sections. In general however the following points about organizational innovation are noticeable:

- there is path dependence in the process and it is characterized by search. That search for the right solution is of importance becomes explicit in the fact that Fokker consciously avoided to come up with a fullblown plan for a new organizational structure, because it recognized that not all aspects of the organizational innovation could be planned. It therefore chose to let the system crystallize in practice. Unexpected consequences were for example, the inability of partners to cooperate, the too long production time of interiors, the painting of wings. This is in accordance with the main points in chapters 4 and 5 that characterized the process of innovation as "messy", with both internal and external factors impacting on it on different occasions. Path dependence is evident in the fact that AtO was not a completely new system, but clearly built on lead-time reduction. Hence, the process of innovation exhibited both continuity and discontinuity.
- on various points longevity of the relation had a negative effect on the speed and extent of implementation of AtO. Hence the benefits of the system have not been realized to the extent possible. The network has also influenced the form of the organizational innovation: the SSM is especially directed at translating the internal Fokker-planning to the external parties. Particularly externalities are a relevant attribute of long-term relations; they were found to limit organizational innovativeness on various points.
- both quantitative and qualitative demand changes have influenced the organizational form. The quantitative change embodied in the collapse of market demand pointed at the need to innovate. Furthermore, the form of the organizational innovation has been influenced by the cyclical nature of demand. The conjecture that qualitative changes may lead firms to replace organization-like linkages with market-like linkages has been illustrated by the AtO standard options list and the C&D case.

Figure 7.8 presents the analytical schema developed in the introduction, but now filled in with elements as they play a role in the AtO-system. In the inside-out box

these are capabilities (of lead time reduction and design capabilities for the interior) and the resource shortage of money. In the outside-in box demand (the demand shock, cyclical demand, the demand for shorter delivery times and fashion) exerts a positive pressure on organizational innovation. Long-term relationships with suppliers are on the negative side, as they work against the AtO-system. Competition was an important impetus to change as well (see figure 7.1).

The other boxes present the management of the Fokker 100 assembly line as the initiators of the system; the organizational innovation is the AtO-system (or rather the trajectory of AtO, including SSM etc.); lower cost and faster response to market changes (both quantitative and with regard to specification) are in general the competitive advantages that AtO contributes. As far as diffusion is concerned, some competitors have partly implemented similar AtO-systems, others lag considerably. Combined with the analysis on sustainability in table 7.9, diffusion seems to be relatively slow.

Figure 7.8 AtO in the analytical schema

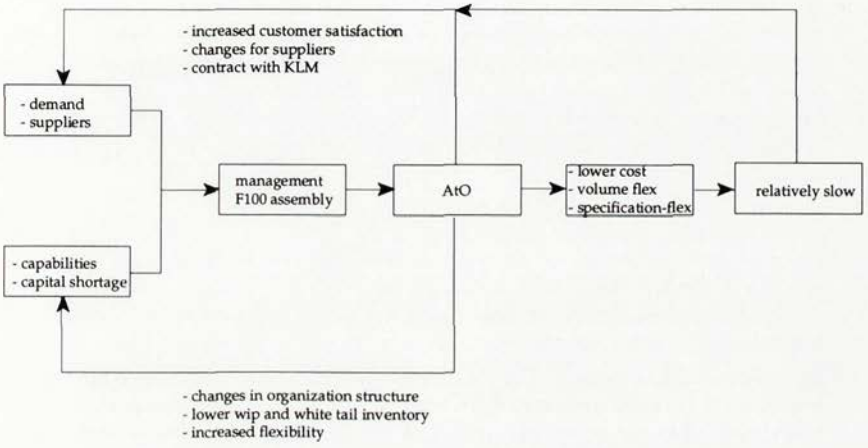


Exhibit I: List of persons interviewed

The interviews took place in the period October-December 1994. A report was presented at the company on 8 February 1995.

- A. Bolier, Manager Jetline Fokker 100/70
- G. Hamers, Plant Manager Final Assembly Plant
- A.C. Ledegang, Communication Partner Specification Changes
- S. Paauwe, Production Preparation Propjet
- R.J. Postma, Manager Interiors Procurement
- G. Pronk, Vice President Corporate Affairs
- C.A. Ruitenbeek, Manager Specification Changes
- L.M. Schot, Manager Logistics Procurement
- A. Schouten, Manager Final Assembly
- T. de Smit, Support Services Final Assembly
- J. Verbeek, Manager Support Services Final Assembly
- R.A. de Wit, Fokker 100 Program Manager
- J.W. Warners, Project Manager AtO

Exhibit II: List of consulted Fokker-documents

- Make or Buy-beleid en vertikale integratie, November 1991 (including appendices)
- Begrippenapparaat Projectbesturing, February 1992
- Project management binnen programma management FAC, April 1993
- Trapped between supplier and buyer, October 1993, (bundle overhead sheets)
- Doorlooptijdreductie eindlijn, December 1993
- Assembly-to-order binnen de Fokker Jetline, January 1994
- AtO SPECFLEX processchema, January 1994
- British Midland evaluatie, May 1994
- Het FEBS in een veranderende omgeving, June 1994
- AtO-beslisstructuren, June 1994
- Position Paper van het Fokker-bedrijf Schiphol, September 1994
- Annual reports 1985-1994

8

European distribution centres: a case in the port of Rotterdam[1]

8.1 *Introduction*

This chapter will describe a trajectory of organizational innovation in the distribution sector, namely the emergence of European Distribution Centres (EDCs), and analyse which factors have determined the course of development of this trajectory. It will also show the impact an organizational innovation can have on the competitiveness of firms (and regions).

EDCs are companies (or parts of companies) in which not only the distribution of products for a large geographical area is concentrated, but also secondary production activities (like assembly, quality control etc.) are performed and information processing takes place. The emergence of EDCs has led to remarkable shifts in activities along the entire value system of distribution. They will be analysed in this chapter.

From the inside-out perspective the development towards European distribution will be described in terms of routines. A trajectory of development can be found along which repeated changes in the value system eventually lead to full-blown European Distribution Centres. As to the influence of the business environment on the emergence of EDCs (the outside-in perspective), again Porter's diamond framework will be used. Specific attention will be directed at the role of quantitative and qualitative changes in demand, in order to research the proposition put forth in chapter 5. This proposition identified changing demand as an important impetus for organizational innovation. More specifically it stated

[1] This case is based on interviews with employees of the Rotterdam Port Authority, managers of the case company and designated literature. On request of the case company its name and the names of its clients have been disguised. Exhibit 1 at the end of the chapter gives an overview of the persons interviewed. The facts of the case were checked by the managers of the case company. The interpretation is the author's responsibility.

that increasing demand fluctuations would lead firms to replace organization-like linkages by market-like linkages.

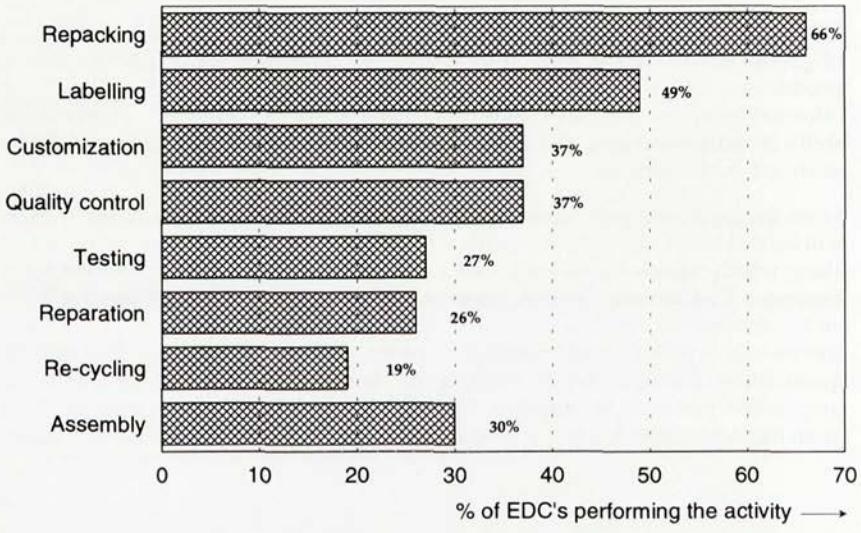
Section 8.2 will present the picture of EDCs which emerges from theory and several research reports. It paints a generic picture of changes in the distribution industry. Section 8.3 will look into detail at the implementation of an EDC in a specific firm, which specializes in organizing European distribution. The case of an innovative distribution company in the port of Rotterdam will serve as an example. Section 8.4 summarizes the main findings of this chapter.

8.2 *EDCs as organizational innovation: the general picture*

8.2.1 The function of EDCs

In European Distribution Centres stocks of products are centralized in few distribution centres, each having a large market to serve. This concentration of inventories is not the only characteristic of EDCs: they also perform various other tasks like secondary production activities and information processing. Regarding production activities, figure 8.1 shows which activities are performed in EDCs in the Netherlands. The value-added connected to these production activities is substantial, which is why both firms and governments are interested in the development towards European distribution.

Figure 8.1 Activities performed by EDC's in the Netherlands



A detailed analysis of the organizational innovation characteristics of EDCs will be given in section 8.2.4 and section 8.3.3. It will be shown that there are not only

intriguing organizational innovations inside EDCs, but that important innovations take place along the entire distribution chain.

8.2.2 Determinants of the development of EDCs

Several reasons are offered in the literature for the rise of European Distribution Centres. If these are related to the diamond framework, the most elaborately discussed determinant is demand. Next to that government, firm strategy and information technology (as part of the determinant factor conditions) are the most frequently cited determinants of European distribution.

Demand

Pertaining to demand the literature on EDC's has defined three relevant factors:

- increasing influence of fashions (Saitua et al., 1988) and shortening product life cycles (Van Schijndel, 1993), which stimulate firms to limit stocks of finished products (Saitua et al., 1988) and to increase the speed of delivery.
- individualization of demand (Saitua et al., 1988; Nederland Distributieland, 1991; Vermunt 1993; Saitua and Koet, 1987). This leads to market fragmentation: smaller amounts of goods have to be distributed. Similarly, Saitua and Koet (1987) conclude that EDCs are particularly useful in case of non-concentrated groups of clients.
- the shift from a supplier market to consumer markets (Van Schijndel, 1993; Vermunt, 1993), in which the reliability of deliveries is important (De Jong and Vethman, 1990).

These factors on the demand side have important implications for firms. First of all because of these developments, firms are inclined to reduce inventory in order to prevent being stuck with inventory that cannot be sold because it dropped out of fashion. Next, the increasing influence of consumers makes that organizations will be geared to satisfying their wants and needs. Swift and customized delivery becomes a necessity, while quality levels must be maintained. The requirement of customized delivery is especially interesting in Europe because of the cultural differences on the continent. Adapting products to different European markets is a complicated matter and a European distribution centre should have extensive knowledge about the product specifications for different national markets.

This fact, combined with the role of fashion, causes a reallocation of secondary production activities from producers to EDCs in order to facilitate customization. In this way products can be tailored to individual tastes and new fads in a rather late phase. Above that, products manufactured in Asia or America are transported to the European market before they are sold. By doing so, swift delivery is possible when an order materializes.

Government

The new requirements from the side of consumers direct the attention to changes in the distribution channels. The preferred centralization of distribution, leading to lower inventory, was less feasible in a Europe that was fragmented in different

national entities with their own rules and regulations. Bordercrossing procedures were so time-consuming, that speedy and reliable deliveries could not be guaranteed. The development of the common market stimulated the growth of EDCs as open borders and new ways of handling taxes on traded goods, eliminated barriers to European distribution. Developments at the supra-national level (EU and GATT/WTO) were therefore a powerful impetus for the concept of European Distribution (Cooke, 1992). Without them the speed of developments would have been inconceivable (Kuipers and Van Mourik (1993) state that the cashflows from American and Japanese EDCs established in the Netherlands to their home countries rose from 0.5 billion guilders in 1986 to 14 billion guilders in 1991).

Firm strategies

A third influential variable which is of interest for outsourcing distribution is the back-to-the-core-business strategy (Saitua et al., 1988, p. 10; Gemeentelijk Havenbedrijf Rotterdam, 1991, p. 4). Many firms have decided not to establish EDCs themselves, but to contract their European distribution out to specialized logistics providers. The popularity of the back-to-the-core idea has opened up a market for these specialized distribution firms. Of course this strategy cannot be seen in isolation from the demand side developments previously discussed. The focus on competences and capabilities is an inside-out factor that lies at the basis of this strategy: firms will focus on those aspects of their business where they can gain competitive advantage. In markets where short product life cycles and fashions are the rule, some firms direct their attention towards their manufacturing capabilities. Above that, there is a general tendency to eliminate inventories, caused by the rather strong organizational trajectory of JIT.

Information technology

Finally, information technology increases in importance as a linkage. It does not so much effect the form of the reconfiguration of activities in the value chain (as demand did in the direction of elimination of the inventory function and reallocation of secondary production activities, government in centralizing distribution and the back to the core strategy in contracting out), but was an enabling factor. Many of the changes in organizational structures would have been possible without information technology, but the accuracy of data interchange would have been much less without it. Information technology not necessarily refers to advanced on-line connections between firms as in the case of EDI. Some EDCs can be very successful with fax and telephone.

In section 8.3 the relation between these (and other) determinants and EDCs will be discussed more elaborately for the case of one firm.

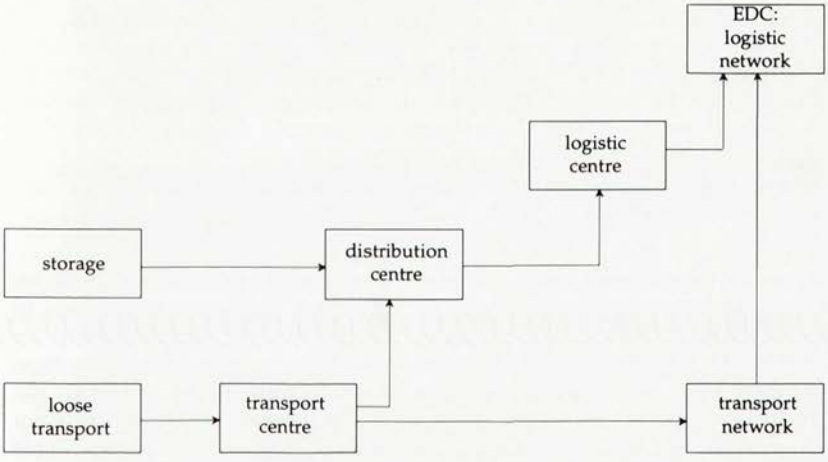
8.2.3 The trajectory of EDCs

EDCs can be of an intra- and interorganizational nature. Some large manufacturers or importers posses their own distribution network. Other firms contract their European distribution out to specialized distribution firms, thus establishing an interorganizational innovation.

The latter EDCs have developed out of other forms of distribution by a process of reallocation of activities from the principal to the EDC. Coopers and Lybrand and Nehem (1989, p. 12) have depicted this development and some intermittent stages as in figure 8.2. They distinguish the following stages:

- storage: space is rented to a tenant, who stores his goods and is responsible for them himself.
- loose transport: the firm puts a truck and driver at the disposal of its customer. Planning is done by the latter.
- transport centre: the customer offers products to be transported and the transport centre takes care of planning the transport.
- distribution centre: products are under the supervision of the distribution centre. The distribution centre is not only responsible for the transport of goods, but also for inventory control, inbound logistics, storage and picking orders.
- logistic centre: the customer transfers the complete information function to the centre. The logistic centre takes care of order-entry and billing. The centre's computer system provides information for the customer. Long-term contracts form the linkage between centre and customer. Often transport is contracted out by these firms to transport companies.
- transport network: a collection of transport centres at which different goods can be transferred and grouped. The hub and spoke system is a model that is often used in this form of organization.
- logistic network: a transport network, which at minimally one point executes several logistic functions, as collecting orders, making products clientspecific, organizing information flows. An EDC is such a logistic network (Nehem, 1993).

Figure 8.2 The trajectory of development towards EDC's



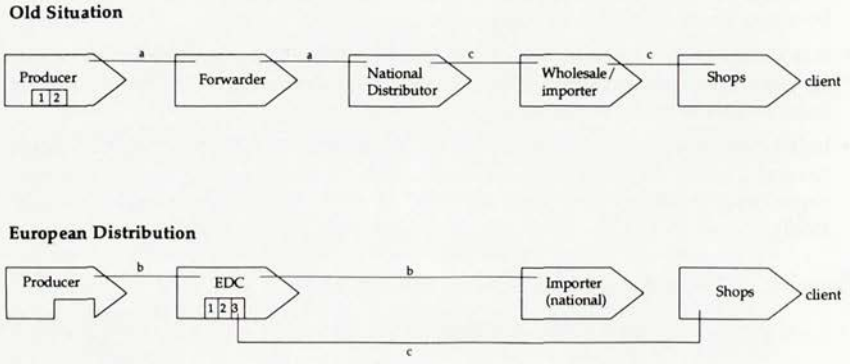
Source: Coopers and Lybrand and Nehem, 1989.

This description clearly shows the reallocation and creation of activities, which characterize the trajectory of development of EDCs. The focus is on activities here, although information technology and long-term contracts are mentioned as a linkage in the logistic centre. Again, the case described in section 8.3 will give a detailed application of this trajectory in a specific situation of an individual firm. The general description here does not provide enough detail to research the specific proposition on path dependence developed in chapter 4.

8.2.4 EDCs: the general picture of value chain reconfigurations

The trajectory of figure 8.2 shows the dynamics of the developments in distribution. Figure 8.3 shows the comparative statics: it gives a general overview of the value system at the beginning of the trajectory and at the phase of a complete EDC. This picture shows the major reconfigurations of activities and linkages in the value system.

Figure 8.3 The value system of distribution with and without European distribution



LEGEND FIGURE 8.3

Activities

1. Assembly
2. Warehousing
3. Distribution to shops

Linkages

a. Single order
b. Long term contract + i.t.
c. Delivery/order

In a typical way of working in the old situation a producer would have his products transported by a forwarder to a national distributor somewhere in Europe. From there the products would be transported to a wholesaler or importer, who would distribute them to the shops in order to be sold. In most cases, there were no long-term relations between firms. Often transport was arranged per order on an ad hoc basis. This is a general picture and it is not necessarily so that all function are performed by different companies. Some companies may for example be producer and importer at the same time.

Comparing this to the case of European distribution, the following organizational innovations can be found:

- First of all, an elimination of the function of national distributor and wholesaler can be observed. All products for the European market are concentrated in the EDC and often distributed to final outlets from that point. This makes national distribution and wholesale activities superfluous. Firms possessing a network of national distribution centres will not find it easy to switch to European distribution. In practice national sales organizations are not always willing to give up their logistic control (Nederland Distributieland, 1991).
- Next some activities are reallocated. The figure depicts assembly and warehousing (no stocks are kept by the producer: they are transported to the EDC), but these activities can include repacking, labelling, quality control etc. as well. In general all these secondary production activities can be performed by the EDC. Formerly these activities of preparing goods for the final market were the final part of the production process. In European Distribution Centres they have become part of the distribution process. Thus client specific activities take place closer to the consumer. The neologism of "industribution" (Saitua, 1995) has been created to denote this mingling of industrial activities and distribution. Another wellknown term for this is "value added logistics".

  For American and Asian producers operating their own EDCs, this reallocation of activities towards the EDC can end up in their establishing their European headquarters near the EDC (Nederland Distributieland, 1990). This is one of the reasons why EDCs have drawn the attention of national governments, as they see an opportunity for attracting high level employment.
- Of great importance is that information flows are coordinated by the EDC as well. Increasingly, EDCs take over activities like billing, inventory control, and providing information to governments (trade and tax figures etc.). This last tendency can be observed in the linkages. Not only are single orders replaced by long-term contracts, but often information technology is used as a linkage as well. Orders and inventory levels can be faxed or communicated by means of EDI (Electronic Data Interchange). It even occurs that orders are no longer communicated to the EDC through importers or producers, but go directly from shops to the EDC. The importer often maintains his risktaking role (he invests in buying the inventory of products) and generally is responsible for marketing as well. The shops however do no longer have to be in contact with the importer, as they can order the required goods directly at the EDC. This system is depicted in the figure: there is no direct linkage between shops and producers.

Like in the old situation, these functions are not by definition performed by different companies. In some instances a producer can have its own EDC and be the importer of its own product.

These are the main organizational innovations for the entire value system of distribution. This picture however obscures much of the change that takes place in the European Distribution Centre. Hence, section 8.3 will give a much more detailed analysis of a specific firm, which developed from a forwarding company to a complete EDC.

8.2.5 Competitive advantages connected to EDCs

National and regional competitive advantage

The tendency to switch to central European distribution for products has as a consequence that firms tend to concentrate their logistic activities in one place in Europe. For overseas products this place usually is a port. This concentration of logistic activities leads to what has become known as the "main port effect": firms will choose one main port in which all their logistic operations are managed. It goes without saying that European ports compete vigorously to attract European Distribution Centres. Especially among those ports that are located near each other in the Hamburg-Le Havre range the battle to attract this value-added is fierce.

In this competitive battle the port of Rotterdam discovered in the course of the 1980s that its position was not particularly strong. Even though the port had been the largest port in the world for quite some time, it had some disadvantages which made it less attractive as a site for European distribution. The port has traditionally concentrated on the transport of bulk goods: the transport and processing of large quantities of oil, iron ore and grain are at the core of the ports activities. There has always been less attention for the transport of smaller quantities of goods and general cargo. As a consequence the value added of the port is relatively low (Kuipers and Van Mourik, 1993, find this is typical for the Dutch distribution sector in general) and little attention was paid to the creation of an infrastructure for these higher value added activities. Even for container transport this holds: the focus is at the quantity of containers transported and not on the possibilities of doing something with the contents of containers. Other ports, specifically Rotterdam's biggest competitor the Belgian port of Antwerp, attempt to fill this niche by trying to attract higher value added transports and actively create possibilities for activities related to these transports to take place. For European Distribution Centres this is of special interest: they usually focus on general cargo container loads with which more has to be done than simply arrange further transport.

To remedy these drawbacks Rotterdam began to develop the idea of introducing "Distriparks": parks near to container terminals on which distribution companies are assembled. In 1990 the first of a total of three of those Distriparks was opened. Attracting EDCs was one of the main aims of these parks. The Distriparks are especially suited for sea-sea transports (goods which come in by sea, and which also will be transported further by sea), and goods which have to be transported to non-concentrated groups of clients (if clients are concentrated in a region it would be more convenient to arrange the distribution in that region; of course if clients are concentrated in the Rotterdam region distribution can take place at Distriparks as well) (Saitua and Koet, 1987; Saitua et al. 1988). Also firms which have to make use of long distance transport services and other parts of the transport cluster in Rotterdam will find Distriparks a good site (Saitua, 1995).

On a national scale the availability of companies that can offer European distribution to American and Japanese firms can create a competitive advantage. The Netherlands had a market share of 40% of EDCs of big Japanese and Ameri-

can companies in 1990 (Nederland Distributieland, 1990), a share which grew to 45% in 1993 (Nederland Distributieland, 1993). In the total number of EDCs (including the smaller ones) this figure was almost 25% of a total of 2400 EDCs in Europe. In the Netherlands a relatively high level of warehousing and distribution is contracted out: about 30% of the big companies make use of a distribution firm instead of performing these activities themselves. In neighboring countries this figure is 22% (Nederland Distributieland, 1993). Hence, the competitive position of the Netherlands in distribution is strong.

As far as regional competitiveness is concerned almost 50% of the EDCs in the Netherlands is located in one of the two mainports: Schiphol Airport and the Port of Rotterdam. These are mainly independent EDCs (not belonging to another company). The increasing use of EDCs may strengthen the already well-developed Dutch transport-cluster (Jacobs, Boekholt and Zegveld, 1990; Vermunt, 1993), which in turn attracts foreign direct investment (Jagersma, 1993). In 1993 employment was estimated at 20.000 people working in EDCs directly (Nederland Distributieland, 1993).

The contributions of an EDC to firm competitiveness

There is considerable agreement in the literature on the advantages connected to European distribution for firms which start to use an EDC (Van den Bossche, Van Oosterhout and Radstaak, 1991; Nederland Distributieland, 1990; Van Schijndel, 1993). Van den Bossche et al. (1991) give the following overview:

- lower cost: a.o. because of lower stocks as stocks are concentrated in one place; lower storage costs etc. Cost savings of 20 to 40% on total logistics costs can be reached (Kuipers and Van Mourik, (1993, p. 216) give an average of 29%). Unisys for instance claims to have saved $35 million dollar in centralizing its European Distribution and contracting out other logistics related operations (Cooke, 1992).
- quality improvement caused by increased control of the distribution process. This control of the distribution process results in a reduction of errors, which enhances the quality of deliveries.
- shorter communication lines and simpler communication. Connected to these points is that the speed of deliveries has substantially augmented, as stocks are shipped to Europe before they have been sold and as parts of the value system have been eliminated.

Disadvantages of European distribution are:

- transport costs in the last phase of delivering goods to the final consumers or shops are higher, as on average the distance from the EDC to these will be further than in the case of separate national distribution centres. The relatively expensive road transport will have to take place over longer distances.
- the value added of EDCs will only be clear in the long run. The gains cannot easily be translated into monetary terms, but are mainly to be found in an increased quality of the services rendered.
- it is more difficult to adapt products to local markets than in the case of national distribution. Different preferences and requirements regarding

products can naturally more easily be dealt with close to the market of destination than in more remote places. The information requirements for customizing and tailoring products to individual markets are quite high. Of course it must be noted that customization was even more difficult in the situation where secondary production activities were performed by the manufacturer.

- the demands on organization are rather high. The quality of coordination and planning are pivotal to the success of European distribution.

These advantages and disadvantages pertain to the overall distribution system. They accrue to individual firms working in that system and of course to the customers. The next section (8.3) will look at the competitive position of an independent EDC (a firm which offers European distribution services to other parties).

Sustainability

About 50% of big American and Japanese companies have centralized their European distribution (Nederland Distributieland, 1993), so there seems to have been a fast diffusion. This group of 50% is however not homogeneous. It includes quite some companies which have centralized their European distribution and warehousing in one or two centres, but which have not made the move to more advanced logistic concepts like value added logistics and information processing. Next, the group of big firms may include the innovators and early adopters, while the laggards may be found in the group of small firms. There are no detailed figures available as to the amount of firms that have really gone all the way with European distribution. The speed and extent of the diffusion of EDCs as organization form can thus not be ascertained. Hence, based on this figure it is difficult to conclude whether the form can lead to a sustainable competitive advantage.

Specific attention must be paid to the role of information technology in European distribution and the sustainability of the competitive advantage connected to it. More and more firms switch to electronic integration: "a specific form of vertical quasi-integration achieved through the deployment of dedicated information systems between relevant actors in adjacent stages of the value chain" (Zaheer and Venkatraman, 1994). The impact of information technology on the distribution sector cannot be denied, but the single fact that it has an impact does not mean that it leads to a competitive advantage. If every firm installs i.t.-systems, no competitive advantages can be obtained. In this case, i.t. becomes a necessity and a prerequisite for being able to compete at all, not an extra (Cooper, Browne and Peters, 1991). According to Zaheer and Venkatraman (1994) and Cooper, Browne and Peters (1991) i.t. will only lead to a competitive advantage if it is a unique or specific system and not a common one: when it is tailored to the specific organization(s) and makes use of information unavailable to others, it may lead to a competitive advantage.

8.2.6 Conclusion

On the basis of the literature reviewed, some conclusions can be drawn. First of all, there is agreement on the role of demand in the emergence of European Distribution Centres. Other determinants identified are the back to the core strategy of firms, information technology and the impact of government. Secondly, the historical development of EDC's suggests a path dependence process of transferring activities from producers to distributors may be present. Yet, the evidence was not sufficiently detailed to allow an indepth study of path dependence. The specific case studied in 8.3 will shed more light on this question. Finally, attention has been paid to the increasing organizational complexity of distribution: a number of changes in activities and linkages in the value chain takes place. A detailed analysis of how these changes and determinants work out on the level of individual distribution centres has however not been given. In order to get a more detailed picture, section 8.3 will study one innovative company that provides European distribution services.

8.3 *Case company: the development of an EDC in a specific firm*

8.3.1 Introduction

The case company is a distribution firm, established at one of the Distriparks in Rotterdam, offering European distribution services to companies. The company was founded in 1966 (see table 8.1 for some key facts). About 31 people work in the office-building and warehouses the company has established on the Distripark in 1989. A further 23 people are active in other parts of the company. It was one of the frontrunners in the distribution sector as far as European distribution is concerned: it implemented innovations earlier than others. This led to a considerable growth in warehouse space: from 500 m^2 in 1989 to 9.600 m^2 in 1995[2]. Its main activities, next to distribution of goods all over Europe are in the handling of customs and information flows surrounding the distribution process. Information handling has received increasing attention in the last few years.

Table 8.1 Some key facts about the case company

- year of foundation: 1966
- number employees: 56 in 1995
- growth warehouse space: 500 m^2 in 1989, 9,600 m^2 in 1995
- main activities: distribution, customs and information handling

Source: interviews and company brochure.

Section 8.3.2 will describe and than analyse the path dependence of the developments of the EDC in the case company. Hence the inside-out elements which play a role in the development of the company's EDC will be defined there. Section 8.3.3 will mainly be descriptive and show what reconfigurations of the value chain

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2 Company brochure.

the firm has gone through and how these have lead to a sustainable competitive advantage. Section 8.3.4 looks into some relationships with clients into more detail and it is this discussion that lies the foundation for the outside-in analysis in section 8.3.5.

8.3.2 Inside-out: the history of the case firm as a path dependent process; attribute-table

Table 8.2 briefly summarizes the history of the case company, looking specifically at the activities performed by it. This table illustrates the gradual development towards a European Distribution Centre.

Table 8.2 History of the case company

1966	• foundation: activities are clearing goods, storing them and arrange further transport (forwarding)
1973	• the company also becomes a ship broker
– 1980	• continued growth and expansion in the direction of forwarding towards total logistics (e.g. including airfreight)
1982	• start-up of software-department: Client 1 becomes a client
1985	• repacking becomes an activity
–	• in the years after 1985 distribution is added to the value chain and a start is made with the creation of a network of agents
1988	• around this year the company begins with final assembly activities (value added logistics)
1989	• the firm gets an entrepôt E license • Client 2 as a client, leading to a considerable expansion in the number of activities a.o. with quality control. Client 2 employees are located at the firm. Consolidation of freight takes place in the Far East. Information flows get more emphasis: on-line connections come into being and billing is done by the company as well. • next to production activities the firm increasingly becomes an advisor for its clients
1992	• Client 3 starts working through the entrepôt E. The case company limits its activities for Client 3 to information flows and custom-activities; software for this is developed jointly. • extension of the global network
1993	• Client 1 opens a factory inside the European Union. The case company increases its information processing for Client 1.
1995	• the company arranges the transfer to the new GATT rules for its clients and investigates the opportunities these rules offer: this kind of consultancy services has become normal. • introduction barcodes in relation with Client 3 • regarding production there are requests for quality management, installation and reparation of products

Source: based on interviews.

The firm's EDC originates from its activities as a forwarder. Until 1981 the company followed a path of growth, basically within these activities of forwarding and storing. Any extension of activities was closely related to the activities that were performed already. From 1982 till 1988, the number of activities in the firm's value chain grew also with activities outside the field of distribution, viz. with secondary production activities (assembly, repacking etc.). These activities pertained to the physical handling of products.

In the years from 1989 onwards the tendency of adding activities to the value chain continued, with the qualification that the focus shifted towards handling the information flows around the products. There were two reasons for this. First of all the company wanted to limit its production activities as it did not want to be responsible for product quality: product liability had to remain with the producer. Secondly, the firm found that it had a capability in information processing: it is better in dealing with logistic information than its principals and its competitors. The software in use is developed in-house and hence it is firm specific. No use is made of standard software packages. Accordingly, it extended its activities in information processing.

Two other points are to be mentioned. First of all, the table shows that the growth in number of activities is initiated by customers, whether the producer or the importer of the products. Secondly, the rapidity of the developments has clearly augmented since 1982; the steps towards European unity and the development of information technology have contributed to this.

Following Van den Bosch and Warmerdam's (1995) method of identifying strategic events in longitudinal studies as starting points of different periods in a firm's history, three events can be found in table 8.3, which relate to three strategic periods (see table 8.3). The first period was characterized by growth of the firm roughly within the same activities with which it started in 1966, viz. forwarding. The start-up of a software department in 1982 was the first of a series of extensions of the number of activities in the company's value chain, also stimulated by a new client, Client 1. The focus remained however on the tangible side of distribution: production activities were added to the value chain. An important third event in the firm's history is that it was granted the entrepôt E license in 1989, which allowed it to perform various activities previously done by customs. This license is an important competitive advantage as the case company can offer clients faster and cheaper services by making use of this license. This, together with a new client which stimulated changes in the case firm, was the beginning of the third period, in which the EDC came into being. This period is characterised by the shift towards information processing.

In each of the strategic periods activities were added to the value chain which were a prerequisite for competing in the subsequent stage of development. This development of the firm towards an EDC, building on previous experiences may point to the existence of path dependence: for example the resource of the software department begun in the second period proved to be of great value in the EDC period because it facilitated the shift towards information processing. In the next paragraphs the possibility of path dependence in the development of the case company will be analysed further.

Table 8.3 Events and strategic periods in the history of the case company

Event	Period
1966 Foundation	*1966-1981* Forwarding period: growth in existing activities, mainly in forwarding
1982 Software-department and Client 1 as a client	*1982-1988* Value added logistics period: growth in the number of activities a.o. with secondary production activities
1989 Entrepôt E license and Client 2 as a client	*1989-present* EDC-period: increasing focus on information processing

Source: see text.

Static and dynamic routines

Table 8.2 provides an illustration of the path dependence in the trajectory of development of the case company's EDC (see chapter 4). Different dynamic and static routines in this process can be found in table 8.4. The table describes four dynamic routines which in combination led to the emergence of the EDC in the case firm. For each dynamic routine, the old static routine is given as well as the new static routine which replaced it. Some practical examples taken from table 8.2 are provided as well. The upper part of table 8.4 describes routines which deal with the physical handling of products, whereas the lower part deals with routines aimed at processing the information flow around these products.

The first dynamic routine is the reallocation of activities from producer and importers to EDCs. The static routine of performing these activities (e.g. assembly, repacking) at the producer's plant is replaced by the routine of having these activities executed at the EDC. A second dynamic routine is taken from the JIT-trajectory, viz. the elimination of inventory. Instead of having inventories at different places, in EDC's inventories are concentrated at one single place. The inventory function is eliminated from the producer's value chain, as well as from the national distributors' and wholesalers' value chains.

The third routine is partly induced by the first one: transfer of activities between firms requires enhanced communication between the companies involved. A considerable number of these new linkages has the form of an information technology relationship. Much of the communication that previously took place inside individual organizations in the distribution system, now is of an interorganizational nature. The fourth and final routine refers to the extension of the number of support activities aimed at supporting the capability of the firm to process the information flow for clients. Here creation of activities takes place: the activities mentioned were not performed before (or only on a very limited scale) by producers and importers.

Table 8.4 Dynamic and static routines in the emergence of the EDC in the case company

PHYSICAL	Dynamic routine:	Reallocate activities from producer or importer to EDC
	Static routine:	Perform activity at producer/importer (old) Perform activity in EDC (new)
	Examples:	Assembly, repacking, distribution
	Dynamic routine:	Eliminate inventory
	Static routine:	Stock products in different places (old) Stock products centrally (new)
	Examples:	No inventory at producers, no national distributors, no wholesale
INFORMATION	Dynamic routine:	Implement (i.t.-)linkages for interorganizational coordination
	Static routine:	Communicate internally (old) Communicate with other organizations (new)
	Examples:	– i.t.: inventory control, declare goods, receive orders, bar codes – personal linkages – long term contracts
	Dynamic routine:	Create support activities aimed at information processing
	Static routine:	Perform support activity (new)
	Examples:	Tracking & tracing, maintain knowledge on trade and tax regulations, software development

Source: see text.

In general, the static routines are changed which entails an organizational innovation as shifts in activities and linkages take place. The direction in which these activities and linkages are reconfigured is determined by dynamic routines. These new dynamic routines shape the organizational trajectory of EDCs (see section 4.3.1 for the theoretical discussion of routines).

The proposition on path dependence

The analysis of routines supports the view of organizational innovation presented in chapter 4 as a process of search based on routines. In table 8.5 the attribute table on path dependence for the case presented is given. The following entries have been made:

- table 8.4 showed that dynamic routines influenced the form of the organizational innovation: they directed the search towards certain solutions. Above that, speed was influenced in that, as table 8.2 showed, similar organizational innovations followed each other very fast. Finally, the repeated application of similar routines completely changed the organization of distribution. One look at figure 8.3, which largely is consistent with developments in the case firm,

shows that the innovation is considerable. Hence, the extent of the innovation is influenced by dynamic routines as well;

- information processing is a capability that influenced the form of the organizational innovation. This is a capability because the software used is firm specific and the firm performs the activity more effectively than its competitors (see section 4.5). The case company deliberately specialized in adding information based activities to its value chain. Its lead in information technology enabled it to implement farreaching innovations, by using information technology as a linkage and facilitating the implementation of diverse information related activities. Hence this capability positively influenced the extent of the innovation;
- the presence of the software department as a resource, influenced form (especially the use of information technology as a linkage) and speed of the development of the EDC. It made it possible for the firm to increase its information processing activities rapidly. For example, the entrepôt E license would not yet have been obtained if there had not been a software department.

Table 8.5 Attribute-table on path dependence

	Dynamic Routines	Capabilities	Resources
Form	Y	Y	Y
Speed	+		+
Extent	+	+	

Y = Yes, the independent variable influences the dependent variable
\+ = The independent variable influences the dependent variable positively

Source: see text.

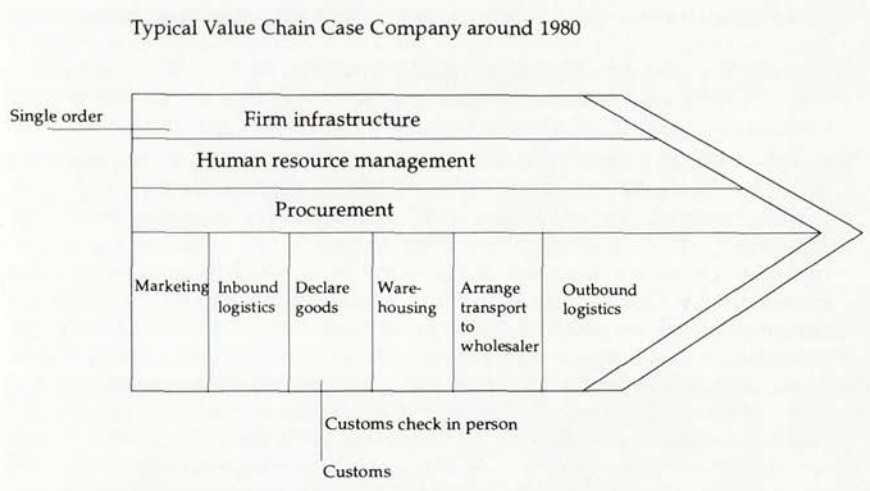
8.3.3 Organizational innovations in the case company

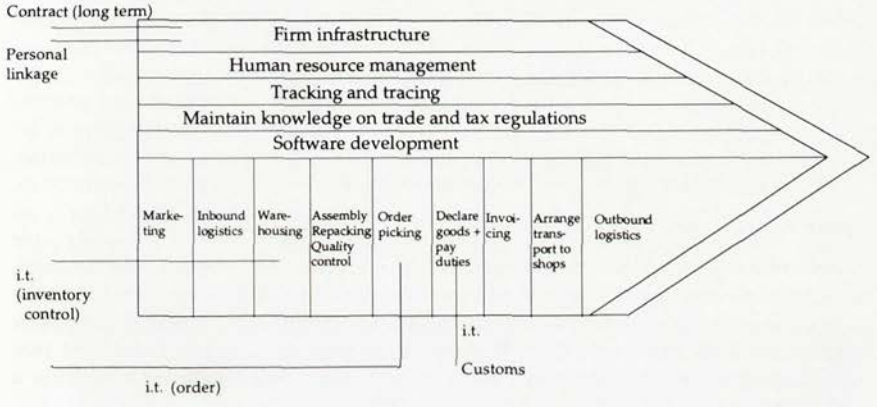
Main reconfigurations of the value chain

To show the extent of the changes in the firm's value chain, figure 8.4 depicts two value chains: the upper one shows the firm around 1980, the lower one shows the complete EDC package it can offer in 1995. The services it can deliver with these value chains are not used by all its clients. Most of them make use of only some of the options the company can offer. The depicted value chains are nonetheless representative of the firm's possibilities in the mentioned years.

The first value chain shows the emphasis on forwarding which characterized the company in the beginning of its existence. Whenever after the required marketing, a new customer was attracted and goods had been received and declared, further transport was arranged, for instance to a wholesaler. The supporting activities (procurement, human resource management) were not of great importance compared to the primary process. Noteworthy in relation to the linkages is that orders more often than not were one time events. Long-term relationships were few in number. Physical control ensured the coordination with customs: a customs officer had to be present when foreign cargo was opened.

Figure 8.4 Value chains of the case company in 1980 and 1995





The 1995 value chain is considerably more complex. The most important changes are:

- the firm's activities are extended: not only warehousing is part of the value chain, but goods can be processed as well (assembly, repacking, and quality control). This can be done even before the goods are declared: the company brochure states that the firm is able "to sort, to pick and to pack, to clean, to repack, to test and to label your cargo in the warehouse". Billing and transport to the retailer can be arranged as well. The company does not run any financial risk on the inventory of goods in its warehouses. This risk is borne by the

importer. The firm is responsible, however, for the payment of import duties and taxes to customs.

There is of course some logic in which activities are added to the value chain. When warehousing is offered, order picking logically follows and the step towards invoicing is not so big, as these activities inevitably follow each other. It is relatively easy to coordinate these activities as a group, so that placing them in one company is efficient.

- Support activities have increased in significance. Software-development for example enables the company to develop specific applications for every client; tracking and tracing makes it possible to tell every customer where his transport is at any moment. Maintaining knowledge on trade and tax regulations is an important specialisation of the company, which has developed in the course of time. This activity allows it to advise clients as to the way they can benefit from new treaties (as for example the new GATT (WTO)) and how they should deliver their products to minimize the amount of import duties payable. These activities have a high information content and do not pertain to the physical handling of goods. In this regard, the company brochure states that the computer systems can provide the customer instantly with input for: "e.g. reviewing your (the customer's, APdM) stock, reviewing your sales, reviewing your duties payable, making statistics, debtors records control, invoicing, preparing forecasts, etc.". Finally, human resource management has increased in importance. In order to satisfy the wishes of clients, personnel sometimes has to be educated and trained e.g. in quality control.
- As to the linkages, the first thing to be noticed is the use of information technology. This is specifically interesting in relation to customs, as no physical control by customs officers has to take place. The entrepôt E license allows the firm to clear goods itself and inform customs through the information system. An important cost advantage can be obtained: import duties do not have to be paid until the month after goods have been taken out of the warehouse, whereas formerly duties were due as soon as goods entered the warehouse. Moreover, because goods can be assembled etc. before they are declared, an important gain in time can be obtained as well. Other interesting linkages are the long-term contracts which replace single orders and the personal linkage, which refers to the possibility of locating the principal's personnel at the case company in their own office. This co-located personnel can review processes or perform additional activities (like checking returned goods). These last two linkages show that the reallocation of activities towards the EDC entails a further intertwining of the organizations involved.

The case company is able to perform any activity for an importer which lies between procurement and sales but there is no standard way of operating. Every client has its wishes and picks those activities from the firm's value chain which it wants. Hence, the case company can make customized value chains for each of its customers (three examples will be given in section 8.3.4). In the majority of cases transport is arranged for customers, but not done by the case company. The availability of all kinds of transport in the Rotterdam port guarantees that the case company will always be able to find a transporter, whether a haulier, shipowner or other transporter.

Table 8.6 summarizes these changes, distinguishing between inter- and intra-organizational innovations.

Table 8.6 Organizational innovations at the case company

Interorganizational Activities: • reallocation of secondary production activities to the case firm • integration of inventory in the case firm Linkages: • long-term contracts • information technology • personal linkage • entrepôt E license (i.t.)
Intra-organizational Activities: • reallocation: goods can be processed before customs clearance • creation of support activities: extension of information related activities

Source: see text.

Competitive advantages of the EDC in the case company

The company has witnessed a considerable growth in the last years. This can best be seen in the growth of the size of warehouse space. The area augmented from 500 m^2 1989 to 9.600 m^2 in 1995. The main competitive advantages of the EDC system are connected to (1) lower cost, (2) speed and (3) flexibility.

1. *Lower cost.* The elimination of links as distributors and wholesalers can lower the cost of distribution considerably as the margins calculated by them do no longer add to the costs. In the case of the firm studied, to this cost saving is added the postponement of payment and lowering of import duties made possible by the entrepôt E system. As the cost connected to maintaining the entrepôt E system and the knowledge on trade and tax regulations can be spread out over the various clients, the case company can offer its clients lower costs compared to the situation in which clients would try to perform these activities themselves. On the other hand transport from the EDC to the final destination is more expensive, as the relatively expensive fine-grained distribution has to take place over longer distances. The company's location at the Distripark is also relatively expensive, certainly compared to competitors outside the port of Rotterdam. In short, the cost position of the firm vis-à-vis its competitors is not that distinctive. Above lower costs, the next two elements of speed and flexibility are also important in attracting and keeping customers.
2. *Speed.* Because of the fact that the entrepôt E license allows the firm to process and transport goods before they are declared, an important gain of time can be obtained. Moreover, the abolishment of links in the distribution chain

speeds up the process as well. Especially in those market segments where fashion plays a role, the reduction of delivery times that can be obtained contributes substantially to the company's competitive advantage. It has a number of clients in this fashion segment, two of which (dealing in sports equipment) will be discussed in the next section. The company can deliver products within a day in the Benelux-countries, within two days in the European Union and Scandinavia, and within three days in Eastern Europe.

3. *Flexibility*. Finally, the capability to customize its activities for specific clients is an important competitive advantage. This capability is rooted a.o. in the knowledge of software development and of trade and tax regulations. The repertoire of secondary production activities also simplifies this customization. In the demanding and changeable market of distribution, this is an essential advantage.

The advantages of an EDC are evident. It can however be doubted whether these advantages are sustainable. The cases in the next section will show that the case company has lost one big client (Client 2) and performs a smaller amount of activities than before for another client (Client 3). Even more important is the fact that the developments in the distribution sector have an unprecedented pace. The rapidity by which innovations which first distinguished firms from one another, become generally accepted and even a prerequisite for survival, is astounding. One of the company people said with regard to value added logistics (adding secondary production activities to the value chain): "Value added logistics has become a precondition to be able to compete at all. Above that you have to take care of information flows as well in order to differentiate from your competitors, and even that is getting normal". The sustainability of competitive advantages seems therefore to be limited. Whereas the requirements for EDCs are getting higher and hence the threat of new entrants diminishes, the rivalry among incumbents is still fierce. Subject to these qualifications table 8.7 relates the characteristics of sustainability defined in chapter 1 to the current case.

The imitability of the case company's way of working is relatively low for the sector. First of all because the benefits (lower cost, higher speed) of the entrepôt E license cannot be reaped by other firms. The unique historical condition is in this case the law, which forbids companies not having such a license to implement the organizational innovation of transporting and processing goods before they are cleared by customs. Less than ten of the firm's competitors in The Netherlands possess such a license. As Dutch customs is advanced in implementing the possibility of awarding the entrepôt E, the case firm also has an advantage over foreign competitors. The low number of licensees is caused by the fact that the organizational and financial requirements for the license are high, because the organization receiving it is responsible for the payment of taxes and duties. Above that the information management of the firm must meet strict standards. The license is a barrier to competition especially vis-à-vis incumbent competitors.

Table 8.7 The sustainability of the case company's EDC

Characteristics of sustainability	Application to the case
Imitability	
• unique historical conditions • causal ambiguity • social complexity	• entrepôt E license • learning • many shifts in linkages and activities
Substitutability	• lowered by license
Tradeability	
• geographical immobility • systemic interdependencies	• high, for firms outside big ports • high, important implications for producer/importer; port cluster
Lock-in of imitators	
• set up cost and organizational disruption • feasibility of piecemeal change	• high: a.o. close national distributors/wholesalers • limited, high demands

Source: the attributes of sustainability can be found in table 1.4.

Another historical condition lies in the software department built up in the course of the years. Many competitors offer standard software packages to clients, which are not so flexible. The case company on the other hand is able to deliver custom made packages, because of the choice it made in 1982 to take care of software itself. As described in section 8.2.5 this is a more sustainable strategy, as unique systems are harder to imitate than non-specific systems.

Causal ambiguity is hard to identify. The flexibility of the case firm and the accumulated knowledge on how to deal with changes in regulations, seem to be grounded in know how that will not be easy to copy. Clearer is the issue of social complexity: the number of shifts of activities and linkages is considerable and the ways of cooperating between organizations have become more complicated. Various coordination mechanisms are required to ensure the smooth performance of activities. The organizations involved have become increasingly intertwined. This complexity is a barrier to imitation, especially for possible new entrants.

Because of the entrepôt E license part of the organizational innovation cannot be substituted, as will be clear from the discussion above. Other ways of organizing the distribution process more efficiently have not yet come up.

The geographical immobility of the EDC system is high insofar that the EDC system as it has materialized in the current case is dependent on the presence of a large flow of containers and a variety of transport companies in its vicinity. This condition is satisfied in the Rotterdam Port. Any firm not located in the presence of such a main port where different distribution activities are concentrated, will be at a disadvantage when trying to start up an EDC. The presence of the port

cluster is of course also a systemic interdependency[3]. Another systemic interdependency lies in the fact that for the real benefits of European distribution to arise, it is necessary to involve the entire distribution chain.

Pertaining to lock-in the disruption EDCs cause can be considerable, certainly along the distribution chain, as wholesalers and national distributors have to be closed. For individual companies similar to the one studied here, it will not be easy to start operating as an EDC overnight, especially because they will lack the necessary capabilities.

If a competitor would like to start an EDC it cannot do so by means of a process of incremental change. In order to compete in European distribution it will have to offer the complete package of activities as depicted in figure 8.4. The discussion of the speed of diffusion of novelties already showed that such a package has become a precondition to compete in the European distribution sector. The gradual trajectory the case firm followed, may therefore perhaps not be repeated by its followers as the demands on firms offering European distribution have become very high. The investments made by the company in warehouses and knowledge act as a barrier to entry for new competitors, but do not limit the competition among incumbents.

Concluding the discussion on sustainability, the threat of new entrants has decreased with the evolution of European distribution towards more complicated forms. Next, for firms removed from major transport clusters implementation of European distribution will be a more difficult task. Regarding the current competition, the company's entrepôt E license distinguishes it from competitors in a rather durable way. However, the high speed of diffusion of innovations makes that the sustainability of any competitive advantage will be limited. The case company clearly finds itself in a hypercompetitive environment that is characterized by fleeting competitive advantages (Volberda, 1996). Managers of the firm recognize this volatile characteristic: one of them stated: "At this moment it cannot be predicted what the market needs will be". The sustainability of competitive advantages in this sector is always limited. Having a competitive advantage for a year is already a long time.

8.3.4 The relation with three important clients

Below three cases will be described to show how out of the general menu of EDC-options offered by the case company, different firms pick what they need in order to ensure a European distribution tailored to their specific desires. The first case concerns the distribution of a chemical used in the food industry; the two other cases are on sports equipment, a sector in which The Netherlands is well represented as far as European distribution is concerned (Nederland Distributieland, 1993).

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[3] The next section will show that one of the case company's clients (Client 1) continues to make use of the company's EDC, despite the fact that it is now situated in the European market itself. The reason for this is exactly that at its current site there is no well-developed transport cluster.

Client 1

In 1982 Client 1, a producer of a chemical used in the food industry, was the first client interested in the possibilities the case firm's information system offered. This interest triggered the case company to continue down the path of information processing for clients.

The main activity Client 1 contracted out to the case company is distribution. As of 1982 Client 1 transported containers with its product from the United States and Japan. The case company unloaded these, cleared them with customs and distributed them. Some years ago a European company started producing the same product at a higher cost than Client 1. An anti-dumping measure was enforced against Client 1 with which a levy was imposed of 52 dollar per kilo of the product. As a consequence Client 1's sales dropped substantially. In a reaction to this situation, Client 1 opened a plant inside the European Union, but outside The Netherlands, in 1993.

Since Client 1 established itself in the European Union, the case company has considerably extended the activities it performs for it. Next to its function as a distribution centre, the case company is now the fiscal representative of Client 1 for the entire European Union. Declaring goods is no longer necessary, because in the EU goods can move freely to Holland from any country. But the value added taxes (VAT) owed by Client 1 on the deliveries inside the Union are handled by the case firm, as are some other administrative tasks. It also registers the stock and mutations in it; it receives orders from Client 1 by fax and arranges the deliveries.

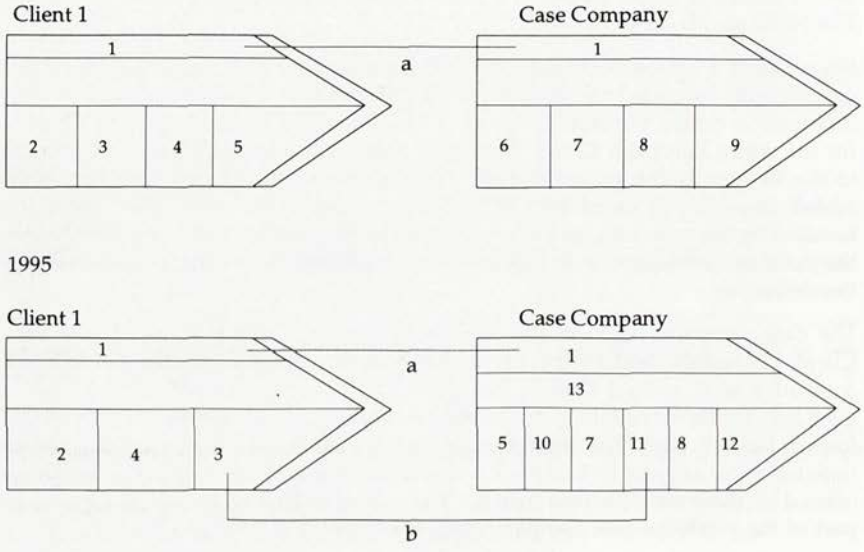
The case company registers the exports to Eastern Europe as well. Now that Client 1 is established in the EU it can benefit from the treaties the EU has concluded with several Eastern European countries. Lower and in some cases even zero tariffs for certain goods have been agreed upon between the EU and the former Eastern bloc. The interesting point is that it was the case firm which initiated these exports to Eastern Europe by pointing Client 1 at the possibilities offered by these new customs treaties. The export to Eastern Europe is a growing part of the work the case company does for Client 1.

Finally, some small productive activities as wrapping boxes in plastic and covering them are also performed by the case company. Occasionally, it weighs the boxes to check whether Client 1's filling machines are well tuned.

The product is a highly concentrated chemical. Because of this characteristic, only small amounts of it are ordered. This poses a problem for distribution: small boxes have to be delivered at different places all over Europe. Moreover, Client 1 is actively searching for possibilities to differentiate the product. Next to a pure form of it, it is developing different products using this pure form as an ingredient. The case firm distributes these as well. The fragmentation of the market and the increased differentiation of the product, put high demands on the distributor's capabilities. Client 1 has contracted out it's distribution for this reason; it was unable to meet these demands itself. Similarly, the fiscal representation has been brought to the case company, as Client 1 was not able to keep up with the speed and complexity of developments in the fiscal field.

Figure 8.5 depicts the value chains of the case company and Client 1 before and after the production in the European Union was started. The most important changes are in the primary activities: despite the fact that declaring goods is no longer necessary, the number of activities in the value chain has been extended, by adding control activities and fiscal representation. The advices the case company gives Client 1 are grounded in the knowledge of trade and tax regulations. Changes in linkages are absent; coordination takes place by phone and fax as Client 1 is not so advanced in the field of information technology.

Figure 8.5 The relation with client 1 in 1982 and 1995 depicted in the value system



LEGEND FIGURE 8.5

Activities

1. firm infrastructure
2. production
3. inventory
4. marketing and sales
5. outbound logistics
6. inbound logistics
7. declaring goods
8. warehousing/inventory control
9. arranging further transport
10. repacking, weighing etc.
11. order picking
12. fiscal representation
13. maintain knowledge on trade and tax regulations

Linkages

a. contract
b. fax orders

Client 2

Client 2 became a client in 1989 and the relationship the companies entered into would become the most farreaching the case company encountered. In the beginning, Client 2 was mainly interested in the possibilities offered for consolidating freight and the advantages of the entrepôt E license. The former could lead to substantial cost savings. Client 2 used to send small shipments of sports goods to Europe from a number of factories in Taiwan. The case company on the other hand was able to collect these small shipments of the various Taiwanese producers and group them into one big shipment, which was cheaper to send to Europe. This system worked so well because the case firm had another customer (Client 3) who also ordered products from Taiwan, which could be transported in the same container as Client 2's. Next to lowering the costs of transport, consolidated freight is easier to track than piece-goods and it has a lower risk of theft, because containers are transported from door-to-door (Van Horssen, 1989).

In the course of the negotiations with the case company, Client 2 appeared to be interested in a better inventory control. In order to meet this wish, the two parties jointly developed a purchasing and forecasting programme, which linked Client 2 with the EDC on-line and enabled it to look into the inventory stored in it. From this point other activities were started, like collecting orders, billing (in different currencies) etc. Client 2 basically used the complete EDC system as depicted in figure 5, with the exception of assembly.

Another request made by Client 2, was whether it was possible for two of its employees to be located at the EDC, whose duty it would be to check returned goods. The case company met this wish. In practice this worked out very well, as the presence of the employees simplified communication with Client 2. As a result the coordination between the firms improved.

Client 2 clearly was a demanding client, but this has helped the case company to create a broader package of services, thereby leading it to become a complete European Distribution Centre. "Client 2 states its wishes and you see what you can do", one of the managers stated. The fierce competition in the market more or less forced the case firm to comply with Client 2's demands. "When you say no against such a wish, the competitor will do it", says one of the case company's employees.

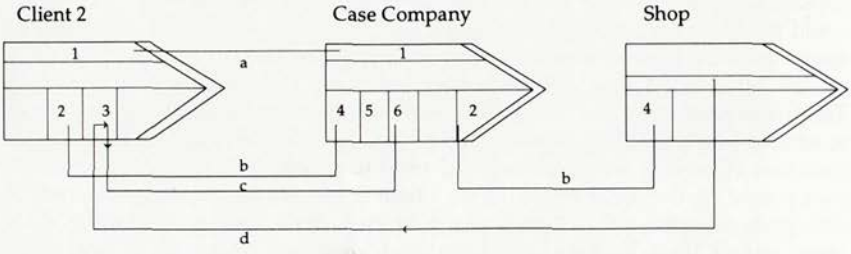
As depicted in figure 8.6, Client 2 delivers goods at the EDC before they are sold. Client 2 receives the orders and communicates these through the on-line connection to the EDC, which takes care of fulfilling the remaining activities.

One of the reasons for this client to contract out activities to this extent, is that a considerable part of its product offering is sensitive to fashion. Speedy delivery of fashionable items is a prerequisite to stay ahead of competition and the case company can realize this.

After Client 2 was taken over by an Italian firm, the case firm lost it as a client in 1995. The break up of the relationship was rather complex, because the firms were so much intertwined. Despite this less fortunate ending, Client 2 has played an

important part in the case firm's development because it pointed the way to a more advanced concept of European distribution.

Figure 8.6 The relation with Client 2 depicted in the value system



LEGEND FIGURE 8.6

Activities

1. firm infrastructure
2. outbound logistics
3. sales
4. inbound logistics
5. repacking etc.
6. order picking

Linkages

a. long-term contracts and personal linkage
b. delivery
c. information technology
d. order

Client 3

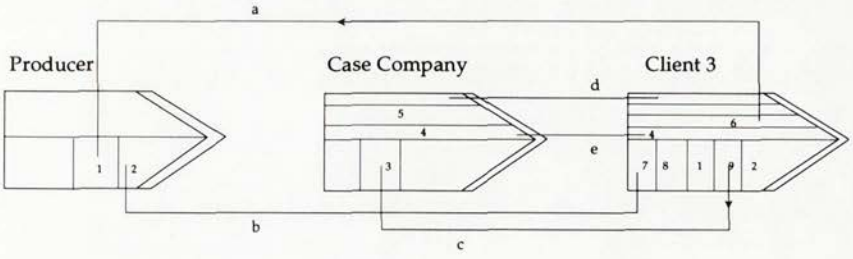
Next to the growth in number of activities realized in the case of Client 2 and Client 1, there are also companies for which the case firm's value chain is practically hollow. Client 3, just like Client 2 specialized in sports equipment, is such a company. Client 3 only uses the case company's entrepôt E license; the products do not even pass the EDC. Figure 8.7 shows the way the system works since 1991.

Client 3 orders goods from a producer. These are sent to Client 3. There they are stored in a separate warehouse for non-declared goods. As soon as goods are shipped from this warehouse, this is communicated electronically to the EDC, which clears the goods through customs. Since 1995 barcodes are used to distinguish between the different products. Software for this system has been developed jointly by the parties.

In this system the flow of goods has been completely separated from the information flows. The activities performed by the case company's EDC are minimal and mainly done by making use of information technology. Except the declaration of goods, the supporting activities of software development and knowledge of tax and trade regulations play a role.

The advantage for Client 3 of this way of working is that import duties are not to be paid until goods are sent from the warehouse, while no delays in the distribution process occur. Without the entrepôt E license duties would have been owed as soon as the goods had arrived.

Figure 8.7 The relation with client 3 depicted in the value system



LEGEND FIGURE 8.7

Activities

1. sales
2. outbound logistics
3. declaring goods
4. software development
5. maintain knowledge on trade and tax regulations
6. procurement
7. inbound logistics
8. warehousing
9. order picking

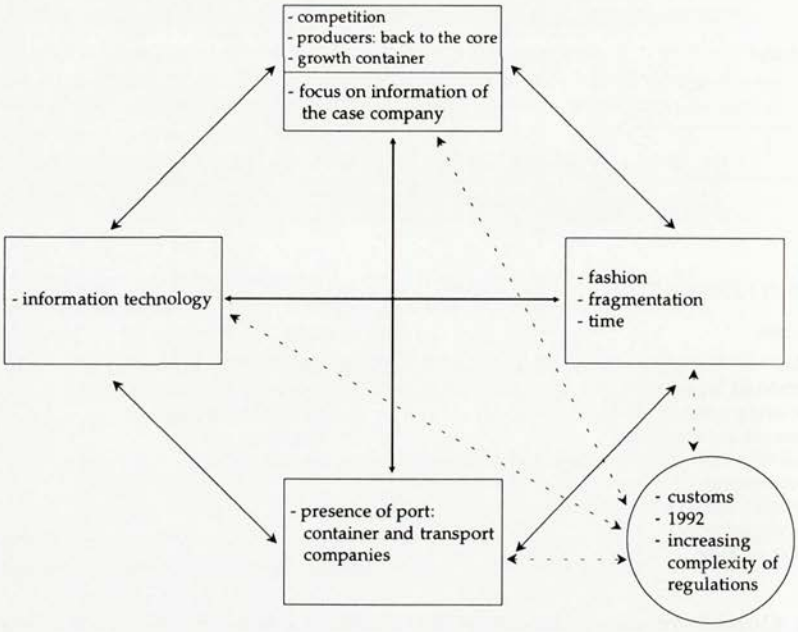
Linkages

a. order
b. delivery
c. information technology
d. long-term contract
e. cooperation

8.3.5 Outside-in: determinants of the development of the EDC in the case company; attribute-table on demand

Where the Fokker case was mainly picked in order to analyse the role of networks in organizational innovation, the current case is mainly directed at analysing the role of qualitative changes in demand. The inside-out analysis was given in section 8.3.2, the outside-in analysis is given in this section. In chapter 5 it was shown that not only demand plays a role, but that many environmental factors interfere in the process of organizational innovation as well. The diamond framework (Porter, 1990) was suggested as a framework which can be helpful in analysing these outside-in determinants. In figure 8.8 the diamond framework contains entries for the specific situation presented here. The different determinants will now be discussed, with the emphasis on demand. It will be shown that demand conditions are the major driving force behind the development of the EDC in the case company.

Figure 8.8 Determinants of Porter's diamond influencing the development of EDC's



Firm strategy, structure and rivalry

Treating these three elements individually the following picture emerges:

- *Rivalry.* Rivalry between firms offering European distribution is fierce. Entry barriers are rather high (see the discussion on sustainability in section 8.3.3), because the capabilities needed for European distribution are considerable. Yet, competition among incumbents is strong. This competition makes companies more amenable to accept changes in their value chain, as became clear in the Client 2 case where a manager of the case company stated that saying no to a client was as good as impossible, as there would always be a competitor ready to oblige the client.
- *Strategies.* Firm strategy should be looked at from two sides in this case. First of all there are the strategies of the case company's clients, secondly there is the strategy of the company itself (an inside-out aspect in the diamond model; see Van den Bosch and Warmerdam, 1995). In the strategies of clients (and certainly the producers among them) the element of back-to-the-core business is relevant. Some firms tend to concentrate on their core activities. The augmenting complexity of distribution causes them to contract this out, in order to be able to pay full attention to their core. This means a growth of demand for distribution services.

  The second aspect is the case company's strategy to focus on information flows, which has led to the creation of predominantly support activities

(maintain knowledge on trade and tax regulations, software development, tracking and tracing) in the value chain. The firm studied was an early innovator in seeing the possibilities of information technology: already in 1982 the software department was set up (see table 8.2). By means of this strategy the firm attempts to escape rivalry. Other companies at the three Distriparks, which are developed in Rotterdam, have tried to attain the same goal by implementing niche-strategies for example by stressing production activities, or specializing in certain goods as chemicals, glass or frozen products. The strategy of the case firm is depicted in the lower part of the determinant of firm strategy, structure and rivalry to show that this is an inside-out factor (Van den Bosch and Warmerdam, 1995).

- *Structure.* The role of structure has been discussed in section 8.3.2: the way the EDC emerged as a structure by application of a number of dynamic routines was described there. Another important organizational innovation was the container (Van Someren, 1991). The standardization of the transport unit makes it possible to transport a small amount of cargo as if it were bulk, by combining several small loads into one big container. The continued growth of container transport created a demand for several new activities, as stuffing, stripping and cleaning containers.

Demand

The quantitative development of demand has been mentioned above when the strategy of producers was discussed. The growth and expected further growth of container transport is an impetus for the case firm to implement organizational innovations. Table 8.2 showed that it was the client's demand which formed the basis for the extension of activities in the case company's value chain. The reason for this demand lies in qualitative market developments. Based on the discussion so far these can be summarized as fashion, speed and fragmentation.

- Fashion. It is attractive to customize fashionable products as close to the final consumer as possible, in order to be able to adapt to the client's wishes in the latest possible phase. The reallocation of secondary production activities aims exactly at doing this. Placing activities closer to the market allows the market to steer the process of customization. As the clients of the case firm contract out these production activities, this reallocation illustrates the proposition on demand: a market-like linkage replaces an organization-like linkage.
- Speed. As fashion becomes more important, the pressure on firms to deliver their products fast increases as well. The products of Client 2 and Client 3 undergo this pressure: many sportswear items are fashionable. Speedy delivery is ensured by the case company by means of a number of organizational innovations:
  - First transport than sales. Goods are transported to Europe first and sold next instead of the other way around (see figure 8.3). In this way delivery times can be shortened: delivery can take place directly from a European warehouse. The time-consuming transport from other continents to Europe has been done previously.
  - The elimination of links in the distribution chain. Figure 8.3 also shows that time-consuming links (wholesale etc.) are deleted from the distribution chain.

- The processing and transport of goods before declaring them is a time saving organizational innovation as well (figure 8.6). Information technology (including fax, EDI and telephone) speeds up the distribution process as well, as orders can be communicated quickly through the value system.

- Fragmentation. Fragmentation refers to the phenomenon that small quantities of products have to be distributed to different places. Fragmentation complicates the distribution process considerably. It is hardly economically feasible to transport these small amounts of products and planning of such transports is cumbersome: the number of points at which goods have to be delivered draws heavily on the organizational capability of the firm organizing the transport. Especially Client 1's product moves on a fragmented market: small amounts are ordered by a considerable number of clients.

The case company deals with the fragmentation of markets by contracting out transport to other specialized firms. The presence of a network of transport firms in its environment enables it to find transport for every route needed: fragmentation is dealt with by offering the products to a specialized trucking company, which assembles cargo for a certain destination. It would be impossible for the company to cover all the transport routes itself.

Individualization of demand is another example of fragmentation. The individualization of demand is reflected in a proliferation of product offerings which contributes to a further complexity of the distribution process. In the past it occurred regularly that products ended up in the wrong distribution centre. As a wider range of product offerings came into being, the mistakes augmented. By concentrating products in only one warehouse this problem is avoided. Hence European distribution is a reaction to this element of market fragmentation as well.

The changes in the value system initiated by demand, require more interfirm control and coordination activities than the old situation, because the firm which contracts out still wants to control its partner. Hence the transfer of activities leads to new organizational innovations in the linkages, in this case the main ones being long-term contracts and co-location of staff (a personal linkage).

Analysing this case, the proposition on the role of demand in organizational innovation is illustrated several times. A number of organization-like linkages are replaced by market-like linkages:

- contracting out of distribution by producers or importers replaces an organization-like linkage by a market-like linkage: first distribution was an activity inside the firm, now the activity is governed by means of a contract.
- the case company itself contracts out transport. The emphasis on transport declines (see also the discussion around figure 8.2, where the logistic centre contracts out transport), because the fragmentation of markets makes it impossible for the firm to serve all transport routes itself.
- secondary production activities are brought closer to the market, thus ensuring that consumer wishes can be reacted to quickly. For similar reasons different links in the entire chain of distribution are eliminated (also see figure 8.3).

There is an important interference between demand and strategy: producers and importers often do not have the capabilities required to arrange distribution because of the complexity of distribution resulting from the volatility of demand in the sectors discussed. Above that, the volatility of demand requires producers to invest more in their manufacturing capabilities, which may prevent them form keeping up with recent developments in the distribution sphere. Hence, the back to the core strategy and demand conditions are related: changes in demand direct a firm's attention to its manufacturing capability and draw heavily on their distribution capabilities, leading them to contract out the latter. This is one of the reasons why the case company has been able to expand its activities for Client 1.

The findings in relation to the proposition on demand are summarized in attribute-table 8.8:

- as to fundamental changes in demand, the fast growth in demand for European distribution has speeded up the process of organizational innovation. No influence on the form of the innovation was found;
- both differentiation and fragmentation have influenced the form of the organizational innovations: both have led to an increased use of market-like linkages over organization-like linkages, thus confirming the proposition. This use of market-like linkages is among others evident in the contracting-out of distribution to the case company;
- in the discussion above, the influence of differentiation (speed and fashion) on the extent of the innovation is evident (see also table 8.9 further below): most shifts in activities and linkages are related to differentiation. Likewise, fragmentation has led to important innovations. Client 1 for example contracted its transport out to the case company and this company in its turn contracted it out to smaller transport firms. The extent of the innovation also becomes clear in figure 8.3.

Table 8.8 Attribute-table on demand in the case

	Fundamental	Cyclical	Differentiation	Fragmentation
Form	N		Y	Y
Speed	+			
Extent			+	+

N = No, the independent variable does not influence the dependent variable
Y = Yes, the independent variable influences the dependent variable
\+ = The independent variable influences the dependent variable positively

Source: see text.

Related and supporting industries

The network of firms in the Rotterdam transport cluster is of key importance to the success of the case company. Without the presence of diverse, specialized transport companies it would not be able to arrange transport to any destination in Europe as fast and as cheap as now. Because these transport companies

specialize in certain routes and destinations, the case firm is able to tackle the observed fragmentation of markets by contracting out its transports. If this network was not available it would have had to provide transport itself, which would mean higher costs and lower speed. Now, these transport companies are hired when they are needed. As the number of possible destinations is extremely large, further transport is arranged on an ad hoc basis. If necessary, the case company can make use of special delivery services. Hence, the relation with the transport companies is mainly a short-term one (in terms of chapter 5).

The presence of a large and regular flow of containers is of course another factor allowing this kind of specialized service companies to exist. It is not a coincidence that the three Distriparks in the port of Rotterdam are located directly behind container terminals.

Factor conditions

An important factor condition, next to the excellent geographical location of Rotterdam, is the advanced telecommunication infrastructure. This stimulates the use of information technology as a linkage.

The Distripark at which the firm is established is another example of a factor condition. It lies directly behind container terminals and is well connected to the rest of the port infrastructure. The cost of the Distripark as a site is rather high compared to sites in other ports and in-land terminals (terminals further from sea). This means that in order to cover costs the case firm has to search for higher value added activities.

Government

Government was one of the key actors in bringing about the EDC in the form it has taken at the presented case. First of all the free movement of goods in the European Union (1992) lifted a number of institutional barriers for EDCs, like control at the borders.

The form of the value chain is also partly determined by developments at the governmental level. Firstly, customs in Holland has gone quite far in transferring activities to companies when the entrepôt E was implemented (Kuipers and Van Mourik, 1993). Several organizational innovations were the consequence of this: the decoupling of information from good flows (Client 3); processing and transporting goods before they are declared (Client 2); a new i.t.-linkage with customs. Secondly, government is responsible for the changes in trade and tax regulations, which become increasingly complex and are subject to considerable dynamism. The last GATT-round and the collapse of the Eastern bloc created an array of new possibilities for companies. These developments make that the case company is increasingly turning towards a consultancy role as specialist knowledge is required to be able to figure out all the consequences of these changes. The activity of maintaining knowledge on tax and trade regulations is a reflection of this. The increasing complexity of trade and tax regulations is also a reason for companies to contract out their distribution activities, as they lack the capability or resources to keep up with developments in this field themselves.

As was pointed out in the discussion on the diamond framework in chapter 5, the role of government may at times be more direct in bringing about innovations (Van den Bosch and De Man, 1994). The emergence of EDC's in The Netherlands is an example of this: governmental policy was one of the determinants shaping the form of the value chain.

8.3.6 Conclusion on the environmental determinants of the case company's EDC

In table 8.9 the different environmental determinants of the EDC are related to the various reconfigurations of the value chain. Demand conditions (especially qualitative aspects of demand) have played the most important role in the emergence of European distribution as an organizational concept.

Table 8.9 *Organizational innovations in the case company and the distribution chain related to elements of the diamond*

Demand
Fashion
• reallocation of secondary production activities, leading to enhanced need for communication: personal linkage and long term contracts
Speed
• reallocation: – first transport to Europe than sales – some activities can be performed before goods are declared (also related to government) – delete links in distribution chain (wholesale etc.)
• information technology as a linkage (also related to factor conditions)
Fragmentation
• contract out transport (also related to related and supporting industries) • concentrate inventory in one European warehouse
Strategy
• creation of support activities: tracking and tracing, software development, maintain knowledge on trade and tax regulations (also induced by government)
• back to the core strategy of producers and importers
Rivalry
• forces the company to expand the value chain
Government
• enabling factor and influenced reallocation (see under speed above)

Source: see text.

More specifically related to the hypothesis, the increased use of market-like over organization-like linkages has been clearly established in the sense that intra-organizational linkages have been replaced by interorganizational linkages, which contain more market-like features. For example, secondary production activities are no longer performed by the production firms but are contracted out to the EDC. In this way the influence of demand on the production process has grown.

Demand was however not the only factor of influence. The innovative process can best be described as a complex process in which many different (occasionally even interacting) factors act to shape and mould a new organizational form.

8.4 *Summary and conclusion*

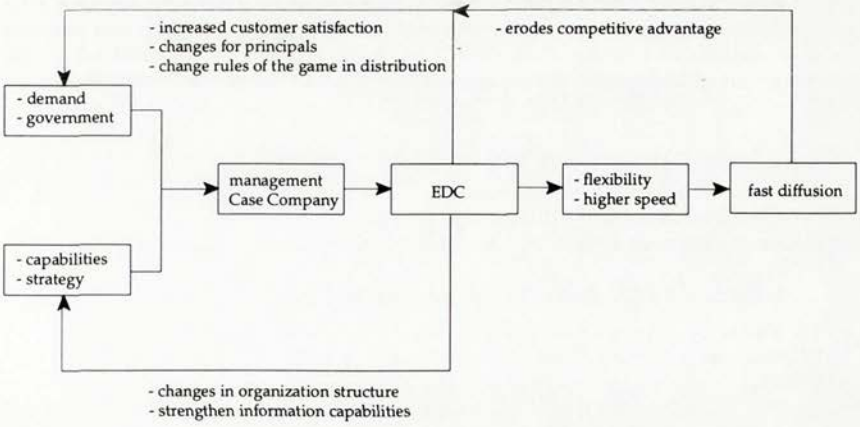
In this chapter the organizational innovation of the European Distribution Centre has been analysed by making use of the tools developed in the previous chapters. The case presented but also the general discussion in section 8.2 illustrate some of the propositions from chapters 4 and 5. The general conclusions with regard to the propositions are:

- there is path dependence in the way the EDC emerged in the case company. Dynamic routines, capabilities and resources influenced several attributes of organizational innovation. Most clear were the first ones: specific dynamic routines were found which described the development of EDC's as an organizational form.
- especially qualitative demand changes had an impact on the form and extent of organizational innovation. Specific changes in linkages and activities were connected to qualitative changes in demand. Speed could be related to fundamental quantitative changes.

Figure 8.9 summarizes the case in the analytical schema developed in the introduction. Two of the main determinants in the business environment are demand and government. On the inside-out side of the schema, the current capabilities and strategy are taken as an input by management in their decision to reconfigure the value chain. These reconfigurations lead to an EDC. The European Distribution Centre is a combination of inter- and intra-organizational innovations. Flexibility in dealing with clients and a high speed of delivering products anywhere in Europe are the major competitive advantages connected to these innovations. The diffusion of novel combinations in the organization of distribution is however quite rapid. Hence, competitive advantages are relatively shortlived.

EDCs have some major effects on the environment: they not only increase customer satisfaction, they have quite some implications for clients/principals as well. Especially the interorganizational changes (e.g. transfer of activities) are referred to here. Even more importantly, EDCs are truly innovatory in that they change the rules of the game in the distribution sector: like elsewhere in the distribution sector many traditional relations are replaced (De Jong and Vethman, 1990). Therefore EDCs require a reaction from competitors (Baden-Fuller (1994) identified this as one of the main characteristics of strategic innovations).

Figure 8.9 The EDC of the case company in the analytical schema



For the case company internally the gradual development of its EDC was connected to changes in its organizational structure and confirmed its strategy of focussing on the information component of distribution. The good results obtained with that strategy strengthened its dynamic routine of creating support activities aimed at information processing.

Exhibit I: List of persons interviewed

This chapter is largely based on interviews with members of the case company staff, who are responsible for its European Distribution Centre. Further information was obtained from representatives of the Rotterdam Port Authority, who were involved in the development of Distriparks. The interviews took place in the period June 1994-January 1995.

In the company interviews were held with:

- the manager of the distribution center
- the adjunct manager of the distribution center
- the head of customs affairs

In the Rotterdam Port Authority interviews were held with:

- T.C. Dekker
- P.J. Jongman
- R. Saitua

all three of them working in the department of social and economic development of the directorate of port innovation.

9

Organizing for competitiveness: summary, conclusions and implications

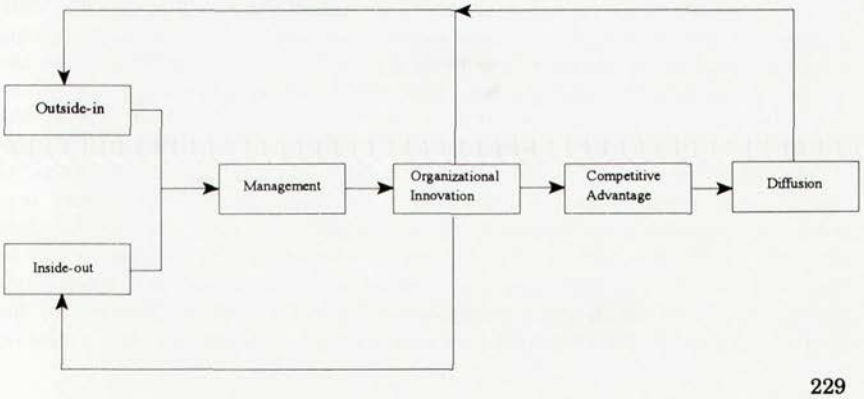
9.1 *Summary*

The research question of this thesis is how new organizational forms come into being. Put differently:

What are the determinants of organizational innovation?

Research into organizational forms has mainly been directed at the efficiency or effectivity of existing forms and not at the way new forms are generated. Insight in the process of development of new forms, can eventually contribute to an increased managerial control over organizational innovation. However, because of the limited amount of work done in this field, quite some fundamental research is required before our understanding of organizational innovation has improved so much that managerial guidelines can be developed. As a result, the research reported on here is of a theory-building nature.

Figure 9.1 An analytical schema of organizational innovation



To answer the main research question, the analytical schema depicted in figure 9.1 is used. The determinants of organizational innovation can be found inside and outside the firm. They will lead management to implement an organizational innovation which brings a competitive advantage with it. In the course of time, diffusion of the form can take place to the competitors. The different feedback loops show how the innovation can change the firm internally (e.g. because of reorganization or shifting power balances) as well as its environment (e.g. by changing the network or creating new customer demands). Diffusion of organizational forms changes the environment in which the firm operates. For example: not only will competitors more closely resemble the innovating firm, but if the organizational innovation is of an interorganizational nature, new networks may come into being as well.

Point of departure of this study is that new organizational forms can be viewed as innovations. For as far as new organizational forms have been studied, this has normally been done by making use of organization theory. Here, it was assumed that by applying innovation theory to organizational issues, new insights in the development of new organizational forms can be obtained. This choice for innovation theory also serves as a guide in narrowing down the number of determinants of organizational innovation to be looked at. Naturally, not all conceivable factors which have an impact on innovation can be studied; some choices have been made based on innovation theory. The inside-out approach will use the concept of routines; the outside-in approach will focus on two well-known determinants of innovation: networks and demand.

The relevance of organizational innovation for the competitive process is shown in chapter 1. New organizational forms can contribute to firm competitiveness in several ways and for a long period of time. Theoretical and empirical evidence shows that the diffusion of organizational innovations is a relatively slow process, even when the profitability of the new organizational form is clear. Organizational innovations may also contribute to country competitiveness. Theory (and some empirical research) has found that organizational forms differ per country and that forms diffuse slower across countries than among firms. Accordingly the conclusion is that organizational innovations have an important impact on competitiveness. But the question what determinants cause organizational innovations to emerge, has not yet been answered.

A review of literature on organizational innovation showed that no clear definition and analytical tool have been developed, which can help in identifying organizational innovations. In this thesis it is proposed that the value chain can be helpful in defining organizational innovation and in providing a way of describing and analysing new organizational forms. From a value chain perspective, organizational innovations are characterized by changes in activities and linkages in the value system, which contribute to a sustainable competitive advantage. As organizational innovations can also be of an interorganizational nature (e.g. networks, alliances), the emphasis in this definition lies on the value *system*, instead of only the value chain: the organization of the value system can be renewed as well. It is especially this element of interorganizational innovations which has been insufficiently addressed in existing theories. Because of the increasing use of interorganizational coordination mechanisms, this omission

increasingly limits the applicability of existing theories. The reference to competitive advantage is necessary, because innovations are (by definition) successful new things and have an impact on the competitive process. By using the concept of the value chain, a way to describe and analyse organizational innovations is provided as well.

Next to *form, speed* and *extent* are also relevant attributes of organizational innovations. With speed is meant the velocity with which the form is implemented. Extent refers to the number and size of the shifts in the value chain. These attributes of organizational innovation are used in the empirical research and will be related to attributes of independent variables. Using attributes to operationalize variables eases the process of tracing these variables in cases.

Theories on organizational innovation have not consistently incorporated all four of the following elements required for analysing the emergence of organizational innovations:

- an outside-in perspective: organizational innovation is context dependent: the business environment influences organizational innovation;
- an inside-out perspective: organizational innovation is historically contingent: the characteristics a firm has acquired in the course of its existence have an impact on the way a firm changes;
- pluriformity of organizational forms: both intra- and interorganizational innovations should be incorporated in the theory;
- a focus on competitive advantage: as organizational innovations can contribute to competitiveness in many ways, a broad definition of company goals should be chosen.

In order to understand the process of organizational innovation, these four elements must be combined in one framework, as in figure 9.1.

The definition of organizational innovation incorporates intra- and inter-organizational innovations, as well as a competitive advantage perspective. Only the inside-out and outside-in perspective remain to be analysed. As to the former, the evolutionary and resource-based view of the firm are good starting points, because they provide concepts to analyse firm specific circumstances. Specifically the concept of path dependence may illuminate the inside-out perspective. Path dependence has three attributes:

- dynamic routines: dynamic routines are routines which operate to modify firm characteristics, whereas static routines replicate previously performed tasks;
- capabilities: firm specific knowledge and resources, competences etc.;
- resources: non-firm specific goods, materials as well as labour.

Based on these three attributes a proposition is developed that organizational innovation is path dependent: the organizational characteristics (in terms of dynamic routines, capabilities, resources) at time t influence the organizational form at t+1.

In technological innovation theory, path dependence is found in the existence of trajectories and paradigms within which innovations develop. Along these tra-

jectories, existing (ideas about) technologies define the next possible stages of technological development. Kogut (1991) and Nelson (1991) suggested that this description of technological innovation might also be applicable to organizational innovation, but they did not present an analysis of this. This research suggests that by studying the role of routines in organizational innovation, trajectories and paradigms in organizational innovation can indeed be found. Connecting the difference between innovations and trajectories to the distinction between static and dynamic routines, allows us to trace innovations and trajectories in practice. On the broadest level, paradigms represent general ways of thinking about organizing. Three organizational paradigms have been distinguished: the craft paradigm (small companies producing customized products), the unitary paradigm (big companies working in mass production, with clear functional distinctions inside the firm) and the networked paradigm (firm boundaries become fuzzy, while inside companies functional boundaries are crossed). Within each of these paradigms various trajectories can be found along which different organizational forms develop. An organizational trajectory is defined by the occurrence of similar reconfigurations of the value system (dynamic routines), for example repeated elimination of inventory as in the JIT-system (chapter 6) or ongoing reallocation of activities from producers to a European Distribution Centre (chapter 8).

Briefly, the inside-out perspective finds that organizational innovations emerge from the existing situation in companies in terms of capabilities and resources. They are also influenced by the dynamic routines developed inside the company for reconfiguring its value chain. These reconfigurations are rarely implemented simultaneously, but normally take place over an extended period of time. The trajectory concept describes this. Organizational innovation is therefore best described as a continuously developing and historically contingent process.

The business environment has an impact on this process as well. It is known that various aspects of the environment can influence technological innovativeness (Porter, 1990a). Two variables in the business environment have been singled out for further study, among others based on the fact that these have been defined in innovation research: interorganizational relations and demand. Both these factors are supposed to enhance technological innovation. Theoretical considerations lead to the proposition that there is a possibility that long-term interorganizational relationships may limit organizational innovation. This proposition is consistent with recent research on the drawbacks of networks (as for instance in Grabher, 1993a,b). Interesting attributes of long-term relations are:

- externalities: an innovation has consequences beyond the innovating firm so that other firms must be able and willing to cooperate with the implementation of an innovation;
- entrenched routines: it is difficult to break through standard patterns of behaviour;
- independence: if firms are independent it may be harder to cooperate in implementing an innovation if one firm is unwilling, because there are no means to force that firm to collaborate.

Pertaining to demand a choice has been made to study both quantitative and qualitative changes. A proposition was developed claiming that changes in demand stimulate reconfigurations of the value chain. Based on other studies it was also possible to specify this effect in more detail: increased volatility of demand may increase the use of market-like linkages in the value chain.

Demand conditions have been divided in quantitative demand and qualitative demand, each having two attributes. Quantitative changes in demand can be:

- fundamental: a lasting change in the quantity demanded or
- cyclical: repeated fluctuations in demand.

Qualitative changes can be:

- differentiation: for example increased customization or
- fragmentation: smaller amounts of products must be delivered to dispersed geographical areas.

Table 9.1 gives an overview of the research questions and the relevant variables. These variables (organizational innovation, path dependence, long-term relations and demand) have been operationalized into various attributes, as described above. This way of working simplifies the translation of the theoretical variables into the practical findings of the case studies.

Table 9.1 Research Question and Propositions

Research Question
What are the determinants of organizational innovation?
Relevant attributes of organizational innovation are the form the value chain takes, the speed of implementation and the extent (number and size of changes) of the organizational innovation.
Propositions
The process of organizational innovation is path dependent in that new configurations of activities and linkages build on their precursors. The reason for this lies in such firm specific attributes as dynamic routines, capabilities and resources.
The presence of long-term interorganizational relations limits the process of value chain reconfiguration both within and between firms. The reason for this lies in the following attributes of these relations: externalities, entrenched routines and independence.
Changes in demand stimulate changes in the value chain. The relevant attributes of demand are fundamental and cyclical changes in the quantity of demand, and differentiation and fragmentation.

Source: see the previous chapters.

By means of a review of existing empirical material supplemented by two new case studies, the propositions from table 9.1 are tested. The details of the empirical analysis are presented in section 9.2 below. The general picture emerging from

this is that on various points the propositions are corroborated, but that some influences are more clearly discernable than others.

In the Fokker Aircraft case it was shown how an organizational innovation in the assembly line of the Fokker 100 aircraft, had repercussions for Fokker's network of suppliers. The system could only be a complete success if the suppliers changed the organization of their production processes as well. For various reasons not all suppliers were able or willing to do so. This has limited the speed of implementation and the extent to which the new organizational form could be developed. Fokker implemented a kind of pull system (called Assembly-to-Order or AtO) which contributed to relieving some parts of the crisis Fokker faced, caused by the fall in demand for aircraft and Fokker's high production costs. The organizational innovation itself was a complicated reconfiguration of activities and linkages, both inside Fokker and in the relationship with its suppliers. Various consultative structures were devised to coordinate Fokker's production schedules with those of its suppliers. The AtO-system led to a cost reduction, while maintaining flexibility in specification and delivery time. As such it contributed to a competitive advantage. Despite the success of AtO in reaching these goals, the depth of the crisis in the European aircraft industry continued to pose a problem for Fokker.

The case of the distribution firm in the Rotterdam port shows how developments on the demand side influence the organizational form of the value system of distribution, eventually leading to a European Distribution Centre (EDC). In a complete EDC structure not only distribution is organized, but secondary production activities and information flows are managed as well. Formerly, these latter activities were performed by the producers of goods. To achieve this new way of working, various new linkages between firms were implemented along the chain of distribution. In combination with several reallocations of activities between firms, this completely altered the value system of distribution. The aim of these reconfigurations of the value system was to better react to changing market demand, especially customization, fragmentation and the demand for speedy deliveries. This case also emphasizes the path dependence of organizational innovation: a trajectory of development could be described which shows how a repeated transfer of activities between firms took place over a period spanning more than a decade.

Several key points of the cases must be highlighted (see table 9.2). Firstly, organizational innovations can contribute to a competitive advantage. They can lead to cost savings, flexibility, etc. A number of competitive advantages can be connected to the implementation of a new organizational form. Secondly, the importance of *inter*organizational innovations is clearly established. For example the innovation implemented inside Fokker, had consequences for its network. Organizational innovations were developed to enable the network to cooperate with the new system for assembling aircraft. The EDC case in chapter 8 shows how the organizational innovation of European distribution led to a complete reconfiguration of an entire value system, involving several companies. This also corroborates the idea of the emergence of a network paradigm of organization. In addition, the use of a value chain perspective to describe new organizational

forms proved its value here. The cases showed that with the concepts of activities and linkages, changes in organization form can be adequately described.

Thirdly, the cases show the historical contingence and, fourthly, the context dependence of organizational innovation, as well as its trial and error rather than planned character. Historical and firm specific circumstances played a major role in determining the reconfiguration of the value system in these cases. Some organizational routines (e.g. Toyota's consistent elimination of inventory and Fokker's lead time reduction) were induced by environmental or internal pressure, but they remained in place till long after the initial reason for implementing them had lost its relevance (inflation and the collapse of military demand led to elimination of inventory in Toyota; the expected high production level in Fokker stimulated lead time reduction which was a precursor to AtO). In this way however a competitive organization form came into being. It follows that local and temporary circumstances can have a long-term impact because of their influence on the kinds of routines which develop. Thus the applicability to organizational innovation of David's ideas on path dependence is shown: "A path-dependent sequence of economic changes is one in which important influences upon the eventual outcome can be exerted by temporally remote events, including happenings dominated by chance elements rather than systematic forces" (David, 1986, p. 30). Trial and error is characteristic of the process of organizational innovation as well, but this does not prevent competitive organizational forms from emerging. Instead, this evolutionary nature of organizational innovation can lead to effective new organizational designs. The EDC case also shows the dynamics of competition: organizational innovations followed each other quickly in the course of time. Each value chain reconfiguration was replaced by another one. There does not seem to be an optimal way of organizing that is lasting, rather less adequate organization forms are succeeded by superior ones (compare with Gould (1988) and the description of the role of innovation in chapter 1), which in their turn are temporary.

Table 9.2 Key results

- organizational innovations can contribute substantially to competitive advantage
- interorganizational innovations must be incorporated in the study of new organizational forms as well; a value system perspective is useful
- historical contingency:
  - the development of organizational forms is path dependent
  - trial and error can lead to competitive new organizational forms
  - no optimal forms emerge only temporarily superior ones
  - local and temporary circumstances can have a long-term impact on the development of organizational forms
- context dependence:
  - demand is a key determinant of organizational innovativeness
  - the presence of long-term interorganizational relations can limit organizational innovativeness

Source: see text.

The environment impacted on organizational innovation in various ways as well: some factors stimulated organizational innovation others limited it. The analysis of the role of demand has shown that superior forms are developed when the value chain reconfigurations are in line with the changes in demand. The ability to react swiftly to developments on the demand side can be strengthened by implementing market-like linkages. Changing demand was the most important stimulating determinant of organizational innovation. By being embedded in a network however, firms may become constrained in their ability to implement organizational innovations independently. The other side of this is of course that once an organizational innovation in a network comes about, the imitability of the innovation may be low. The time period for which such an innovation can bring benefits to the organization may then be long, as the competition may not be able to follow suit.

9.2 *Conclusions on the propositions and attribute-tables*

This section will discuss the conclusions on the propositions advanced in chapter 5 and studied empirically in the chapters 6, 7, and 8. Per proposition conclusions will be drawn and questions for further research will be put forth. The approach taken is one of theory-building by means of theoretical sampling: cases have been chosen on their relevance for extending or replicating emerging theory. For each proposition an attribute-table will be presented, which shows which relationships between the attributes of dependent and independent variables have been literally replicated (Yin, 1989, p. 53) in the cases. This means that the attribute-tables presented below only show those relationships which were predicted by theory *and* found in the embedded cases. When appropriate, proposals to extend the emergent theory by filling in other boxes of the attribute-table will be put forth. These extensions are only proposed when in more than one of the embedded cases the relationship between the attributes appeared to be interesting. Horizontally, the attribute-tables show the attributes of the independent variables. Vertically, the attributes of the dependent variable (organizational innovation) can be found.

Proposition 1: Path dependence

The first proposition stated that routines, capabilities and resources present in an organization will direct the path of development of the organizational innovation. The findings reported below, show that there is path dependence in the development of organizational forms: routines, capabilities and resources influence the form the organizational innovation takes. Further confirmation of this finding is found in the description of the trajectory of the JIT-system in Toyota and the trajectory of development of European Distribution. The cases show that the search for organizational innovations is local. Firm specific circumstances influence the search process to a large degree. Trial and error, which is also a characteristic of the innovations studied here, has led to effective organization forms. Hence, the idea that an organizational innovation has to come about by design does not find support in this study. The result of confronting the empirical attribute-tables with the findings in the theoretical attribute-table, is presented in table 9.3, which contains the literal replications.

Table 9.3 Literally replicated relations between attributes of path dependence and organizational innovation

	Dynamic routines	Capabilities	Resources
Form	Y	Y	Y
Speed			
Extent	+		

Y = Yes, the independent variable influences the dependent variable
+ = the independent variable influences the dependent variable positively

Source: see text.

LITERAL REPLICATIONS

- Dynamic routines (patterns in the change of organizational form) influence both the form and the extent of the innovation. The form is determined by routines because organizational routines guide the reconfiguration of the value chain in a certain direction. As these dynamic routines are repeated over and over again, they exert a positive influence on the extent of the innovation as well: the repetitive nature of dynamic routines increases the number of changes in the value system. For example: elimination of inventory was a dynamic routine which, through repeated application, led to the JIT-system. Other dynamic routines have been identified in the cases presented in chapter 7 and 8.
- Capabilities and resources influence the form of the organizational innovation. As theory predicted the form of an organizational innovation corresponds to the resources and capabilities present in an organization. The cases do not show a clear result as to the influence on speed and extent of capabilities and resources. This influence seems to depend on their specific nature and on the specific situation.

EXTENSION

In the cases presented in chapter 7 and 8, there was a relation between dynamic routines and the speed with which the organizational innovation was implemented. Perhaps this is an extension of the theory. A theoretical reason for extending theory with this relation is that routines shorten the period of search for a solution (see chapter 4) and thus can speed up the process of innovation.

Proposition 2: Long-term relations

On the longevity of relationships, the proposition stated that innovations in long-term interorganizational relationships can be inhibited, because of externalities, entrenched routines and independence. In general the cases showed that long-term relations can indeed have a negative effect on organizational innovation, but some of the attributes of long-term relations proved to be more important than others. Table 9.4 gives, in detail, an overview of the more important relations between the attributes.

Table 9.4 *Literally replicated relations between attributes of long-term relations and organizational innovation*

	Externalities	Entrenched routines	Independence
Form			
Speed	–	–	–
Extent	–	–	

– = the independent variable influences the dependent variable negatively

Source: see text.

LITERAL REPLICATIONS

- Externalities have been found to limit the speed and extent of organizational innovation. Two important aspects of externalities played a role. First of all the costs an innovation implemented in one company may have for another firm, can reduce the will of the other firm to cooperate. Secondly, the other company must be able to cooperate. If the other company does not have the required capability to do so, the implementation of the innovation may be inhibited (extent) or delayed (speed).
- According to both theory and cases, entrenched routines limit the speed and extent of the innovation. Having to break entrenched routines is a time consuming task, which if it fails or succeeds only partly, limits the extent of organizational innovation as well.
- As to independence, this attribute was found to slow down the process of organizational innovation. Obviously, the time needed to negotiate a new way of working between firms, lowers the speed of implementation of a new organizational form.

Especially the role of externalities is interesting. Their impact was clearly discernable in the cases. Both costs and other impediments (especially the lack of capabilities to implement a new organizational form) could be traced and were readily observable. As these two aspects of cost and capabilities are the most tangible of the attributes, they may also be most relevant to management. From a practical perspective the management of externalities may be one of the key challenges in managing organizational innovations.

EXTENSIONS

A general remark on these replications should be made. As was shown in chapter 5, theory predicted a negative effect of longevity on organizational innovation. A division between speed and extent was however not made. In the cases this difference was observable: e.g. externalities led to neither a fast nor a complete implementation of Fokker's new way of assembling. The distinction between speed and extent of organizational innovation seems to be a useful extension of theory.

The cases suggested that externalities can also influence the form of organizational innovations. Firms can design organizational mechanisms specifically aimed at coping with externalities. The consultation structures in which knowledge and information are transferred in the Fokker-case are an example of this. They are aimed at creating suppliers' capabilities and at diminishing some of the disadvantages suppliers encountered after the implementation of AtO. In this way, externalities had an impact on the eventual form of the organizational innovation.

FURTHER RESEARCH

Further research should especially be directed at the role of externalities in networks in limiting organizational innovativeness. From the perspective of network theory, the findings in this thesis are very interesting because they give detailed empirical evidence on a drawback of networking. This supplements the work of Grabher (1993a,b) and Miles and Snow (1992) who also pointed to disadvantages of networks. Surprisingly, in not a single case a positive effect of long-term relations on organizational innovation was found. With the increasing importance of networking, the interest in the difficulties of managing a network will and should augment. Important topics also include whether the one disadvantage found in this thesis is important enough to offset, in the long run, the numerous advantages of networks and whether it is possible to find ways of managing a network which avoids lock-in into a certain organizational form.

Finally, it should be researched whether the impediments to organizational innovation in a network also apply to technological innovation. Teece (1980) seems to imply that organizational innovation leads to more disruption than technological innovation because it is more difficult to confine organizational change to a limited part of the company. This may mean that the disadvantage of networks found above may be of particular relevance for organizational innovation. On the other hand, Tushman and Romanelli (1990) imply that it is the magnitude of change which is of relevance here: incremental changes are possible in networks, while radical changes are not. If we accept this view, the impediments to change in networks may also pertain to larger scale technological change.

Proposition 3: Demand

For research purposes demand conditions have been divided in quantitative demand (fundamental and cyclical) and qualitative demand (differentiation and fragmentation). The proposition states that increased fluctuations in demand will lead firms to abandon organization-like organizing mechanisms in favour of market-like and interfirm organizing mechanisms. Thus a firm is able to profit best from its resources and capabilities: the increased contact with the market helps to ensure that resources and capabilities will not become obsolete and are kept up-to-date. General confirmation of this proposition was found, but not all attributes of demand impacted on all attributes of organizational innovation. Table 9.5 looks into the relations between the various attributes in detail.

Table 9.5 *Literally replicated relations between attributes of demand and organizational innovation*

	Fundamental	Cyclical	Differentiation	Fragmentation
Form		Y	Y	Y
Speed	+			
Extent				

Y = Yes, the independent variable influences the dependent variable
\+ = the independent variable influences the dependent variable positively

Source: see text.

LITERAL REPLICATIONS

- In the cases, fundamental changes in demand were especially related to the speed with which innovations were implemented, as theory predicted. Both growth in demand and a collapse in demand induce reconfigurations in the value chain.
- Cyclical changes influence the form an organizational innovation takes. Fokker's new way of organizing, especially the coordination with its suppliers, is designed to meet fluctuating demand.
- Differentiation and fragmentation influenced the form of innovation. They lead to an increased use of market-like linkages in the organization of the value system. For example: fragmentation led the EDC-firm to contract out transport.

EXTENSIONS

Differentiation and fragmentation also enhance the extent of the innovation. Most shifts in activities and linkages in the EDC case were related to these two attributes of demand. The importance of these attributes may be considerable and hence we should look into the use of extending theory by incorporating them.

FURTHER RESEARCH

The general picture emerging from this study is the following. Qualitative trends have no influence on speed but do influence the form and, possibly, the extent of organizational innovation. Innovative activity is speeded up especially when fundamental quantitative changes occur. The supposed trend towards an increased penetration of market-like organizational concepts in organizational forms as a consequence of volatile demand was corroborated in the case studies as well. Increased volatility of demand has been met more successfully by a loosening of organization-like principles to the benefit of market-like principles, rather than with attempts at exercising increased control over more activities in the value system. The reallocation of activities from producers to EDCs is an example of this, as is the introduction of a new, flexible coordination mechanism in the relation between Fokker and its suppliers, which replaces the rigid long-term planning.

In general, demand was a very important variable in enhancing organizational innovativeness. Most reconfigurations of the value chain could be related to changes in demand. Further research may be conducted into the role of a third attribute of demand defined by Porter (1990a), namely the internationalization of demand. The key idea behind this is whether innovations which are developed to meet one kind of demand can also be transferred to the demand of other clients. The point here is that an innovation aimed at satisfying a specific customer is more interesting for a firm when the innovation is relevant for other (potential) customers as well. It may be possible that firms consciously form their innovation in such a way, that it is easy to adapt it for other customers.

Evaluation

The general conclusions emanating from the cases are that (1) there is path dependence in the development of organizational forms (history matters), (2) long-term interorganizational relationships limit organizational innovativeness mainly because of the existence of externalities and (3) demand is an influential, environmental determinant of organizational innovation. The last two determinants show that organizational innovation is not only historically contingent but also context dependent.

As to the attributes of the three independent variables, the most interesting are routines for path dependence, and externalities for long-term relationships. Regarding externalities emphasis should not only be on the *will* of the network to cooperate but also on its *ability* to do so. All attributes of demand appeared to be of more or less equal interest. Further research into organizational innovation may take these results into account.

The method of the attribute-tables (described in the Appendix) ensured that the operationalizations of the variables remained fixed across cases. This made it easier to draw cross case conclusions and also clarified the translation of the theoretical concepts to the practical situation. It seems that some of the disadvantages of working with cases identified by Eisenhardt (1989b) can be remedied by using attribute-tables.

9.3 *Implications for research and practice*

This final section will derive some research questions and practical implications from the research reported on in this thesis.

Research implications

One conclusion is that it is fruitful to look upon new organizational forms as being innovations and to analyse them with the tools provided by innovation and strategy theory (including Porter's diamond framework as a model for the business environment). Moreover, new organizational forms can contribute substantially to competitive advantage. Consequently the study of new organizational forms as innovations merits attention. New organizational forms should not only be judged as a handmaiden to technological change (Nelson, 1991), but should be judged and studied as a separate category of innovation, with many different

kinds of competitive advantage attached to them, to a large extent independent from the technologies used. Such a view is consistent with Schumpeter's broad conception of innovation. His view on innovative activity has been impoverished by limiting research in the Schumpeterian tradition to technological innovation only. This is not to say that technology doesn't matter. It does mean however that there are many ways to organize around a given technology and that the organization form chosen does matter in creating and sustaining competitive advantage. The cases underline this point. They show that almost without investments in new technology, cost savings and increased flexibilization can be realized.

In addition, it has been shown that innovation theory is applicable to organizational innovation. This refutes Van Someren's (1991) contention that the approach of evolutionary economics can not contribute to our understanding of new organizational forms and supports Nelson's (1991) and Kogut's (1991) ideas on this subject. The application of innovation theory is however not straightforward: the definition of paradigms and trajectories in organizational innovation differs from those in technological innovation, even though the mechanism lying behind these two kinds of innovation is similar: dynamic routines direct innovation. Another difference lies in the role of networks in organizational innovation: these do not stimulate organizational innovation like they do technological innovation.

Secondly, the distinction between outside-in and inside-out proved valuable in this thesis. Some relations have been found between the two as well. Inside-out factors may determine outside-in factors for example because firms shape demand in their industry. The impact can also run in the opposite direction: the history of experiences with the environment lies embodied in a firm's routines and capabilities (see e.g. David, 1986; March, 1994). Table 9.2 already pointed at the impact that temporary events can have through their impact on routines. Further research may shed light on this issue of the mutual relation between a firm and its environment on a detailed level (also see Van den Bosch and Warmerdam, 1995).

Further reflection on the basic scheme depicted in figure 9.1, suggests that this simple scheme encompasses many of the aspects of organizational innovation and hence seems to be a good and surveyable point of departure for further research. Some parts of the box have however not been explicitly studied. The managerial component of organizational innovation for example requires more research. Interesting questions are e.g. how management can smooth the implementation of a new organizational form, whether management consciously uses dynamic routines or not, and how management tries to assess the effect of an organizational change before actually implementing it.

Thirdly, in explaining organizational forms it is not sufficient to look at their efficiency characteristics. In order to grasp how the precise form of the organizational innovation is shaped, longitudinal analysis is required as well. History matters a great deal when one attempts to explain the exact configuration of activities and linkages in a firm. Efficiency characteristics may contribute to an explanation of the survival of an organization form, but cannot explain its initial derivation. Put in evolutionary terms: a framework like Williamson's (1975)

organizational failures framework defines the selection environment, whereas in the previous chapters more emphasis has been put on the process of variation.

Fourthly, this research shows the feasibility and importance of incorporating interorganizational innovations in theory. It is not necessary to develop a completely separate set of tools to realize that. The tools used in the case studies proved to be applicable to intra- and interorganizational innovations alike. The modified model of the value chain, which includes a wide array of linkages, proved its value in describing organizational innovations too.

Turning back to the questions put forth by Grandori (1993) as discussed in the introduction, the following answers can be provided:

- Are there common logical features in organizational innovations?

  Yes, there are. The main point to be made here is that organizational innovation is best defined as a *configuration* of building blocks. The building blocks of organizational form (activities and linkages) are combined and recombined into new configurations. Hence, an innovation consists of a number of recombinations of building blocks, not just one. This configurative approach is characteristic of several strategic issues (see for example Elfring and Volberda, 1994, and Baden-Fuller, 1994, for other examples of configurative approaches).

- How do they emerge and do they use existing knowledge?

  The picture arising from the research is that several forces impact on the emergence of new organizational forms, which makes that the process is characterized by search and trial and error. Organizational innovation is context dependent. Yet, simultaneously existing knowledge is used. The historical contingency of organizational innovation shows that existing knowledge on how to organize serves as a basis for finding new organizational forms. Routines replicate this existing knowledge of organizing.

- How are possible organizational solutions tested?

  This subject has not been researched here. The definition of organizational innovation suggests that management will try to assess the impact on competitive advantage of a certain innovation. The trial and error found in some of the cases suggests that the real test takes place in practice and not before implementation. None of the testing procedures defined by Grandori (1993) (viz. quasi-experiments, predictive case studying, simulations) have been found, but it must be noticed that a search for these methods was not part of the research. In conclusion, there is ample opportunity for further research into this question. Perhaps depicting different design options by means of the value chain model can give management insight into the chances an innovation will succeed. Perhaps the test of feasibility of an organizational form is embodied in dynamic routines, for routines are also a way of narrowing choice sets and simplifying decision-making (see chapter 4).

- Can guidelines be developed on how to create new organizational forms (can the process be rationalized)?

  The aim of this study has mainly been to build theory and hence to describe organizational innovation and not to develop prescriptions. The reason for this

approach is that the knowledge we possess on this subject is limited. Hence, the focus has been on trying to understand. Nonetheless some possible guidelines may be put forth. The first one is that building on existing structures by means of applying similar dynamic routines may be a rational approach. This reduces the impact of uncertainty and lack of legitimacy (see table 2.7), which are endemic to innovative approaches (Machiavelli, 1513). Firstly, the uncertainty surrounding the organizational innovation is reduced because the new organizational form will not be completely unfamiliar to the firm, if it builds on the existing structures. Secondly, building on an existing structure heightens the legitimacy of the changes made, for the same reason. A more radical step into unknown territory in which all existing knowledge becomes superfluous, will be subject to much questioning and resistance. Staying close to what is accepted usually has a higher degree of legitimacy in the eyes of those who have to change, than throwing existing practice completely overboard. The second rational guideline is to look at the impact organizational innovation has on the demand side. This, after all, is where a competitive advantage has to materialize. If the reconfiguration of activities and linkages has no benefit for customers, the viability and necessity of the change can be questioned.

Implications for governmental policy and strategy

The analysis of organizational innovation corroborates the idea that not only costs matter in competitive processes, but that innovation can contribute to competitive advantage as well. The view on innovation taken in this thesis shows that not only technological innovation should be on the agenda of firms. Looking beyond existing trajectories of organizational forms can fundamentally alter the competitive game as well. Lock-in of the development of an organizational form is however a barrier to change. The theory developed above can help to make explicit managers' mental models (Senge, 1990) or dominant logic (Prahalad and Bettis, 1986) of organizing. According to Senge (1990) clarifying the mental models is a first prerequisite to change. In relation to this, depicting different organizational design options with the modified value chain perspective developed in chapter 2 may point the way to innovative organization designs. Attention for innovative organization designs lying outside the territory of current conceptions of organizing, can contribute substantially to competitive advantage.

A new organizational form emerges out of a relatively messy process. For firms this implies that attempts to implement comprehensive innovative organization designs should be avoided. As the process of organizational innovation is very complex, it will be unlikely that in these grand designs all problems are anticipated. Unanticipated consequences are the rule rather than the exception in innovation and they limit the chances of success of quantum leap changes. Search and trial and error are unavoidable and put even greater strain on organizations when they venture into completely unknown territory. Accordingly, successful innovations build on their precursors thus limiting the extent of newness and reducing organizational disruption in comparison to radical departures from prevailing practice. Of course in the process of diffusion of a new organizational form, characteristics of the form will become increasingly better known, enabling larger-scale changes to take place. In this diffusion process firms like consultancies

which build up experience in implementing new forms may acquire extensive knowledge about them. The application of this knowledge can speed up the diffusion of a new form (and thus contribute to the destruction of its competitive advantage). In this way larger-scale changes from an existing form to a new one will be possible in the diffusion process of an organizational innovation, whereas the emergence of the innovation is characterised by search and trial and error.

As the emergence of new organizational forms is a highly local process, stimulating organizational innovation does not seem to be a feasible governmental policy. Rather governments may direct their attention to the diffusion of new organizational forms. Starting point here can be the obstacles to cross country diffusion of organizational innovations, as identified by Kogut (1991) and discussed in section 1.6.1. Diffusion can be stimulated by governments for example by funding research into the characteristics, advantages and drawbacks of the form, thus increasing the identifiability of the organizational innovation (see Kogut, 1991, or section 1.6.1). In the case of European distribution, government was an important influencing factor among others by allowing new ways of handling customs to be implemented. Governments may look at other institutional barriers to change and try to alleviate these in order to stimulate (the diffusion of) new organizational developments. In this way institutional lock-in (Kogut, 1991, see section 1.6.1) can be prevented. Within the networked paradigm several governmental policies have been devised in practice to create interorganizational networks (an overview is given in Jacobs and De Man, 1995 b,c). Some governments play a role as a matchmaker between firms to bring about new interorganizational relations. For example, small and medium-sized enterprises are coupled to larger firms, which transfer their managerial knowledge to the SME's. These, in return, can thus upgrade the quality of products delivered to the mentor firm. Government can fund and support the different phases leading up to such a collaboration. This in fact contributes to an economy-wide dissemination of network structures and thus strengthens the networked paradigm of organization.

A final point of attention is that in the idea of organization, interorganizational forms are to be incorporated as well. Interorganizational relations can exhibit a variety of complex organization designs, which do not have to be limited to contracts and equity stakes. Instead managing a network can require as much effort as managing the firm internally. The Fokker and distribution cases show the importance of knowledge transfer and communication mechanisms to coordinate production processes throughout the value system and to secure smooth implementation of a new organizational form. When the management of interorganizational aspects of an organizational innovation is taken into account explicitly, a substantial contribution can be made to the success of an organizational innovation.

From the Fokker case several options emerge which can smooth the introduction of a new interorganizational form. These options are:

- knowledge transfer: if a firm is not able to implement a new organizational form, it may be possible to alleviate this problem by means of transfer of

knowledge. This knowledge transfer can give that firm the capabilities required to cooperate.

- information sharing: next to transfer of knowledge, information is of interest in implementing an interorganizational innovation. The Fokker-case showed for example that providing sales information to suppliers, allowed these firms to make their own planning. This made it possible to abolish the old linkage of long-term planning and replace it by a more flexible arrangement.
- reallocations of activities: transfer of activities between firms can help in solving problems of the new way of working. Activities may have to be reallocated according to the logic of the new organizational form. Naturally, elimination, creation or integration of activities can be useful as well.

Research agenda

Out of the presented discussion an agenda for further research can be constructed. The main points are assembled in table 9.6.

The first question must be which managerial implications can be distilled from this research. In figure 9.1 management was incorporated as the initiator and implementor of change. Yet, as was said in the beginning of this chapter, before any guidelines can be developed, fundamental research into organizational innovation is required. Based on the research presented above the key managerial questions are:

- is management necessarily the initiator of change or do organizational innovations also come bottom-up?
- can management consciously use routines to develop a new organizational form?
- what ways of organizing have the best fit with demand?
- what are the managerial processes by which transition from one form to another is achieved?
- can the process be managed more effectively or is trial and error inherent in the process?

Table 9.6 A research agenda

1. What can the role of management in organizational innovation be?
2. Can hypothetical organizational arrangements be tested?
3. What are the causes of failure of organizational experiments?
4. How can networks be managed to avoid lock-in?
5. Does large-scale empirical research confirm the relations between the attributes?

Source: see text.

Grandori's question whether the process of organizational innovation can be rationalized, also referred to the need for managerial guidelines. Based on the research presented however, the question can be asked whether it is necessary or even possible to rationalize the process, because the trial and error with which the search for a new organizational form takes place, does not necessarily lead to an

ineffective form. Instead, trial and error can lead to highly competitive organizational innovations. This is also recognized by managers. Unilever's former CEO for instance, described the process by which the transnational structure of Unilever emerged as "not the outcome of a conscious effort" (Maljers, 1992, p. 46). Instead, "our actual progress was not made by the application of theory but through a much messier evolution of trial and error" (Maljers, 1992, p. 51). Similarly, in the case of Fokker, management consciously avoided to come up with a complete organizational blueprint, because it realized that the innovative process was too complicated to foresee all eventualities. Management chose the trial and error approach. Perhaps this approach is very effective in bringing about organizational innovation, but at least the conclusion is warranted that it can be effective. In developing managerial guidelines this result should be taken into account. The guidelines should perhaps be aimed more at speeding up and reducing the errors of the process, than at attempting to design detailed organizational blueprints. The next research question deals with finding ways to reduce the errors.

The second question addresses the issue whether management develops different organization designs and next tests these on their feasibility. Grandori (1993) identified some mechanisms for this. The use of routines can also be an implicit way of judging whether a particular organizational form will be successful or not. Likewise, if a trajectory of organizational innovation exists, the existence of precursors of an organizational innovation, may be sufficient for management to believe that a specific new innovation will work in practice. The previous paragraph showed that trial and error is important in the innovative process as well. Does this mean that management only tests new organizational forms in a very general way? Or are there other situations in which organizational forms are tested extensively? The theory and the cases presented here point in the direction of the first idea, but no in-depth research has been undertaken into this issue and hence these questions are still awaiting answers.

The third question (what are the causes of failure of organizational experiments) can also contribute in answering the second one. Organizational experiments which have failed can provide interesting lessons for management and theorists alike. Are the causes of failure to be found inside or outside the organization? Are organizational errors defined by intra-organizational problems or by their misfit with the business environment? Causes of failure suggested by this research are:

- the new organizational form does not build on precursors, so that too many unforeseen problems and a low legitimacy work against it;
- organizational innovation is seen as incidental, not as part of a continuous process;
- no attention is paid to network externalities;
- the effect of the innovation on demand is ignored.

The fourth question is actually a subquestion of the first one. The growth in the number of interorganizational relations observed by most researchers justifies its separate discussion here. The more networks develop, the more interesting it becomes to look at the disadvantages of networks and at ways to manage these. As especially externalities are of interest as a drawback of networks, research

should look into the question of how firm strategies can aim at preventing or coping with externalities. Based on the Fokker-case some managerial options (transfer of knowledge and information, reallocation of activities) have been mentioned. It may be interesting to see if these can be generalized and found in other cases as well.

Finally, the fifth question points to extension of the research into the variables of path dependence, demand and networks. In some cases, we can move from theory-building to theory-testing. Large-scale empirical testing can be feasible based on the various attributes of the variables. This can extend our insight in the relative importance of the variables and attributes. In other cases, extensions of the emerging theory have been put forth in section 9.2. Interesting work can also be done into the disadvantages of networks and the analysis of organizational trajectories. The latter point requires longitudinal analysis based on the analytical schema depicted in figure 9.1.

In the introduction of this thesis the observation was made that most theorizing about organizational forms is aimed at explaining the legitimacy of existing organizational forms and not at analysing the development of new ones. This gap in research constrains managers in their ability to handle the process of organizational innovation effectively, as our knowledge of this process is at best superficial. Broadly speaking, the contribution of this thesis is threefold:

- it focuses on the *dynamics* of organizational forms and describes organizational innovation as subject to forces inside and outside the firm, whereas existing theories have mainly used comparative static methods;
- it shows the possibility and importance of using *innovation theory* instead of organization theory to describe and analyse new organizational forms. Limiting the concept of innovation to technological innovation neglects the breadth and scope of innovative activity;
- it incorporates both *inter- and intra*-organizational forms, while most research focuses on either one of these. Inter- and intra-organizational forms do not require a different set of tools and analyses, but can be studied by the same set of concepts.

The way in which new forms come into being still requires a considerable amount of fundamental research, before it is understood to such a degree that managerial guidelines can be developed. The research agenda presented above is indicative of the kind of problems to be tackled before we truly understand how firms go about organizing for competitiveness.

Appendix

Qualitative operationalizations in case studies[1]

1.1 *Introduction*

Though the method of the case study receives increasing attention, the problem of operationalizing the often general variables used in qualitative case studies is absent from otherwise good discussions of the case method like Eisenhardt (1989b) and Yin (1989). Yin for instance merely states that operationalizations should be "correct" (Yin, 1989, p. 40). When operationalizations are discussed in more detail, this is usually for quantitative studies only (see for example Van der Zwaan, 1990, p. 46). Operationalizations in that case refer to developing measures which can be expressed in numerical terms. Qualitative operationalizations are never discussed, while these are necessary for the kind of theory-building studies as done in this thesis.

The problem of qualitative operationalizations gets more complicated the more complex the phenomena under study are: complex concepts can seldom be reduced to one operational measure, without loosing much of the content of the concept. Several characteristics (or attributes) of the concept will have to be used. In the increasingly popular pluralist approach of research (Mahoney, 1993; De Man, forthcoming) this problem poses itself with even more vigour. The emphasis on firm specific circumstances (as capabilities, routines etc.) which plays a large role in the pluralist tradition, should not lead to unsystematic analysis. It must be avoided that operationalizations are guided by individual cases. Otherwise the chance of developing narrow and idiosyncratic theories gets too big (Eisenhardt, 1989b). Furthermore, despite the complexity inherent in real life cases, usually the aim remains to test some relationship between dependent and independent variables. This kind of analysis can become complicated or even impossible if qualitative operationalizations are not stable across cases.

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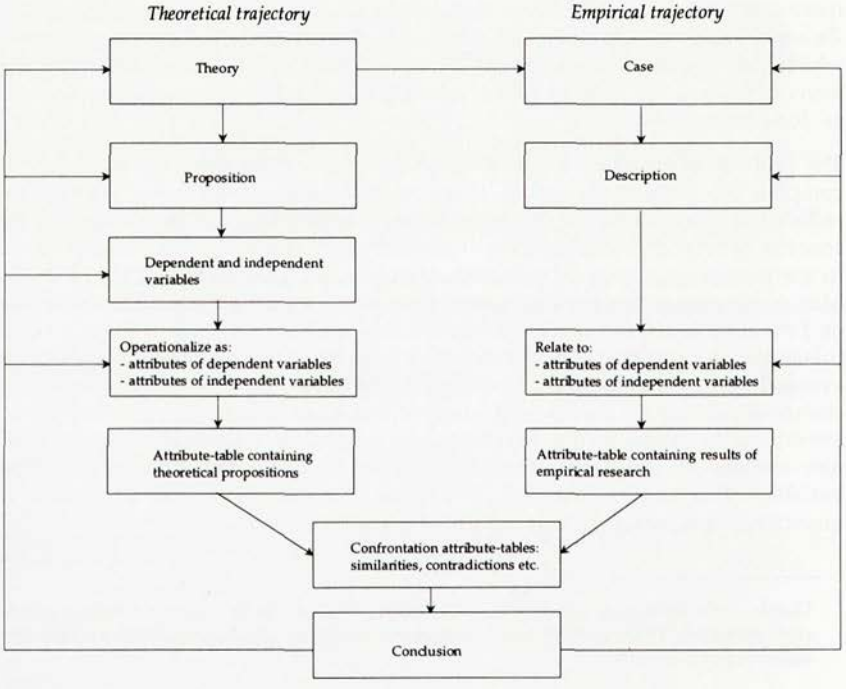
[1] Thanks to Professor van den Bosch for providing some of the first ideas for working with attribute-tables. The way these ideas have been incorporated in this Appendix remains the author's responsibility.

Hence a balance must be struck between on the one hand leaving open enough room for the search for and extension of an emerging theory, and, on the other hand, the need to be clear and specific about what relation between variables is looked for. In theory-building studies some freedom must be allowed with respect to the concepts used, but the search for a theory should simultaneously be constrained by the scientific need for clarity. Put differently: it is necessary to operationalize variables in a way which is specific enough to be able to trace the variables in cases and general enough to prevent idiosyncratic operationalizations. Hence operationalizations useful for cases should not be too theoretical (because than they cannot be related to the real life facts), and not be too practical and idiosyncratic (because than they cannot contribute to developing a more general theory). Especially in the case of theory-building this is relevant, because shifting between theory and empirical material is characteristic of many theory-building approaches and this requires good operationalizations (see for example Glaser and Strauss, 1976).

How then to operationalize variables in such a way that the relations between dependent and independent variables can be made clear while also staying close to the observations made in the case? In the chapters 6, 7 and 8 a technique has been used, based on operationalizing dependent and independent variables by means of *attributes* of these variables. The method is depicted in figure A.1.

Figure A.1 A method of working with operationalizations in qualitative, theory-building case studies



In figure A.1 the formulation of a proposition based on an emergent theory is taken as a starting point. This proposition will relate some broadly defined independent variable (e.g. demand or long-term relations) to a dependent variable (e.g. organizational innovativeness). Based on the literature a broad statement can be made as to the relation between the dependent and independent variable[2]. For example: demand stimulates organizational innovativeness and the presence of long-term relations does not.

When this statement is put next to a case study, some problems will become evident. It will for instance become clear that demand is not an unambiguous variable, which can be easily traced in the case. Therefore operationalizations are needed in order to say something about whether the predicted relationship between the dependent and independent variables holds. This operationalization can be done for cases by picking out some of the key characteristics of the dependent and independent variables. These key characteristics are called the *attributes*.

Normally these attributes will not completely describe the variable they pertain to, but by grounding them in theoretical developments or other cases, the chance that they are important attributes of the variable augments. Moreover, because the same attributes are used in both the theoretical and the empirical part of the research, it becomes easier to draw clear cross-case conclusions than when the variables are defined broadly. In the latter case the interpretation of the variable can shift from case to case, thus reducing the possibility to draw unambiguous conclusions. A list of attributes used in chapters 6, 7 and 8 is given in table A.1.

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2 Note that it is assumed here that some theories are available which can be used for defining propositions. When this is not the case and even the first rudiments of concepts have to be developed, Glaser and Strauss' grounded theory can be a useful method (Glaser and Strauss, 1976). In the later phases of grounded theory research, the method presented here can be useful as well.

Table A.1 Overview of attributes used for operationalizing variables

Organizational innovativeness (see chapter 2):

Form refers to the way in which the value chain is reconfigured. The question is whether the independent variables influence the direction of change. The answer to this question is yes or no: no value judgement can be given. This attribute can be found in Grandori (1993).

Speed refers to the velocity with which the innovation is implemented. An independent variable can e.g. stimulate the innovation (+) or slow down the process (−). This attribute can be found in Wolfe (1994).

Extent refers to the importance and number of the innovations implemented. This attribute can be found in Wolfe (1994) and Downs and Mohr (1976).

Path dependence (see chapter 4):

Dynamic routines are repeated patterns of changes in activities and linkages.

Capabilities are firm specific, non-transferable skills.

Resources are non-firm specific, transferable assets, including things as money and labour.

Long-term relations (see chapter 5):

Externalities refer to the phenomenon that intra-organizational change will have inter-organizational consequences the more companies are intertwined. These consequences can refer to costs (another company has certain costs connected to the change and as a consequence is unwilling to cooperate with the innovation) and to other impediments (the other company is unable to work with the change).

Entrenched routines refer to the difficulty of breaking through standard patterns of behavior. They become manifest when behavior is continued despite attempts to change it.

Dependence comes in various forms: independence, interdependence and dependence. In the case of independence there is no dominance in the relation between parties, so that a firm cannot dictate change to another one. In dependent relationships one party is dominant: the dominant party has more degrees of freedom to change than the dependent party. In interdependent relationships there is no dominance, but firms are mutually dependent. In these relationships the common interest of the parties may facilitate organizational innovation.

Demand (see chapter 5):

QUANTITATIVE

Fundamental changes are lasting changes in the quantity of demand

Cyclical changes are temporary fluctuations in demand

QUALITATIVE

Differentiation is the phenomenon that products and services are increasingly tailored to the wishes of consumers. Main examples are fashion, the demand for speed and product diversity.

Fragmentation refers to the phenomenon that different geographical markets have to be served with a limited number of products.

Source: chapters 2, 4, 5.

When the attributes have been defined they are ordered in an *attribute-table*. In this table the attributes of a dependent variable are arranged vertically, and the attributes of an independent variable are arranged horizontally (of course it is possible that for a variable only one attribute is used). In table A.2 a practical example of an attribute-table can be found (table 4.7 is reproduced). Each relation between the attributes can than be studied. Based on the theory used or

developed, theoretical predictions can be entered in the table with the following symbols:

- yes (Y) or no (N): there is a relation between the variables (Y) or there is none (N);
- minus (-): the independent variable influences the dependent variable negatively;
- plus (+): the independent variable influences the dependent variable positively.

Table A.2 Example of an attribute-table

	Routines	**Capabilities**	**Resources**
Form	Y	Y	Y
Speed			
Extent	+		

Source: table 4.7.

The first function of this attribute-table is that it shows the gaps in the theory as far as used in the research. The boxes in which no entries occur, may require further study. The attribute-table closes the theoretical trajectory of the research.

The empirical trajectory starts with the choice of cases and the design of the case studies. Eisenhardt (1989b) and Yin (1989) provide extensive guidelines for this. Important are the number of cases and the kind of cases.

As to the number of cases Eisenhardt claims that one case usually is insufficient. Dyer and Wilkins (1991) attack this idea: they claim that several wellknown authors have limited themselves to a single case study. Eisenhardt (1991) however points to the fact that these authors have made use of an embedded design (Yin, 1989): within one case they look into several mini-cases. Following this embedded design, in Fokker and the distribution company several mini-cases have been researched in order to corroborate the propositions on long-term relationships (two cases in Fokker next to the overall case of the implementation of AtO) and demand (three cases in the distribution company)[3]. It appeared that in these cases also some things could be said on the other propositions and hence in each case the attribute-tables for the other propositions have been reproduced as well. The overall picture then, is that of an embedded multiple-case design (Yin, 1989, p. 46) for the propositions on long-term relations and demand. The proposition on path dependence builds on the two cases in chapter 6 (Just-in-Time and ABB), as well as on the cases of European distribution and Fokker. As a result each proposition is researched in at least three or four cases.

Pertaining to the kind of cases, Eisenhardt (1989b) proposes to use theoretical sampling. She states that "it makes sense to choose cases such as extreme

[3] Above that in chapter 6 existing empirical material was reviewed on its contribution to the propositions.

situations and polar types in which the process of interest is "transparently observable". Thus, the goal of theoretical sampling is to choose cases which are likely to replicate or extend the emergent theory" (Eisenhardt, 1989b, p. 537; also see Glaser and Strauss, 1976). Translated to the propositions on long-term relations and demand, a choice was made for the cases of Fokker and European distribution. Based on a preliminary discussion with persons in the field as well as a quick literature study, it was expected that in these two firms the process of interest would indeed be transparently observable and hence replication might take place[4]. This is important as "in replication logic, cases which confirm emergent relationships enhance confidence in the validity of the relationships" (Eisenhardt, 1989b, p. 542). Hence the theory drives the choice of cases to be studied. This relation is depicted by the arrow between theory and cases in figure A.1.

In the Fokker and distribution case use was made of multiple data collection methods. This triangulation (Eisenhardt, 1989b, p. 538) meant for Fokker that company documents were studied, interviews were conducted in Fokker with people occupying different positions in the firm, and use was made of newspaper and magazine articles. In the case of the distribution firm in the Rotterdam port, interviews were held inside the company as well as with experts outside the company. Also various research reports issued by consultancies and the archives of the Rotterdam Port Authority contributed information to the case.

In the next phase, the case description is related to the same attributes of the variables as used in the theoretical trajectory. As a list of operationalizations of the attributes has been made in the theoretical trajectory (see table A.1), this should be rather easy to do (see among others section 7.4.4/7.4.5 and 8.3.5/8.3.6). Closing the empirical trajectory, an attribute-table is made in which the attributes of the independent variable are related to the attributes of the dependent variable, based on the case study evidence. This table contains the main findings of the case and is the end of the empirical research trajectory.

The last step in the method used was to compare the attribute-table of the theoretical trajectory, with the attribute-table of the empirical trajectory for each of the propositions studied. Putting these tables next to each other, helps in determining which theoretical relations are corroborated by the data, which are not and which are inconclusive.

From this conclusion there can be various feedback loops to the different stages of the research trajectory. The conclusions drawn can extend and confirm a theory

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[4] For Fokker the 1992 Annual Report announced the possible introduction of a new way of assembling aircraft (see chapter 7). A first discussion with the company made clear that long-term organizational relations had had an impact on this organizational innovation, when it was implemented in 1993 and that at that time the new way of working with suppliers was still crystallizing out. This increased the researcher's interest in Fokker. In the case of the distribution company, research reports showed the role of demand in the emergence of EDC's (see chapter 8 in which some of these reports were quoted) and talks at the Rotterdam Port Authority identified the case company as an innovative and successful company. This triggered the interest for the cases, as possibly suitable research objects.

or they can be final conclusions regarding the question whether a specific proposition is confirmed or not. The researcher can also be guided back to earlier stages of the research. For example, the attribute-tables can show that some variables are not worth studying further, or that the operationalization of variables can be improved by eliminating an attribute. This latter point may be very important as better operationalizations can break the ground for a quantitative operationalization, thus not only facilitating quantitative empirical research but also sharpening the theory.

It goes without saying that not only in the theoretical trajectory mistakes can be made which can explain contradictions between the theoretical and the empirical attribute-tables, but that in the empirical trajectory mistakes can be made as well. For example the case studied may not be chosen wisely, in the description of the case unclarities may be present etc. This stresses the requirements pointed out in the discussion of the empirical trajectory above, that the way of working with empirical material should be correct. The feedback loop in figure A.1 from the conclusion to the various stages of the empirical trajectory depicts the possibility that the research may be guided back to the empirical material as well.

As the procedure outlined above is specifically aimed at theory-building, it will probably not lead too often to clear confirmation or rejection of a complete theory. Rather it will show which are fruitful routes for further research and which are not. This conclusion can be reached by a replication logic, which can either involve literal replication (in which a proposition is confirmed) or theoretical replication (in which contrary results are found, but for predictable reasons (Yin, 1989, p. 53)) of a proposition. In this way the emerging theory is amended based on confirmation or rejection of propositions. Some directions for research are closed and others can be opened up. A useful by-product of this method is that it increases the construct validity as in the course of the research some attributes will prove to be more important than others. Hence, the contribution to the emerging theory is twofold: it points to interesting research directions (it fills gaps in theories) and improves constructs.

The advantages and disadvantages of the method used have been assembled in table A.3. The first advantage is that the method is systematic. Most important in this respect is that when a multiple case or embedded design is used, there is consistency across cases with regard to the attributes used. The attributes defined force the researcher to use a rather specific operationalization of the variables he wants to study and to make this operationalization clear. Consequently, it becomes more difficult for him/her to shift the interpretation of the variable depending on the case. This not only prevents an opportunist way of operationalizing, but also simplifies the search for cross-case patterns which is always a cumbersome task in case studies (Eisenhardt, 1989b, p. 540).

Another major problem identified by Eisenhardt is that it is often difficult for the reader to track in how far the actual data collected relates to the conclusions. "...a huge chasm often separates data from conclusions" (Eisenhardt, 1989b, p. 539). The current method of operationalization narrows this gap between data and conclusions and at least makes it easier for the reader to see which translations the researcher had to make in order to get from his data to the theoretical

variables. Not only does this make the translation of data into variables more tractable, but the way the operationalizations are obtained is tractable as well: for they should be grounded in either existing or emerging theory, or be distilled from existing cases.

A third advantage is that the attribute-tables can help to identify the gaps in literature and theory. On each spot where a question mark appears theory or empirical material have not yet shed light. Of course this remark only pertains to the theories and cases studied in the research at hand. Naturally, the researcher may have missed a theory (or misinterpreted one) or he may have looked over some facts in the empirical material.

Table A.3 Advantages and disadvantages of the operationalization method used

Advantages

- Systematic (simplifies search for cross-case patterns (Eisenhardt, 1989b, p. 540) and cross-case consistency of the attributes)
- Tractable (smaller chasm between data and conclusions, see Eisenhardt, 1989b, p. 539; also operationalizations tractable to literature: either theoretical concepts are used or more practical ones drawn from other case studies)
- Clarifies gaps in literature and empirical research
- Orders material in cases; otherwise the amount of facts can be overwhelming
- Improved constructs
- Easier to replicate the study in other cases by other researchers

Disadvantages

- Restricts number of variables: not usable for studies which are completely inductive, only when the contours of a theory is established and initial propositions can be formulated which extend or develop the emerging theory
- Attributes are connected to attributes, not independent variables to dependent variables

Source: see text.

Fourthly, when one does a case study the amount of diverse data collected in a relatively short period of time can be overwhelming. The attribute-tables provide a surveyable means to order these data, without loosing much of the richness of the case study data.

A fifth advantage is that the method can further develop the constructs used. Based on the findings of the research, the choice and definition of the attributes can be evaluated. The research can show for example that one attribute of a variable might just as well be eliminated in future research or should be defined differently. In this way the validity of constructs can be improved.

The sixth and final advantage is related to replication of the study. The tractability of the method not only allows other researchers to judge the way of working of the researcher who performed the study, but it also makes it easier for them to do a similar study themselves.

A major disadvantage is that the attributes have to be defined rather narrowly. This limits the things the researcher observes. As a result, for completely inductive studies (like Hamel (1991)) it is not possible to use this method. The method will probably work best in emerging theories, where some general relations have been found or can be hypothesized, but further extension of details or core attributes is necessary. In the cases in chapter 7 and 8 this was the case: concepts from different theories could be used to formulate a rather detailed proposition, but the different aspects of that proposition were not yet clear enough to allow other, large scale research methods to be used.

A second disadvantage lies in the fact that not independent variables are related to dependent variables, but attributes of independent variables to attributes of dependent variables. Of course this is true for every operationalization of a variable: it is impossible to include in that operationalization every aspect of the variable. Hence this drawback does not exclusively pertain to this method. Only when a variable is directly observable in practice, this problem is avoided.

Concluding, the method for operationalization of qualitative variables in qualitative case studies has some distinct advantages and disadvantages. The method seems to be applicable in those situations where theory has developed beyond the phase of induction, but is not yet so far developed that deductive testing by means of statistical techniques is possible. The method is aimed at theory building and extension. Further research into this method may suggest some refinements. These can for example deal with ways to use this method with some alterations in inductive research. Another interesting question is how the quality of qualitative operationalizations can be raised even further. This is a question that so far has been insufficiently addressed and at which this method only provides a first tentative answer. The importance of this is clear: if we want to learn from cases we must move beyond story telling in order to generate better constructs and theories (Dyer and Wilkins, 1991).

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Samenvatting: Concurreren door organiseren

Onderzoek naar organisatievormen is vooral gericht op het analyseren en verklaren van de efficiency of effectiviteit van *bestaande* vormen. De vraag hoe *nieuwe* organisatievormen tot stand komen is in de literatuur nog nauwelijks onderzocht. Het gaat bij het laatste bijvoorbeeld om de vraag of nieuwe organisatievormen bewust worden ontwikkeld en in één keer geïmplementeerd of dat zij in de loop van de tijd onder invloed van bepaalde determinanten uitkristalliseren. Dit onderzoek richt zich op de vraag hoe nieuwe organisatievormen zich ontwikkelen en welke determinanten op deze ontwikkeling van invloed zijn. Naast deze nadruk op de dynamiek van het ontstaan van organisatievormen, zal daarbij niet alleen aandacht worden besteed aan intra-organisatorische vernieuwingen maar ook aan interorganisatorische (nieuwe wijzen van organiseren van de relatie tussen bedrijven). Een derde kernpunt betreft de gebruikte theorie: om het ontstaan van organisatievormen te verklaren, wordt innovatietheorie gebruikt in plaats van organisatietheorie.

Inzicht in dit ontwikkelingsproces kan bijdragen aan de formulering van strategieën ten aanzien van de meest geëigende wijze waarop succesvolle nieuwe organisatievormen tot stand kunnen worden gebracht. Gedetailleerde prescripties voor management kunnen gezien de beperkte hoeveelheid onderzoek die naar het ontstaansproces van organisatievormen is gedaan, echter nog niet worden gegeven. Derhalve is het onderhavige onderzoek vooral theorievormend: het beoogt voornamelijk een bijdrage te leveren aan de kennis over het ontstaan van nieuwe organisatievormen, eerder dan te komen tot voorschriften die tot direct nut kunnen zijn voor managers.

Uitgangspunten voor een theorie van organisatorische innovatie

Uitgangspunt is dat een theorie over het ontstaan van nieuwe organisatievormen aan vier voorwaarden dient te voldoen:

- de theorie moet *historisch contingent* zijn. Dat wil zeggen dat verklaard moet worden hoe ontwikkelingen in de loop van de tijd hebben bijgedragen aan de

wijze waarop de organisatievorm tot stand is gekomen. De in de loop van de geschiedenis van een onderneming ontwikkelde vaardigheden en gewoontes, kunnen bijvoorbeeld een organisatorische vernieuwing vergemakkelijken of tegenwerken. De karakteristieken die een onderneming in de loop van de tijd verworven heeft, bepalen derhalve mede de wijze waarop een nieuwe organisatievorm in die onderneming tot stand komt.

- de theorie moet *context afhankelijk* zijn. De aanleiding voor een organisatorische innovatie hoeft niet alleen voort te komen uit interne organisatorische ontwikkelingen, maar kan ook liggen in de bedrijfsomgeving. Druk uit de omgeving van een bedrijf kan een vernieuwing afdwingen, maar ook de implementatie ervan belemmeren.
- de theorie moet er vanuit gaan dat nieuwe organisatievormen worden geïmplementeerd om een *concurrentievoordeel* te bereiken. Een dergelijk strategisch perspectief erkent dat de door de organisatie nagestreefde doelen veelvormig kunnen zijn. Concurrentievoordelen kunnen bijvoorbeeld liggen in verlaging van kosten, vergroten van de produktdifferentiatie en een snellere reactie op vraagveranderingen.
- de theorie moet de *pluriformiteit van organisatievormen* kunnen verklaren. Zowel organisatievormen binnen een bedrijf (intra-organisatorisch) als nieuwe organisatievormen tussen bedrijven (interorganisatorisch, bijvoorbeeld in netwerken en allianties) behoren in de theorie te zijn opgenomen. Het toenemende gebruik van interorganisatorische dwarsverbanden vereist dat een theorie van organisatorische innovatie deze kan beschrijven en verklaren.

Het blijkt mogelijk te zijn aan deze vier vereisten te voldoen door het vraagstuk van nieuwe organisatievormen niet te definiëren als een organisatietheoretisch probleem, maar als een probleem van innovatie: er wordt hieronder dan ook gesproken van organisatorische innovatie. Een combinatie van strategie- en innovatietheorieën blijkt licht te kunnen werpen op de wijze waarop organisatievormen zich ontwikkelen.

Organisatorische innovatie en concurrentievoordeel

Het belang van dit onderwerp (en het belang van het strategisch perspectief) wordt duidelijk wanneer de bijdrage van organisatorische innovaties aan concurrentievoordeel nader wordt bekeken. Die bijdrage is namelijk aanzienlijk. Met behulp van nieuwe organisatievormen kan een breed scala aan onderscheidende concurrentievoordelen worden bereikt: lagere kosten, snellere levering, betere produktdifferentiatie etc. Bovendien geeft een theoretische analyse van de duurzaamheid van deze voordelen aan dat organisatorische innovaties moeilijk te imiteren zijn. Bestaand empirisch onderzoek heeft dit bevestigd: de verspreiding van nieuwe organisatievormen naar concurrenten verloopt traag.

Organisatorische innovaties dragen niet alleen bij aan concurrentiekracht op het bedrijfsniveau, maar hebben tevens effect op nationale concurrentiekracht. In de literatuur is een begin gemaakt met zowel de theoretische als empirische analyse van de samenhang tussen organisatievormen en nationaal concurrentievoordeel. Hoewel literatuur hierover nog niet talrijk is, geven de huidige resultaten aan dat

de rol van organisatorische innovaties op het nationale vlak niet te verwaarlozen is. Zo lijkt de diffusie van organisatievormen langzamer te verlopen tussen landen dan binnen landen. Dit betekent dat bedrijven in een bepaald land een concurrentievoordeel op kunnen bouwen ten opzichte van bedrijven in het buitenland, omdat de implementatie van een innovatie bij de laatsten later plaats vindt.

Definitie

Na het belang van organisatorische innovaties aldus te hebben vastgesteld, doet de vraag zich voor wat precies organisatorische innovaties zijn en hoe deze kunnen worden beschreven. De afwezigheid van een bruikbaar concept dat het begrip organisatorische innovatie hanteerbaar maakt, wordt in de literatuur genoemd als één van de belangrijkste beperkingen voor onderzoek naar nieuwe organisatievormen. Het blijkt in hoofdstuk 2 dat een waardeketenperspectief (value chain) bruikbaar is voor het definiëren en analyseren van het begrip organisatorische innovatie. Met behulp van de bouwblokken van de waardeketen, te weten activiteiten en de verbindingen tussen de activiteiten, blijkt het tevens mogelijk te zijn organisatorische innovaties op een zodanige wijze te beschrijven, dat recht wordt gedaan aan de pluriformiteit van organisatievormen. Een organisatorische innovatie wordt gedefinieerd als een nieuwe combinatie van activiteiten en/of verbindingen in het waardesysteem, die bijdraagt aan een duurzaam concurrentievoordeel voor de betrokken onderneming(en). Enkele elementen van deze definitie vragen om verduidelijking:

- de term "verbindingen" wordt in deze definitie vrij breed gedefinieerd. Het gaat niet alleen om kostenrelaties, zoals in Porter's definitie van de waardeketen. Hier worden onder dit begrip ook andere coördinatiemechanismen opgenomen, zoals autoriteit, sociale normen, standaardisering en informatie-technologie.
- de nadruk op het "waardesysteem" (value system) is opgenomen om recht te doen aan de pluriformiteit van organisatievormen. Door de rol van het waardesysteem te benadrukken, maken ook interorganisatorische relaties deel uit van het begrip organisatorische innovatie.
- het duurzaam concurrentievoordeel is een demarcatiecriterium dat verband houdt met het woord innovatie. Innovaties zijn succesvolle vernieuwingen, die het concurrentievoordeel van het bedrijf dat de innovatie implementeert, vergroten. Kleinere innovaties zonder impact op concurrentievoordeel vallen hier dus niet onder het begrip organisatorische innovatie, evenmin als de opvatting waarin alles wat nieuw is voor een bepaalde organisatie als een innovatie wordt aangemerkt.

Tot zover zijn twee van de vier vereisten voor een theorie van organisatorische innovatie besproken: de rol van concurrentievoordeel en de pluriformiteit van organisatievormen zijn opgenomen in de definitie van het begrip organisatorische innovatie. Er resteren derhalve twee van de hierboven besproken vereisten, namelijk historische contingentie en context afhankelijkheid. Beide worden ingevuld met behulp van concepten uit de strategie- en innovatietheorie, waarbij wordt gekeken naar de vraag of concepten uit de technologische innovatietheorie ook toepasbaar zijn op organisatorische innovaties.

Historische contingentie

Historische contingentie kan worden teruggevonden met behulp van het concept padafhankelijkheid (path dependence), dat voornamelijk in de technologische innovatietheorie is ontwikkeld en hier wordt toegepast op organisatorische innovatie. In het kort betekent padafhankelijkheid dat nieuwe organisatievormen zich ontwikkelen uit voorgaande vormen en uit situatiespecifieke omstandigheden. Zoals reeds vermeld, is met name deze dynamiek in de ontwikkeling van organisatievormen in de literatuur onderbelicht. Drie begrippen spelen een rol bij de toepassing van het concept padafhankelijkheid op organisatorische innovatie:

- dynamische routines. Organisatievormen ontwikkelen zich volgens een proces waarbij in de loop van de tijd soortgelijke veranderingen in de waardeketen worden aangebracht. Dit proces laat zich beschrijven in termen van routines: een routine-matige wijze van werken (statische routine) wordt doorbroken doordat de waardeketen wordt veranderd. Deze veranderingen in de waardeketen zijn echter zelf vaak gelijksoortig (dynamische routine): dat wil zeggen de ene verandering lijkt op de andere. Een voorbeeld verheldert dit: bij de ontwikkeling van het JIT-systeem in Toyota werd telkens een bestaande werkwijze (statische routine) doorbroken door middel van het elimineren van voorraad op verschillende plaatsen in het produktieproces. Eerst gebeurde dit op één plaats in het bedrijf, maar in de loop van de tijd werden door herhaalde toepassing van de dynamische routine van voorraadeliminatie in het hele bedrijf de tussen- en eindvoorraden uitgebannen. Vervolgens gebeurde hetzelfde in de relatie met de toeleveranciers.
- resources. Naast padafhankelijkheid op het vlak van organisatorische routines, kunnen ook de in het bedrijf aanwezige verhandelbare en niet-bedrijfsspecifieke hulpbronnen (resources) de organisatorische innovatie bepalen. De huidige door het bedrijf vergaarde resources kunnen immers bepaalde wijzen van innoveren in de organisatiestructuur aantrekkelijker maken, of eenvoudiger. Voor een tekort aan bepaalde resources geldt natuurlijk ook dat dit de richting van de organisatorische innovatie kan beïnvloeden.
- capabilities. Capabilities zijn de niet-verhandelbare en bedrijfsspecifieke vaardigheden die een onderneming bezit. Voor de invloed van capabilities op het proces van organisatorische innovatie geldt hetzelfde als wat is opgemerkt met betrekking tot resources.

Context afhankelijkheid: de rol van netwerken en vraag

De context afhankelijkheid van een organisatorische innovatie kan worden bestudeerd door gebruikmaking van raamwerken voor omgevingsanalyse. Een voorbeeld hiervan is het diamant-raamwerk van Porter. Uit deze diamant worden twee determinanten gelicht wederom omdat die bekend zijn uit de innovatietheorie, te weten de rol die netwerken en vraag spelen bij het ontstaan van innovaties.

In het geval van technologische innovatie worden netwerken veelal positief besproken: er wordt van uit gegaan dat zij bijdragen aan de snelle ontwikkeling en verspreiding van nieuwe technologieën. In dit proefschrift wordt echter op basis van bestaande theorieën de propositie geformuleerd dat netwerken en in het

bijzonder de langdurige relaties daarin, organisatorische innovatie belemmeren. De redenen hiervoor zijn:

- het bestaan van externe effecten: een verandering in een bedrijf dat ingebed is in een netwerk, heeft ook een effect op de andere bedrijven in dat netwerk. Naarmate ondernemingen meer met elkaar verweven zijn, zal het sneller voorkomen dat een organisatorische innovatie een dergelijk effect heeft. De andere bedrijven in het netwerk moeten zowel in staat zijn om mee te veranderen als de wil daartoe hebben. Indien aan één van deze voorwaarden niet is voldaan, wordt de implementatie van de organisatorische innovatie belemmerd. De wil tot medewerking kan onder andere beperkt worden door het feit dat bepaalde kosten moeten worden gemaakt; het vermogen om mee te werken kan beperkt worden door het ontbreken van kennis en vaardigheden.
- ingesleten routines: in langdurige relaties kunnen gewoontes en standaardgedragspatronen ontstaan die eerst moeten worden doorbroken voordat een nieuwe organisatievorm kan worden geïmplementeerd. Het doorbreken van die ingesleten routines in een relatie kan tijdrovend zijn, of zelfs onmogelijk.
- onafhankelijkheid: bij bedrijven die van elkaar onafhankelijk zijn of in een gelijkwaardige positie verkeren kan de dwang afwezig zijn een organisatorische innovatie van de partner te volgen. Een bedrijf dat van een innovator afhankelijk is zal daarentegen eerder geneigd zijn zich in te spannen om de innovatie tot een succes te maken.

De tweede bestudeerde omgevingsfactor is de rol van de vraag. Bij het tot stand komen van technologische innovaties speelt deze vaak een belangrijke rol. Hieronder zal blijken dat dit ook voor organisatorische innovaties geldt. Ontwikkelingen in de vraag vallen uit één in kwantitatieve en kwalitatieve veranderingen. Kwantitatieve veranderingen kunnen cyclisch zijn of blijvend; belangrijke, in de literatuur besproken kwalitatieve veranderingen zijn differentiatie (toename van het aantal produktvariëteiten) en fragmentatie (verspreiding van de vraag over kleinere en geografisch verspreide eenheden) van de vraag. Een analyse van vraagontwikkelingen maakt duidelijk dat naarmate schommelingen in de vraag vaker voorkomen, bedrijven in toenemende mate organisatie-achtige verbindingen vervangen door marktachtige verbindingen. Praktisch gezien betekent dit bijvoorbeeld dat er meer activiteiten van de waardeketen worden uitbesteed en dat bedrijven intern zich ook op zodanige wijze organiseren, dat zij sneller in staat zijn op marktontwikkelingen te reageren. De toename van marktachtige verbindingen is tevens een aanduiding van de opkomst van zogenaamde netwerkvormen, zowel in organisaties als tussen hen.

Tot zover zijn dus drie uit de innovatie-literatuur bekende variabelen gedefinieerd die van invloed zijn op het proces van organisatorische innovatie: padafhankelijkheid, netwerken en vraag. De proposities dat deze variabelen van belang zijn, zijn geconfronteerd met de empirie met behulp van gevalstudies. Daarbij is het begrip organisatorische innovatie geoperationaliseerd aan de hand van de vorm van de innovatie (de wijze waarop de variabelen invloed hebben op de configuratie van de waardeketen), de snelheid waarmee de innovatie wordt geïmplementeerd (bevorderen de onafhankelijke variabelen een voorspoedige implementatie of juist niet) en het belang van de innovatie (bevorderen de onafhankelijke variabelen de

totstandkoming van belangrijkere en verscheidene innovaties of staan zij slechts een gering aantal kleinere veranderingen toe).

Om deze proposities nader te onderzoeken is gebruik gemaakt van al bestaand empirisch materiaal aangevuld met twee nieuwe gevalstudies: de ontwikkeling van een nieuw organisatiemechanisme in Fokker en de ontwikkeling van Europese Distributiecentra. Beide cases tonen belangrijke interorganisatorische innovaties, naast enkele intra-organisatorische aspecten. Het blijkt dus nuttig te zijn om ook de eerste soort innovaties in de definitie van organisatorische innovatie te betrekken.

Case 1: Fokker Aircraft

De Fokker case laat zien hoe een organisatorische innovatie in een onder druk staande onderneming een bijdrage levert aan het verminderen van een aantal financiële en logistieke problemen. In 1993 voerde Fokker het Assembly-to-Order (AtO) systeem in op de eindlijn van de Fokker 100. Dit systeem vertoont gelijkenis met de van uit de auto-industrie bekende Just-in-Time systemen. Voor de vliegtuigbouw moet dit systeem echter zo ver worden aangepast, met name op het interorganisatorische vlak (in de relatie met de toeleveranciers), dat hier toch sprake is van een originele innovatie. Bovendien was Fokker de eerste vliegtuigfabrikant die een dergelijk systeem implementeerde. De in hoofdstuk 7 van dit proefschrift gepresenteerde analyse van het systeem laat zien dat hier inderdaad sprake is van een majeure vernieuwing in de organisatie van het produktieproces en de relatie met toeleveranciers. Het AtO-systeem moest twee doelen in zich verenigen, bijdragend tot vergroting van het concurrentievoordeel van Fokker. Het moest enerzijds leiden tot kostenverlaging door daling van het onderhanden werk en de voorraad white tails (afgebouwde, maar niet verkochte of geleaste toestellen) en anderzijds tot een kortere levertijd en minstens handhaving van de specificatieflexibiliteit (het vermogen om aan klantenwensen tegemoet te komen).

Het eerste punt is bij Fokker gerealiseerd door de assemblage van toestellen na een bepaald punt te staken, wanneer verkoop of leasing van het toestel niet verzekerd is. Dit leidt echter wel tot de opbouw van voorraden bij de toeleveranciers. Om dit te verhelpen en om een zodanige produktieplanning te kunnen maken dat een kortere levertijd mogelijk is, is een nieuw afstemmingsmechanisme met de toeleveranciers ontwikkeld. Dit is de Strategic Suppliers Meeting (SSM), waarin aan de belangrijkste toeleveranciers de verwachte verkopen voor een bepaald kwartaal worden meegedeeld en verdere afstemming plaats vindt ten aanzien van de produktie in de komende kwartalen. Dit stelt de toeleveranciers in staat een zelfstandige produktieplanning te maken, waar zij voorheen werkten op basis van een voornamelijk door Fokker opgestelde lange-termijnplanning. In termen van de waardeketen laat de SSM zich beschrijven als een nieuwe verbinding in het waardesysteem, tussen de activiteiten van Fokker en die van zijn toeleveranciers. De geschiedenis van het AtO-systeem illustreert een aantal punten uit de proposities:

- ten eerste is er sprake van padafhankelijkheid. In de periode voordat er van het AtO-systeem sprake was, werkte Fokker al aan doorlooptijdverkorting. Door een groot aantal organisatorische en technologische vernieuwingen in het

assemblageproces, zoals het parallelliseren van activiteiten en het later inbouwen van dure delen in een toestel, konden kortere levertijden en lagere kosten op het onderhanden werk worden gerealiseerd. Doorlooptijdverkorting was niet alleen een voorwaarde voor het AtO-systeem (het maakte het bijvoorbeeld mogelijk om kortere produktietijden te realiseren), maar AtO was ook een meer radicale toepassing van doorlooptijdverkorting (bijvoorbeeld: in plaats van het later inbouwen van dure delen, werden ze helemaal niet ingebouwd). De bestaande routines van doorlooptijdverkorting bepaalden dus mede de vorm van het AtO-systeem.

Interessant in dit verband is ook dat de doorlooptijdverkorting in eerste instantie onder meer was ingegeven door een verwacht hoog produktieniveau, terwijl zij in het AtO-systeem wordt gebruikt bij een laag produktieniveau. Dit was een onverwacht effect. Fokker vermeed ook opzettelijk een blauwdruk van het nieuwe systeem te maken. De verwachting was dat het beter was het systeem in de praktijk te laten uitkristalliseren. Deze twee punten laten zien dat organisatorische innovatie een zoekproces is, waarbij via een proces van "trial and error" met soms onverwachte effecten een effectieve organisatievorm tot stand komt. Ook in de relatie met de toeleveranciers deden dit soort effecten zich voor.

- ten tweede werd de implementatie van het systeem bemoeilijkt door de aanwezigheid van toeleveranciers. Een gedetailleerde analyse van de relatie met een tweetal toeleveranciers maakt dit duidelijk. Bij één van deze ontbrak de wil om mee te werken, vanwege de kosten die met een verandering gepaard gaan, de onafhankelijkheid van deze toeleverancier en ingesleten routines. De andere toeleverancier had weliswaar de wil om mee te werken, maar was intern niet in staat goed in het AtO-systeem te participeren, voornamelijk vanwege de beperkte flexibiliteit van het eigen produktieproces. Door verdere organisatorische innovaties, te weten het overdragen van activiteiten tussen de bedrijven, is aan deze problemen gedeeltelijk tegemoet gekomen. Een extra beperkende factor voor het invoeren van organisatorische innovaties in langdurige relaties, bleek het verschil in industrietak te zijn waarin bedrijven werken. De gewoonten in de civiele luchtvaartindustrie wijken bijvoorbeeld aanzienlijk af van die in de militaire vliegtuigbouw.
- ten derde spelen vraagontwikkelingen een rol. In het bijzonder de cycliciteit van de vliegtuigbouw heeft bijgedragen aan een snellere invoering van het AtO-systeem. De vorm van het systeem is hier ook door beïnvloed: de produktieplanning in de SSM is zodanig georganiseerd dat specifiek wordt ingespeeld op schommelingen in de vraag. Kwalitatieve vraagontwikkelingen speelden ook een rol, in het bijzonder de vraag naar kortere levertijden.

De organisatorische innovatie bij Fokker heeft een aantal aanwijsbare bijdragen geleverd aan de oplossing van enkele van de problemen waarmee het bedrijf kampt. Zoals de case laat zien zijn er twee hoofdredenen waarom het systeem nu en niet eerder werd ingevoerd. De belangrijkste reden is de diepte van de crisis, waardoor het systeem is afgedwongen (ook al had het in principe deels eerder kunnen worden ingevoerd). De tweede reden is dat de doorlooptijdverkorting eerst vergevorderd moest zijn alvorens AtO mogelijk was. Er geldt echter ook dat Fokker in het verleden een hogere prioriteit aan technologische vernieuwing heeft

toegekend dan aan organisatorische vernieuwing. De conclusie lijkt dan ook gerechtvaardigd dat verdere organisatorische vernieuwingen kunnen bijdragen aan betere prestaties van Fokker. Dit geldt niet alleen binnen de organisatie, maar ook op het interorganisatorische vlak.

Case 2: Een Europees distributiecentrum in Rotterdam

De tweede case analyseert de ontwikkeling van Europese Distributiecentra (EDC's) in de Rotterdamse haven. In EDC's komt een aantal activiteiten samen. Allereerst wordt er de distributie van produkten door heel Europa georganiseerd. Daarnaast vinden er echter ook secundaire produktie-activiteiten plaats (zoals assemblage, verpakken en klantspecifiek maken van produkten) en in toenemende mate wordt ook de informatiestroom rondom de goederendistributie behandeld. Hierbij worden bijvoorbeeld voorraadbeheer, facturering en douane-formaliteiten in een EDC uitgevoerd. Er is dus sprake van een reallocatie van activiteiten van producenten naar een distributiecentrum. De belangrijkste concurrentievoordelen die hiermee gepaard gaan zijn verlaging van de kosten van het distributieproces en vergroting van de snelheid van levering.

Een analyse van een EDC dat zich in toenemende mate op de verwerking van informatie heeft geconcentreerd, levert de volgende conclusies op ten aanzien van de hypothesen over padafhankelijkheid en vraag:

- een historisch overzicht van de ontwikkeling van het bedrijf toont het belang aan van routines en capabilities in de ontwikkeling van het EDC. Deze ontwikkeling laat zich beschrijven in termen van de herhaalde toepassing van enkele dynamische routines; de belangrijkste daarbij is de gefaseerde overname van activiteiten van de producent door het EDC. In elke fase die de onderneming doormaakte, werden de voorwaarden gecreëerd om in de volgende periode te kunnen concurreren. Dit laatste was echter niet een van te voren gepland proces, maar bleek voornamelijk een consequentie van het volgen van de vraag van klanten.
- ontwikkelingen aan de vraagkant, in het bijzonder de differentiatie en fragmentatie van markten, hebben de belangrijkste impact gehad op de ontwikkeling van het systeem. Het dichterbij de consument brengen van de secundaire produktie-activiteiten is een voorbeeld van de wijze waarop door middel van organisatorische innovatie wordt getracht sneller op veranderingen in de vraag te reageren. Wijzigingen in produkten kunnen dan immers dichtbij de consument worden aangebracht, zodat de consument niet lang op zijn bestelling hoeft te wachten.

De ontwikkeling naar EDC's is een snel doorzettende trend met een belangrijke impact op de concurrentiekracht van ondernemingen en de Rotterdamse haven. Interessant in deze case is dat EDC's niet alleen ontstaan bij de gratie van informatie-technologie, maar dat zij ook zeer belangrijke organisatorische wijzigingen in zich bergen, waardoor de gehele distributieketen fundamenteel verandert. Net als in de vorige case zijn dus de interorganisatorische aspecten van belang.

Conclusies

De cases tonen aan dat een historisch perspectief nodig is om organisatorische innovaties te kunnen verklaren. Het blijkt dat de wijze waarop een organisatievorm tot stand komt in belangrijke mate wordt bepaald door de er aan voorafgaande organisatievorm, door bedrijfsspecifieke omstandigheden en door een aantal omgevingsinvloeden, waarvan de vraag één van de belangrijkste is. Een verklaring voor het ontstaan van nieuwe organisatievormen vereist dan ook altijd een contextuele en historische analyse. Daarbij valt op dat er naast verandering van organisatievormen ook in belangrijke mate sprake is van continuïteit: zoals gezegd bouwen organisatievormen op elkaar voort.

Het uitsluitend benadrukken van de efficiency of effectiviteit van een nieuwe organisatievorm verklaart niet het ontstaan ervan. Deze dissertatie toont aan dat het proces van organisatorische innovatie er eerder een is van zoeken naar een oplossing dan van een geplande activiteit. Ten einde organisatorische innovatie te verklaren dient eerder dan de efficiency van organisatievormen, de zoektocht naar concurrentievoordeel centraal te staan.

De implicatie hiervan is dat innovaties door de met hen samenhangende onzekerheden en onverwachte voor- en nadelen stapsgewijs tot stand komen en dat de implementatie van grootschalige, innovatieve organisatie-ontwerpen waarschijnlijk een beperkte slaagkans heeft. Succesvolle innovaties bouwen juist voort op hun voorgangers, waardoor de afbreukrisico's worden beperkt. Naarmate de karakteristieken van een organisatorische innovatie beter bekend worden (bijvoorbeeld doordat meer ondernemingen de innovatie hebben geïmplementeerd), worden grootschaliger veranderingen in de richting van de innovatie eenvoudiger, omdat de onzekerheid omtrent hun effect dan afneemt.

Samenvattend zijn de belangrijkste bijdragen van dit onderzoek:

- de focus ligt op de *dynamiek* van organisatievormen. Organisatorische innovatie wordt beschreven als een proces, waarop zowel krachten in als buiten organisaties van invloed zijn. De meeste bestaande theorieën maken daarentegen gebruik gemaakt van comparatief statische methoden.
- het onderzoek toont de mogelijkheid en het nut van het gebruik van *innovatietheorie* in plaats van organisatietheorie, bij het beschrijven en analyseren van nieuwe organisatievormen. Hieraan gerelateerd geldt dat het beperken van het concept innovatie tot technologische innovatie geen recht doet aan de veelvormigheid van innovatieve activiteiten. Het is in overeenstemming met de opvatting over innovatie van Schumpeter om ook de andere vormen van innovatie meer aan bod te laten komen in onderzoek en praktijk.
- *inter- en intra*-organisatorische innovaties zijn in het onderzoek meegenomen, waar de meeste onderzoeken zich op één van deze concentreren. Het blijkt dat inter- en intra-organisatorische innovaties met dezelfde analyse-methoden en theorieën kunnen worden geanalyseerd en geen verschillende concepten vereisen.

Curriculum Vitae

Ard-Pieter de Man (Dirksland, 26 November 1967) studied business administration from 1986 till 1990 at the Erasmus University Rotterdam, specialising in financial-economic management. From 1991 onwards he held a position as a research associate in the Department of Strategic Management and Business Environment, Rotterdam School of Management, at the same university. Next to his main research interest in organizational innovation, of which this thesis is the result, he also has published on questions of regional and national competitiveness, especially focusing on the role of clustering in shaping national competitive advantage.

Stellingen

behorende bij het proefschrift

ORGANIZING FOR COMPETITIVENESS

Ard-Pieter de Man

Erasmus Universiteit Rotterdam

25 januari 1996

I

In het begrip organisatorische innovatie dienen niet alleen intra-organisatorische innovaties te worden opgenomen, maar ook interorganisatorische.

II

Innovatietheorie is meer dan organisatietheorie een nuttig instrument voor de beschrijving en analyse van het ontstaan van nieuwe organisatievormen, omdat de organisatietheorie zich voornamelijk heeft bezig gehouden met de analyse van de effectiviteit van bestaande organisatievormen in plaats van met het ontstaansproces van nieuwe. Juist dit laatste proces kan met innovatietheorie worden bestudeerd.

III

Het feit dat nieuwe organisatievormen niet ontstaan uit een lineair en gepland proces, maar uit een deels ongeordend zoekproces, betekent niet dat de resulterende organisatievormen ineffectief zijn. Eerder het tegendeel is waar.

IV

Het succes van McDonald's en Ikea wordt in de EZ-nota *Kennis in Beweging* (Ministerie van Economische Zaken, 1995) ten onrechte geheel toegeschreven aan een "breder concept" en "goede marketing". In feite is de innovatieve wijze waarop deze bedrijven zijn georganiseerd de basis van het succes, dat daarom ook duurzamer is dan het geval zou zijn geweest indien uitsluitend goede marketing de sterke concurrentiepositie had veroorzaakt.

V

Anders dan het Nederlandse overheidsbeleid doet vermoeden, ligt concurrentiekracht niet uitsluitend in technologie besloten.

VI

Gezien de onmogelijkheid de toekomst te berekenen, behoort de besluitvorming over grote infrastructurele projecten niet in de eerste plaats een kwestie van calculatie op basis van cijfers van het CPB of Nijfer te zijn, maar één van visie.

VII

Gelet op de weerstand die diverse ideeën van Machiavelli al in zijn eigen tijd opriepen, lijkt Machiavelli's beschrijving van de innovator (De Heerser, VI) vooral ingegeven te zijn door zijn persoonlijke ervaringen.

VIII

De grote aandacht die in de literatuur nog altijd wordt gegeven aan Adam Smith' analyse van de speldenproduktie, staat in schril contrast tot het economische belang van deze activiteit (zie: Adam Smith, The Wealth of Nations, 1776).

IX

De universiteitsromans van auteurs als David Lodge en Kingsley Amis dienen niet zozeer gelezen te worden als gewild komische fictie, als wel als fel-realistische weergaven van de moderne wetenschapspraktijk.

X

Met het verscheiden van W.F. Hermans op 27 april 1995 vervalt de belangrijkste reden om te promoveren: namelijk doctor te worden om te voorkomen door hem te worden aangemerkt als "iemand die zijn studie niet heeft afgemaakt".